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—: એ કે ડે મિક કાઉન્સિલ :—

—: કાર્યસૂચિ -૨ :—

તા.૦૫-૦૨-૨૦૨૨

વાર :શનિવાર

સમય : બપોરે ૧:૦૦ કલાકે

૫. "સ્નાતક કક્ષાના વિવિધ અભ્યાસક્રમોના પ્રથમ વર્ષમાં પ્રવેશનું નિયમન કરવા અંગેની સૂચિત નીતિ, નિયમો અને પ્રક્રિયા " ના સૂચિત ડ્રાફ્ટ અંગે વિચારણા કરવા બાબત.

(બિડાણ: ૨)

(એકેડેમિક વિભાગ)

૬. સિન્ડિકેટ તા.૨/૧૧/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંક:૧૧૯ અન્વયે શૈક્ષણિક વર્ષ ૨૦૨૨-૨૩ થી યુનિવર્સિટી કેમ્પસમાં એમ.એ.- હિન્દુ સ્ટડીઝ અભ્યાસક્રમ શરૂ કરવા ઠરાવેલ હોય Hindu Studies (હિન્દુ સ્ટડીઝ) વિષયને Statute-106 અને બોર્ડ ઓફ સ્ટડીઝ માટે Statute-120 માં આમેજ કરવા અંગે વિચારણા કરવા બાબત.

(સેનેટ/સિન્ડિકેટ વિભાગ)

૭. M.Sc. Chemistry અને M.Sc. Pharmaceutical Chemistry ના Programme Outcome, Programme Specific Outcome અને Course Outcome બાબતે કેમેસ્ટ્રી વિષયની અભ્યાસ સમિતિની તા.૨૪/૦૧/૨૦૨૨ની સભાનાં ઠરાવ ક્રમાંક:૫ અન્વયે મંજૂર કરી વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરેલ છે, જે વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિજ્ઞાન વિદ્યાશાખાનાં ડીનશ્રીએ વિદ્યાશાખાવતી મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે, જે અંગે વિચારણા કરવા બાબત.

કેમેસ્ટ્રી વિષયની અભ્યાસ સમિતિની તા.૨૪/૦૧/૨૦૨૨ની સભાનાં ઠરાવ ક્રમાંક:૫

- :: આથી ઠરાવવામાં આવે છે કે, Post Graduate Programme M.Sc. Chemistry અને M.Sc. Pharmaceutical Chemistry ના Programme Outcome, Programme Specific Outcome અને Course Outcome મંજૂર કરી વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

(બિડાણ:૩)

(સેનેટ/સિન્ડિકેટ વિભાગ)

૮. B.Arch. M.Arch. ((Landscape Architecture), Master of Urban & Regional Planning નાં PO, PSO and CO આર્કિટેક્ચર વિષયની અભ્યાસ સમિતિનાં ચેરમેનશ્રીએ બોર્ડવતી અને આર્કિટેક્ચર એન્ડ ડિઝાઇન વિદ્યાશાખાનાં ડીનશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિદ્યાશાખાવતી મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે, જે અંગે વિચારણા કરવા બાબત.

(બિડાણ:૪)

(સેનેટ/સિન્ડિકેટ વિભાગ)

૯. યુનિવર્સિટીમાં નીચે મુજબના મલ્ટી ડિસિપ્લીનરી સર્ટીફિકેટ કોર્સો મંજૂર કરવા અંગે વિચારણા કરવા બાબત.

Sr.No	Certificate Course	Credit	Duration
1	Develop a Contributor Personality: <i>Practical Vedanta as applied to Career & Modern Workplaces</i>	3	45 hours
2	Leatures from Colombo to Almora :Swami Vivekananda's message on Indian Culture and Nation Building .	2	30 hours

(બિડાણ:૫)

(સેનેટ/સિન્ડિકેટ વિભાગ)

૧૦. સાસ્કમા ઈંગ્લિશ મિડીયમ કોમર્સ કોલેજ, કલાવતી ફુલચંદભાઈ વખારીયા એજ્યુકેશન કોમ્પ્લેક્સ, ગોવર્ધન હવેલીની સામે, લાલભાઈ કોન્ડ્રાકટર સ્ટેડીયમની પાસે, ડુમસ રોડ, સુરતની નીચે દર્શાવેલ વિગતે સ્વનિર્ભર અભ્યાસક્રમ બી.કોમ.નું ચાલુ તથા વધારાના વર્ગનું જોડાણ મેળવવા માટેની જોડાણ અરજીના સંદર્ભમાં સિન્ડિકેટે તા.૨૨-૦૩-૨૦૨૧ ના રોજ મળેલ સભાના ઠરાવ ક્રમાંક: (૦૮) અન્વયે માનનીય કુલપતિશ્રીને આપેલ સત્તાની રૂએ માનનીય કુલપતિશ્રીએ નિયુક્ત કરેલ સ્થાનિક તપાસ સમિતિનાં સભ્યોએ સિન્ડિકેટની તા.૨૭-૫-૨૦૨૧ની સભાના ઠરાવ ક્રમાંક (૧૩) અન્વયે ઓનલાઈન LIC કરી યુનિવર્સિટી કાર્યાલયને મોકલેલ સ્થાનિક તપાસ સમિતિનાં અહેવાલ પર વિચારણા કરવા બાબત.

ક્રમ	વિષય / અભ્યાસક્રમ	જોડાણનો પ્રકાર	સમયગાળો
1.	બી.કોમ. (અંગ્રેજી માધ્યમ) (સ્વનિર્ભર અભ્યાસક્રમ)	ચાલુ તથા વધારાના વર્ગનું જોડાણ	તા.૧૫-૬-૨૦૨૧ થી તા.૧૪-૬-૨૦૨૨ (૧ વર્ષ)

શરતો :

- (૧) યુનિવર્સિટી માન્યતા પ્રાપ્ત કોમર્સ/એકાઉન્ટન્સી વિષયના ૨ આસી.પ્રોફેસર, યુનિવર્સિટી માન્યતા પ્રાપ્ત અંગ્રેજી વિષયના ૧ આસી.પ્રોફેસર, યુનિવર્સિટી માન્યતા પ્રાપ્ત ૧ લાઈબ્રેરીયન અને યુનિવર્સિટી માન્યતા પ્રાપ્ત ૧ લાઈબ્રેરીયન અને યુનિવર્સિટી માન્યતા પ્રાપ્ત શારીરિક શિક્ષણના ૧ આસી.પ્રોફેસરની નિયમાનુસાર નિમણુક કરવી.
- (૨) કોમર્સ, બિઝનેસ રેગ્યુલેટરી ફ્રેમવર્ક તેમજ પર્યાવરણ વિષય માટે વિષયદીઠ એક વીઝીટીંગ ફેકલ્ટી/ ટીચિંગ આસીટન્ટની નિમણુક કરવી.
- (૩) યુનિવર્સિટીના ordinance ૬૮(એ) અને ૬૮(બી) નું ચુસ્તપણે પાલન કરવામાં આવે.

ભલામણ :

અમો, નીચે મુજબના સમિતિના સભ્યોએ ઉપરોક્ત માહિતીની ચકાસણી કરી છે અને ઉપલબ્ધ આધારો મુજબ તે સાચી અને ખરી છે. ઉપરોક્ત માહિતી અને અવલોકનોના આધારે અમો સદર ડિગ્રી પ્રોગ્રામ માટે સંસ્થાની જોડાણની અરજી ગ્રાહ્ય રાખી શૈક્ષણિક વર્ષ ૨૦૨૧-૨૨ માટે ચાલુ જોડાણ આપવા ભલામણ કરીએ છીએ.

(નોંધ : સ્થાનિક તપાસ સમિતિનાં અહેવાલની નકલ આ સાથે બિડાણ તરીકે સામેલ છે.)

(બિડાણ : ૬)

(જોડાણ વિભાગ)

૧૧. ડૉ. કિરણ સી. પટેલ મેડિકલ કોલેજ એન્ડ રીસર્ચ ઇન્સ્ટીટ્યુટ, ન્યુ સિવિલ હોસ્પિટલ કેમ્પસ, સ્ટેશન રોડ, ભરૂચની નીચે દર્શાવેલ વિગતે સ્વનિર્ભર અભ્યાસક્રમ એમ.બી.બી.એસ.નું ચાલુ /ક્રમશઃ વધારાનું જોડાણ મેળવવા માટેની જોડાણ અરજીના સંદર્ભમાં સિન્ડિકેટે તા.૨૨-૦૩-૨૦૨૧ ના રોજ મળેલ સભાના ઠરાવ ક્રમાંક: (૦૮) અન્વયે માનનીય કુલપતિશ્રીને આપેલ સત્તાની રૂએ માનનીય કુલપતિશ્રીએ નિયુક્ત કરેલ સ્થાનિક તપાસ સમિતિનાં સભ્યોએ સિન્ડિકેટની તા.૨૭-૫-૨૦૨૧ની સભાના ઠરાવ ક્રમાંક (૧૩) અન્વયે ઓનલાઈન LIC કરી યુનિવર્સિટી કાર્યાલયને મોકલેલ સ્થાનિક તપાસ સમિતિનાં અહેવાલ પર વિચારણા કરવા બાબત.

ક્રમ	વિષય / અભ્યાસક્રમ	જોડાણનો પ્રકાર	સમયગાળો
1.	એમ.બી.બી.એસ. (સ્વનિર્ભર અભ્યાસક્રમ)	ચાલુ/ક્રમશઃ વધારાનું જોડાણ	તા.૧૫-૬-૨૦૨૧ થી તા.૧૪-૬-૨૦૨૨ (૧ વર્ષ)

શરતો :

- (૧) NMC ગાઈડલાઈન દ્વારા વખતો વખત પ્રસિધ્ધ થતી માર્ગદર્શિકા મુજબ મેડિકલ કોલેજ તથા સંલગ્ન હોસ્પિટલ માટે જરૂરી બાંધકામ તથા માળખાગત સુવિધાઓ, મહેકમ વર્ગ ૧ થી ૪ તથા જરૂરી માનવબળ જરૂરી લેબોરેટરી તથા તેને લગતા સાધન સામગ્રી, તમામ પ્રકારના દર્દીલક્ષી સારવાર, વહીવટી પ્રક્રિયા તથા રીસર્ચ કાર્ય માટેની સાધન સામગ્રીની વ્યવસ્થા તબબકાવાર ઉપલબ્ધ કરાવવાની રહેશે.
- (૨) રાજ્ય સરકાર અને કેન્દ્ર સરકાર દ્વારા વખતો વખત પ્રકાશિત થતી માર્ગદર્શિકા તથા નીતિ નિયમનું સંપૂર્ણ પાલન કરવાનું રહેશે.
- (૩) સંલગ્ન યુનિવર્સિટીના કુલપતિશ્રી દ્વારા નિયુક્ત કરેલ પસંદગી સમિતિની હાજરીમાં ડીનશ્રી, ફેકલ્ટી, સિનિયર અને જુનિયર રેસિડન્ટના ઇન્ટરવ્યુની પ્રક્રિયા રાખી તેઓનો રિપોર્ટ જમા કરાવવાનો રહેશે.
- (૪) હોસ્ટેલ ખાતે ફાયર સેફ્ટીના સાધનો ઉપલબ્ધ કરાવી સક્ષમ સત્તા મંડળનું NOC જમા કરાવવાનું રહેશે.
- (૫) યુનિવર્સિટીના ઓર્ડિનન્સ ૬૮(એ) અને ૬૮(બી) નું સંપૂર્ણ પાલન કરવાનું રહેશે.

ભલામણ :

અમો, નીચે મુજબના સમિતિના સભ્યોએ ઉપરોક્ત માહિતીની ચકાસણી કરી છે અને ઉપલબ્ધ આધારો મુજબ તે સાચી અને ખરી છે. ઉપરોક્ત માહિતી અને અવલોકનોના આધારે અમો સદર ડિગ્રી પ્રોગ્રામ માટે સંસ્થાની જોડાણની અરજી ગ્રાહ્ય રાખી શૈક્ષણિક વર્ષ ૨૦૨૧-૨૨ માટે ચાલુ જોડાણ આપવા ભલામણ કરીએ છીએ.

(નોંધ : સ્થાનિક તપાસ સમિતિનાં અહેવાલની નકલ આ સાથે બિડાણ તરીકે સામેલ છે.)

(બિડાણ : ૭)

(જોડાણ વિભાગ)

૧૨. બી.યુ.ટી. તારીખ ૨૮/૧૦/૨૦૨૧ ના ઠરાવ ક્રમાંક ૨૦ , એકેડેમિક કાઉન્સિલ તારીખ ૩૦/૧૦/૨૦૨૧ ના ઠરાવ ક્રમાંક: ૨૮ તથા સિન્ડિકેટ તારીખ ૨/૧૧/૨૦૨૧ થી નિર્ધારિત કરેલ પદ્ધતિ અનુસાર છઠા સેમેસ્ટરના પરિણામની રાહ જોયા વગર સ્નાતક કક્ષાના સેમેસ્ટર - ૧ થી સેમેસ્ટર - ૫ ને આધારે મેરીટ બનાવી અનુસ્નાતક અભ્યાસક્રમોમાં પ્રવેશ પ્રક્રિયા હાથ ધરવાની થતી હોવાથી શૈક્ષણિક વર્ષ ૨૦૨૨-૨૦૨૩ ના વિવિધ અનુસ્નાતક અભ્યાસક્રમોમાં પ્રવેશ માટે પ્રવેશ ફોર્મ ભરાવવાની પ્રક્રિયા ચાલુ કરવામાં આવી છે , જેની છેલ્લી તારીખ ૨૮/૨/૨૦૨૨ નિર્ધારિત કરવામાં આવી છે.

સદર ૨૦૨૨ - ૨૦૨૩ ની અનુસ્નાતક અભ્યાસક્રમોની પ્રવેશ પ્રક્રિયા દરમિયાન ક્યાં અનુસ્નાતક કેન્દ્રો/અભ્યાસક્રમો મર્જ/બંધ /સ્થગિત કરવા તથા ક્યાં અનુસ્નાતક કેન્દ્રો/અભ્યાસક્રમો માં કેટલી બેઠકો ફાળવીને પ્રવેશ પ્રક્રિયા હાથ ધરવી (શૈક્ષણિક વર્ષ ૨૦૨૧-૨૦૨૨ મુજબની ઇન્ટેક રાખવી કે તેમાં કોઈ ફેરફાર કરવો) તેમજ સ્વાનિર્ભર કોલેજોની એડિલિએશન ની પ્રક્રિયા ચાલુ હોય તે દરમિયાન પ્રવેશ ફાળવવા કે એડિલિએશન ની પ્રક્રિયા પૂર્ણ થયા બાદ જ પ્રવેશ ફાળવવા તે અંગે વિચારણા કરવા બાબત.
(નોંધ: (૧) શૈક્ષણિક વર્ષ ૨૦૧૮ - ૨૦૧૯ થી ૨૦૨૧ - ૨૦૨૨ એમ કુલ ૪ વર્ષ દરમિયાન બેઠકો તથા રજીસ્ટ્રેશન ની વિગતો બિડાણ તરીકે સામેલ છે. ,

(૨) અભ્યાસક્રમો/ કેન્દ્રોમાં પ્રવેશ સ્થગિત કરવા તે અંગે BUT ની તા.૨૭-૦૧-૨૦૨૨ ના ઠરાવ ક્રમાંક: ૦૯ ની એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે.

(૩) કાઉન્સિલને શૈક્ષણિક વર્ષ ૨૦૨૨ - ૨૦૨૩ દરમિયાન કેટલી બેઠકો પર પ્રવેશ કાર્યવાહી કરવી શૈક્ષણિક વર્ષ ૨૦૨૧ - ૨૦૨૨ મુજબ રાખવી કે તેમાં કોઈ ફેરફાર કરીએ તે અંગે એલ=વિચારણા કરવાની થાય છે.

(૪) સ્વાનિર્ભર કોલેજોની એડિલિએશનની પ્રક્રિયા ચાલુ હોય તે દરમિયાન પ્રવેશ ફાળવવા કે એડિલિએશનની પ્રક્રિયા પૂર્ણ થયા બાદ જ પ્રવેશ પ્રવેશ ફાળવવા તે અંગે પણ વિચારણા કરવાની થાય.)

અનુસ્નાતક શિક્ષણ મંડળની તા.૨૭-૦૧-૨૦૨૨ની સભાના ઠરાવ ક્રમાંક: (૯)

:: આથી ઠરાવવામાં આવે છે કે, વિનયન અને વાણિજ્ય વિદ્યાશાખામાં ૨૫ વિદ્યાર્થીઓ તથા વિજ્ઞાન વિદ્યાશાખામાં ૨૦ વિદ્યાર્થીઓ તેમજ અન્ય વિદ્યાશાખાઓમાં એપેક્ષ બોડી સિવાયના અભ્યયસક્રમોમાં છેલ્લા ચાર વર્ષની રેગ્યુલર કુલ સંખ્યાના સરેરાશ કરતા ૫૦ % કરતા ઓછી વિદ્યાર્થી સંખ્યા ધરાવતી નીચે મુજબની કોલેજો/ યુનિવર્સિટી કેમ્પસમાં ચાલતા અનુસ્નાતક અભ્યાસક્રમોને શૈક્ષણિક વર્ષ ૨૦૨૨-૨૩ ના એક વર્ષ માટે સ્થગિત કરવા એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

આ ઉપરાંત વિશેષ કિસ્સાઓમાં અનુસ્નાતક અભ્યાસક્રમ ચાલુ રાખવા માટેની સત્તા મા. કુલપતિશ્રીને આપવા એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

<u>Name of Programme/ Subject</u>	<u>No. of Centre</u>	<u>Name of Centre/ University Department</u>
M.A. - English	1	J. Z. Shah Arts & Commerce College, Amroli (Girls)
	2	Government Arts, Science and Commerce College, Nani Daman
M.A. - Gujarati	1	J.Z. Shah Arts & Commerce College, Amroli (Girls)
	2	J.B. Dharukawala Arts College, Varachha, Surat (Girls)
	3	Smt. Kusumben Kadakia Arts & Commerce College, Ankleshwer
M.A. - Hindi	1	M.R.D. Arts & Commerce College, Chikhli
	2	V.S.Patel Arts & Science College, Billimora
	3	M.R. Arts & Science College, Rajpipla
	4	Jayendrapuri Arts & Science College, Bharuch
M.A. - Sanskrit	1	J.P. Shroff Arts College, Valsad
	2	M.R.D. Arts & Commerce College, Chikhli
	3	Shree Rang Navchetan Mahila Arts College, Valia
	4	Government Arts & Commerce College, Ahwa
M.A. - Economics	1	Government Arts, Science and Commerce College, Nani Daman (Government)
P.G.Dip. Journalism	1	Department of Journalism and Mass Communication, VNSGU, Surat
M.Com. -Statistics	1	Shah N.H. Commerce College, Valsad
M.Com.-Marketing Mgt	1	R.K. DESAI COLLEGE OF COMMERCE & MANAGEMENT, VAPI
M.Com. Financial & Management Accounting	1	Rofel Arts & Commerce College, Vapi. (English Medium)
M.Sc.-Mathematics	1	C.B. PATEL COMPUTER COLLEGE & JAMANABEN NARROTTAMBHAI MOTIRAM PATEL SCIENCE COLLEGE, BHARTHANA, VESU, SURAT.
M.Sc. -Electronics	1	Department of Physics, VNSGU, Surat.
	2	Narmada College of Science & Commerce, Zadeshwar
MASTER OF LABOUR WELFARE	1	DEPARTMENT OF HUMAN RESOURCE DEVELOPMENT, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
P.G. Diploma in Computer Application	1	Department of Computer Science, VNSGU, Surat
P.G. Diploma in Corporate Social Responsibility	1	DEPARTMENT OF HUMAN RESOURCE DEVELOPMENT, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
P.G. Diploma in Toxicology	1	Department of Biosciences, VNSGU, Surat
P.G. Diploma in Molecular & Biochemical Technology	1	Department of Biotechnology, VNSGU, Surat
P.G. Diploma in Rural Development	1	MAHATMA GANDHI DEPARTMENT OF RURAL STUDIES, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
P.G. Diploma in Natural Resource Management	1	MAHATMA GANDHI DEPARTMENT OF RURAL STUDIES, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

(બિડાણ: ૮)
(અનુસ્નાતક વિભાગ)

૧૩. સાયન્સ ફેકલ્ટીનાં કેમેસ્ટ્રી વિષયમાં પીએચ.ડી. ના માર્ગદર્શક શિક્ષક તરીકેની માન્યતા મેળવવા જે. એન. એમ. પટેલ સાયન્સ કોલેજ, સુરતના આસિ. પ્રોફેસર ડૉ. સોની હેતલબેન ઈશ્વરલાલને પીએચ.ડી.ના માર્ગદર્શક શિક્ષક તરીકેની માન્યતા પબ્લીકેશન મુલ્યાંકનના નીચે મુજબના તજજ્ઞોના અહેવાલને BUT ની તા.૨૭-૦૧-૨૦૨૨ ની સભાના ઠરાવ ક્રમાંક : ૦૩થી મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે. જે પર વિચારણા કરવા બાબત.

- (૧) ડૉ. પ્રણવ અસે. શ્રીવાસ્તવ, ડિપાર્ટમેન્ટ ઓફ કેમેસ્ટ્રી , સ્કુલ ઓફ સાયન્સ, ગુજરાત યુનિવર્સિટી, અમદાવાદ નો અહેવાલ હકારાત્મક છે.
 (૨) ડૉ.એચ.એસ.જોષી, પ્રોફેસર એન્ડ હેડ, ડિપાર્ટમેન્ટ ઓફ કેમેસ્ટ્રી, સૌરાષ્ટ્ર યુનિવર્સિટી, રાજકોટ નો અહેવાલ હકારાત્મક છે.

BUT ની તા.૨૭-૦૧-૨૦૨૨ ની સભાના ઠરાવ ક્રમાંક : ૦૩

:: આથી ઠરાવવામાં આવે છે કે, સાયન્સ ફેકલ્ટીનાં કેમેસ્ટ્રી વિષયમાં પીએચ.ડી.ના માર્ગદર્શક શિક્ષક તરીકેની માન્યતા મેળવવા જે. એન. એમ. પટેલ સાયન્સ કોલેજ, સુરતના આસિ.પ્રોફેસર ડૉ. સોની હેતલબેન ઈશ્વરલાલને પીએચ.ડી.ના માર્ગદર્શક શિક્ષક તરીકેની માન્યતા આપવા એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

(અનુસ્નાતક વિભાગ)

૧૪. સાયન્સ ફેકલ્ટીનાં માઈક્રોબાયોલોજી વિષયમાં પીએચ.ડી. ના માર્ગદર્શક શિક્ષક તરીકેની માન્યતા મેળવવા સરકારી વિજ્ઞાન કોલેજ, સુરતના આસિ. પ્રોફેસર ડૉ. અનિલકુમાર સિંઘ ને પીએચ.ડી.ના માર્ગદર્શક શિક્ષક તરીકેની માન્યતા પબ્લીકેશન મુલ્યાંકનના નીચે મુજબના તજજ્ઞોના અહેવાલને BUT ની તા.૨૭-૦૧-૨૦૨૨ ની સભાના ઠરાવ ક્રમાંક : ૦૪થી મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે. જે પર વિચારણા કરવા બાબત.

- (૧) પ્રો. ડૉ. મોનિકા જૈન, પ્રોફેસર એન્ડ હેડ, ડિપાર્ટમેન્ટ ઓફ લાઈફ સાયન્સ, એમ.આર.એસ. કોલેજ ઓફ પ્રોફેશનલ સાયન્સ,ઈન્દોર નો અહેવાલ હકારાત્મક છે.
 (૨) ડૉ.સુનીતા સિંઘ,એસો.પ્રોફેસર,હેડ,સ્કુલ ઓફ બાયોટેકનોલોજી એન્ડ બાયોઈન્ફોર્મેટિક્સ,ડી.વાય. પાટીલ યુનિવર્સિટી, મુંબઈ નો અહેવાલ હકારાત્મક છે.

BUT ની તા.૨૭-૦૧-૨૦૨૨ ની સભાના ઠરાવ ક્રમાંક : ૦૪

:: આથી ઠરાવવામાં આવે છે કે, સાયન્સ ફેકલ્ટીનાં માઈક્રોબાયોલોજી વિષયમાં પીએચ.ડી.ના માર્ગદર્શક શિક્ષક તરીકેની માન્યતા મેળવવા સરકારી વિજ્ઞાન કોલેજ,સુરતના આસિ.પ્રોફેસર ડૉ. અનિલકુમાર સિંઘ ને પીએચ.ડી.ના માર્ગદર્શક શિક્ષક તરીકેની માન્યતા આપવા એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

(અનુસ્નાતક વિભાગ)

૧૫. કોમ્પ્યુટર સાયન્સ એન્ડ ઈન્ફોર્મેશન ટેકનોલોજી ફેકલ્ટીના કોમ્પ્યુટર સાયન્સ વિષયમાં પીએચ.ડી. ના માર્ગદર્શક શિક્ષક તરીકેની માન્યતા મેળવવા વિવેકાનંદ કોલેજ ફોર બી.સી.એ., જહાંગીરપુરા, સુરતના આસિ. પ્રોફેસર ડૉ. અમી શૈલેષભાઈ દેસાઈ ને પીએચ.ડી.ના માર્ગદર્શક શિક્ષક તરીકેની માન્યતા પબ્લીકેશન મુલ્યાંકનના નીચે મુજબના તજજ્ઞોના અહેવાલને BUT ની તા.૨૭-૦૧-૨૦૨૨ ની સભાના ઠરાવ ક્રમાંક : ૦૫થી મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે. જે પર વિચારણા કરવા બાબત.

(૧) ડૉ.પ્રીતિ શ્રીનિવાસ સજ્જા, પ્રોફેસર, ડિપાર્ટમેન્ટ ઓફ કોમ્પ્યુટર સાયન્સ, સરદાર પટેલ યુનિવર્સિટી, વલ્લભ વિદ્યાનગરનો અહેવાલ હકારાત્મક છે.

(૨) ડૉ.મેઘના પટેલ, એએમપીઆઈસીએસ, ગણપત યુનિવર્સિટી, ખેરવા નો અહેવાલ હકારાત્મક છે.

BUT ની તા.૨૭-૦૧-૨૦૨૨ ની સભાના ઠરાવ ક્રમાંક : ૦૪

:: આથી ઠરાવવામાં આવે છે કે, કોમ્પ્યુટર સાયન્સ એન્ડ ઈન્ફોર્મેશન ટેકનોલોજી ફેકલ્ટીના કોમ્પ્યુટર સાયન્સ વિષયમાં પીએચ.ડી.ના માર્ગદર્શક શિક્ષક તરીકેની માન્યતા મેળવવા વિવેકાનંદ કોલેજ ફોર બી.સી.એ., જહાંગીરપુરા, સુરતના આસિ.પ્રોફેસર ડૉ. અમી શૈલેષભાઈ દેસાઈ ને પીએચ.ડી.ના માર્ગદર્શક શિક્ષક તરીકેની માન્યતા આપવા એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

(અનુસ્નાતક વિભાગ)

૧૬. એકવેટીક બાયોલોજી વિષયનાં PO, PSO, CO અંગે ચર્ચા કરતા એકવેટીક બાયોલોજી વિષયની અભ્યાસ સમિતિની તા.૨૮/૦૧/૨૦૨૨ની સભાનાં ઠરાવ ક્રમાંક:૧ અન્વયે કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાનાં ડીનશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિજ્ઞાન વિદ્યાશાખાવતી મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે, જે અંગે વિચારણા કરવા બાબત.

એકવેટીક બાયોલોજી વિષયની અભ્યાસ સમિતિની તા.૨૮/૦૧/૨૦૨૨ની સભાનાં ઠરાવ ક્રમાંક:૧

:: આથી ઠરાવવામાં આવે છે કે, M.Sc. Aquatic Biology નાં Programme Outcome, Programme Specific Outcome અને Course Outcome મંજૂર કરવા વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

(બિડાણ:૮)

(સેનેટ/સિન્ડિકેટ વિભાગ)

૧૭. M.Sc. Physics and Electronics વિષયનાં PO, PSO and CO ભૌતિકશાસ્ત્ર વિષયની અભ્યાસ સમિતિનાં ચેરમેનશ્રીએ બોર્ડવતી અને વિજ્ઞાન વિદ્યાશાખાનાં ડીનશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિજ્ઞાન વિદ્યાશાખાવતી મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે, જે અંગે વિચારણા કરવા બાબત.

(બિડાણ:૧૦)

(સેનેટ/સિન્ડિકેટ વિભાગ)

૧૮. M.A.Mass Communication and PG Diploma in Journalism કોર્સનાં PO, PSO and CO માસ કોમ્યુનિકેશન એન્ડ જર્નાલિઝમ વિષયની નિયૂક્ત એડહોક બોર્ડનાં ચેરમેનશ્રીએ બોર્ડવતી અને વિનયન વિદ્યાશાખાનાં ડીનશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિનયન વિદ્યાશાખાવતી મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે, જે અંગે વિચારણા કરવા બાબત.

(બિડાણ:૧૧)

(સેનેટ/સિન્ડિકેટ વિભાગ)

એકેડેમિક કાઉન્સિલના સર્વે સભ્યશ્રીઓ....

સ્નાતક કક્ષાના વિવિધ અભ્યાસક્રમોના પ્રથમ વર્ષમાં પ્રવેશનું નિયમન કરવા અંગેની સૂચિત નીતિ, નિયમો અને પ્રક્રિયા

1. વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી સુરત સંલગ્ન સરકારી, અનુદાનિત તથા સ્વનિર્ભર કોલેજોમાં પ્રથમ વર્ષ B.Com, B.Com. (Hons.), B.B.A, B.R.S, B.Sc, B.Sc (Computer Science), BCA તથા યુનિવર્સિટી પરિસર ખાતે ચાલતા Five Year Integrated B.Com LL.B (Hons.), Five Year Integrated M.Sc IT, Five Year Integrated M.Sc Biotechnology, Five Year Integrated M.R.S. in Sustainable Development, BFA (ફાઈન આર્ટ્સ), BID (ઇન્ટિરિયર ડિઝાઇનિંગ) તથા B.A Mass Communication અભ્યાસક્રમોમાં પ્રવેશ માટે ધોરણ ૧૨ માં અભ્યાસ કરતા વિદ્યાર્થીઓ ધોરણ ૧૨ ની પરીક્ષા આપે તે પહેલાં જ જાન્યુઆરી માસના બીજા અઠવાડિયામાં ધોરણ ૧૦ ના પરિણામને આધારે સ્નાતક કક્ષાના અભ્યાસક્રમો માટેના પ્રવેશ ફોર્મ ભરાવવાની વ્યવસ્થા ગોઠવવી.

2. MBBS, BHMS, B.Sc. Nursing, B. Optometry, B. Architecture તથા B. Physiotherapy ની પ્રવેશ યુનિવર્સિટી દ્વારા કે યુનિવર્સિટી સંલગ્ન કોલેજ દ્વારા કરવામાં આવતા નથી પરંતુ ગુજરાત સરકારશ્રી દ્વારા નિયુક્ત સેન્ટ્રલાઈઝડ એડમિશન કમિટી દ્વારા કરવામાં આવતા હોય, આ અભ્યાસક્રમોમાં યુનિવર્સિટી કાર્યાલયે માત્ર એનરોલમેન્ટની કાર્યવાહી કરવી.

3. B.A. માં યુનિવર્સિટી દ્વારા પ્રવેશ કાર્યવાહીના કરતાં દરેક કોલેજ પોતપોતની કોલેજમાં પ્રવેશ કાર્યવાહી કરે તેવી વ્યવસ્થા ગોઠવવી. યુનિવર્સિટી કાર્યાલય દ્વારા માત્ર એનરોલમેન્ટ ની કાર્યવાહી કરવી.

4. B.R.S. તથા Five Year Integrated M.R.S. in Sustainable Development બંને માટે એક જ કોમન ફોર્મ ભરાવવું. તેજ રીતે B.Com, તથા B.Com. (Hons.). બંને માટે પણ એક જ કોમન ફોર્મ ભરાવવું. એ સિવાયના પ્રત્યેક અભ્યાસક્રમ માટે અલગ અલગ પ્રવેશ ફોર્મ રાખવા.

5. ધોરણ ૧૨ નું પરિણામ જાહેર થતાં વિદ્યાર્થી પોતનો ધોરણ ૧૨ નો સીટ નંબર તથા ધોરણ ૧૨ ના પરિણામની વિગતો ભરે તેવી વ્યવસ્થા ગોઠવવી. જો ગુજરાત માધ્યમિક શિક્ષણ બોર્ડ, ગાંધીનગર તરફથી પરિણામના ડેટા મળે તો ગુજરાત માધ્યમિક શિક્ષણ બોર્ડ ગાંધીનગરમાંથી ધોરણ ૧૨ ની પરીક્ષા પાસ કરનાર વિદ્યાર્થી માત્ર પોતાનો સીટ નંબર નાખીને ડેટા ફેચ કરે તેવી વ્યવસ્થા પણ રાખવી. ગુજરાત માધ્યમિક શિક્ષણ બોર્ડ ગાંધીનગર સિવાયના વિદ્યાર્થીઓ પોતનો સીટ નંબર નાખી માર્કસની એન્ટ્રી કરે તેવી વ્યવસ્થા ગોઠવવી. જો કોઈ સંજોગોમાં ગુજરાત માધ્યમિક શિક્ષણ બોર્ડ, ગાંધીનગર તરફથી પરિણામનો ડેટા ના મળે તો ગુજરાત માધ્યમિક શિક્ષણ બોર્ડ, ગાંધીનગર માંથી ધોરણ ૧૨ પાસ કરનાર

વિદ્યાર્થીઓ પણ પોતાનો ધોરણ ૧૨ નો સીટ નંબર તથા પરિણામ નો ડેટા એન્ટર કરે તેવી સુવિધા પણ રાખવી.

6. વિદ્યાર્થીઓના રેકૉર્ડ તથા પ્રવેશ સંબંધી વિગતોના વેરિફિકેશનની વ્યવસ્થા:

(A) પ્રથમ તબક્કાનું વેરિફિકેશન:

વિદ્યાર્થી પોતાની માર્કશીટ સહિતના તમામ દસ્તાવેજો ઓનલાઇન ફોર્મની સાથે ઓનલાઇનજ અપલોડ કરે, વિદ્યાર્થીએ ડોક્યુમેન્ટ જમા કરાવવા કે વેરીફાય કરાવવા કોઈપણ કોલેજ, યુનિવર્સિટી કે હેલ્પ સેન્ટર પર રૂબરૂ જવાનું ના રહે તથા વિદ્યાર્થીઓએ ઓનલાઇન અપલોડ કરેલ દસ્તાવેજો ને આધારે યુનિવર્સિટીના કર્મચારીઓ આ સાથે સામેલ વેરિફિકેશનની ગાઇડલાઇન (Annexure - 1) ને આધારે ફોર્મની ચકાસણી કરે તેવી વ્યવસ્થા ગોઠવવી. આ પ્રથમ તબક્કાનું વેરિફિકેશન થશે.

(B) દ્વિતીય તબક્કાનું વેરિફિકેશન:

પ્રથમ તબક્કાનું વેરિફિકેશન યુનિવર્સિટી દ્વારા કર્યા બાદ દ્વિતીય તબક્કા ના વેરિફિકેશન માટે પ્રોવિઝનલ મેરીટ લિસ્ટ જાહેર થાય તે સમયે વિદ્યાર્થીને પોતે પોતાની વિગતોના વેરિફિકેશન ની તક આપવામાં આવે, વિદ્યાર્થીઓને પોતાના માર્ક્સ કેટેગરી કે અન્ય કોઈ વિગત ની ભૂલ જણાય તો આ તબક્કે વિદ્યાર્થી પોતે પોતાના એડમિશન ડેશબોર્ડ માંથી જરૂરી આધાર પુરાવા અપલોડ કરીને પોતાની વિગતો સુધારવા માટે વિનંતી મોકલી શકશે. આવી વિનંતીઓ જોઈ પુરાવા ચકાસી જો યોગ્ય રજૂઆત હશે તો યુનિવર્સિટી કક્ષાએ જરૂરી સુધારો કર્યા બાદ ફાઇનલ મેરીટ લિસ્ટ જાહેર કરવામાં આવશે. એકવાર ફાઇનલ મેરીટ લિસ્ટ જાહેર થયા બાદ ચાલુ પ્રવેશ પ્રક્રિયા દરમિયાન વિગતોમાં કોઈ સુધારો થઈ શકશે નહીં.

(C) તૃતીય તબક્કાનું વેરિફિકેશન:

પ્રોવિઝનલ પ્રવેશ આપતા સમયે કોલેજ કક્ષાએ વિદ્યાર્થીના અસલ દસ્તાવેજો અને તેને આધારે ઓનલાઇન ફોર્મ માં દર્શાવેલ વિગતોનું ત્રીજા તબક્કાનું વેરિફિકેશન થશે. ખાસ કરીને વિદ્યાર્થીએ ઓનલાઇન ફોર્મમાં દર્શાવેલા માર્ક્સ તથા અસલ માર્કશીટ પરના માર્ક્સ, વિદ્યાર્થીએ દર્શાવેલ અનામત કેટેગરી તથા તેનું પ્રમાણપત્ર તથા પ્રમાણપત્રની વેલિડિટી, અભ્યાસક્રમની નિર્ધારિત લાયકાત તથા વિદ્યાર્થી વાસ્તવિક લાયકાત વગેરે બાબતોની ચકાસણી થશે. આ તમામ બાબતો પરિપૂર્ણ થાય તો જ વિદ્યાર્થીને કોલેજ પ્રોવિઝનલ પ્રવેશ ફાળવશે. જો વિદ્યાર્થીઓને ધોરણ - ૧૨ ની અસલ માર્કશીટ મળેલ નહીં હોય તો વિદ્યાર્થીએ રજૂ કરેલ ઇન્ટરનેટ પરથી ડાઉનલોડ કરેલ માર્કશીટની સ્વપ્રમાણિત નકલ ધ્યાને લેવાશે.

(D) વિદ્યાર્થીએ ફોર્મ માં જે વિગતો દર્શાવી હશે જે યુનિવર્સિટીએ વેરીફાઈ કરી હશે તથા પ્રોવિઝનલ લિસ્ટ જાહેર થતાં વિદ્યાર્થીએ પોતે તે ચકાસી હશે તેમ છતાં જો વિદ્યાર્થીની વિગતમાં જો કોઈ ભૂલ જણાશે અને નીચે મુજબના સંજોગો પ્રવર્તે તેવા સંજોગોમાં નીચે મુજબ ના નિર્ણય વિદ્યાર્થીઓને બંધનકર્તા રહેશે.

૧) જો વિદ્યાર્થીના વાસ્તવિક માર્ક્સ વિદ્યાર્થીએ ફોર્મમાં દર્શાવેલ માર્ક્સ કરતા વધુ હશે તેવા કિસ્સામાં ફોર્મમાં દર્શાવ્યા અનુસાર ના માર્ક્સ (વાસ્તવિક કરતાં ઓછા માર્ક્સ) મુજબ જ વિદ્યાર્થીને ઓનલાઇન પ્રવેશ મળી શકશે.

૨) જો વિદ્યાર્થીના વાસ્તવિક માર્ક્સ વિદ્યાર્થીએ ફોર્મમાં દર્શાવેલ માર્ક્સ કરતા ઓછા હશે તેવા કિસ્સામાં વિદ્યાર્થીનું પ્રવેશ ફોર્મ રદ થયેલ ગણાશે અને વિદ્યાર્થીનો પ્રવેશ માટે કોઈ હકદાવો રહેશે નહીં, આમ છતાં આવા વિદ્યાર્થી અરજી કરી યુનિવર્સિટી ખાતે વિનંતી કરે તેવા કિસ્સામાં માત્ર શક્ય હોય તેવા સંજોગોમાં વિદ્યાર્થીના સાચા મેરીટ મુજબના કટ ઓફ માર્ક્સ તથા બેઠકોની ઉપલબ્ધતાને આધારે યુનિવર્સિટી જેકોલેજોમાં પ્રવેશ ફાળવે તે વિદ્યાર્થીને બંધનકર્તા રહેશે.

૩) જો વિદ્યાર્થી જનરલ કેટેગરીનો હશે અને ફોર્મમાં અનામત કેટેગરી માટે પ્રવેશ ફોર્મ ભરેલ હશે તેવા કિસ્સામાં વિદ્યાર્થીઓને માત્ર જનરલ કેટેગરીમાં જ પ્રવેશ મળશે.

૪) જો વિદ્યાર્થી અનામત કેટેગરીનો હશે પરંતુ જનરલ કેટેગરી માટે ફોર્મ ભરેલ હશે તો પણ વિદ્યાર્થી માત્ર જનરલ કેટેગરીમાં જ પ્રવેશ માટે લાયક બનશે. આવા વિદ્યાર્થીઓને અનામત બેઠકો પર પ્રવેશ મળશે નહિ.

૫) જો વિદ્યાર્થી જે કેટેગરીનો હશે તે સિવાય ની કેટેગરી માટે ફોર્મ ભરશે તેવા કિસ્સામાં (દાખલ તરીકે એસ.સી. વિદ્યાર્થીઓ એસ.ટી. કેટેગરી માટે ફોર્મ ભરે અથવા એસ.ટી, વિદ્યાર્થી એસ.ઈ.બી.સી. કેટેગરી માટે ફોર્મ ભરે) આવા વિદ્યાર્થીઓ માત્ર જનરલ બેઠકો પર પ્રવેશ માટે લાયક બનશે, આ વિદ્યાર્થીને અનામત બેઠકો પર પ્રવેશ મળી શકશે નહીં.

(E) ચોથા તબક્કાનું વેરિફિકેશન: એનરોલમેન્ટ સમયે ચોથા તબક્કાનું વેરિફિકેશન થશે, કોલેજ એનરોલમેન્ટ સમયે વિદ્યાર્થીની અસલ માર્ક્શીટ વિદ્યાર્થી પાસેથી લઈને વિદ્યાર્થીના મેરીટ માર્ક્સનું

વેરિફિકેશન કરશે તથા એનરોલમેન્ટ માટે વિદ્યાર્થીઓની માર્કશીટ યુનિવર્સિટી પર મોકલશે, તેના પર યુનિવર્સિટી કાર્યાલય સિક્કો લગાવી ને એનરોલમેન્ટ ની કાર્યવાહી પૂર્ણ કરશે.

(F) પાંચમા તબક્કાનું વેરિફિકેશન: જે વિદ્યાર્થીઓએ GSEB સિવાયના બોર્ડમાંથી ધોરણ ૧૨ ની પરીક્ષા પાસ કરેલ હશે તેવા પ્રત્યેક વિદ્યાર્થીઓની માર્કશીટ ની કોપી જે તે બોર્ડના વેરિફિકેશન માટે મોકલવામાં આવશે અને જે તે બોર્ડ તરફથી માર્કશીટની સત્યતા પ્રમાણિત કરવામાં આવશે ત્યારબાદ જ વિદ્યાર્થી ને ફાઇનલ એલિજબિલિટી સર્ટિફિકેટ આપવામાં આવશે. જો વિદ્યાર્થી ની માર્કશીટ ની સત્યતા પુરવાર થશે નહિ તો વિદ્યાર્થીઓનો પ્રવેશ રદ કરવામાં આવશે.

(G) વિદ્યાર્થીઓને ફાઇનલમાં આવનાર પ્રવેશ તથા એનરોલમેન્ટ પ્રોવિઝનલ ગણાશે. ભવિષ્યમાં વિદ્યાર્થીના પ્રમાણપત્રો / માર્કશીટો ની સત્યતા અથવા પ્રવેશ ની નિર્ધારિત લાયકાત અંગે કોઈ વિસંગતતા ઉભી થશે તેવા સંજોગોમાં પ્રવેશ રદ કરવા અને કોઈ પરીક્ષા આપી દીધી હોય તો પરીક્ષાના પરિણામો રદ કરવા તથા પદવી મેળવી લીધી હોય તો પદવી પ્રમાણપત્ર પણ રદ કરવા સહિતનો નિર્ણય વિદ્યાર્થીઓને બંધનકર્તા રહેશે.

7. પ્રવેશ પ્રક્રિયા દરમ્યાન વિદ્યાર્થીઓ પાસે રૂ. ૨૦૦ પ્રોસીસિંગ ફી (નોન-રિફન્ડેબલ) તેમજ ૮૦૦ ટોકન ફી (રિફન્ડેબલ) એમ કુલ રૂ. 1000 ઓનલાઇન ફોર્મ નું ફાઇનલ સબમીશન કરતા સમયે લેવાના રહેશે.

8. B.Com, B.Sc, BBA , તથા B.C.A ની પ્રવેશ પ્રક્રિયા સુરત, વલસાડ, નવસારી, બારડોલી અને ભરૂચ એમ પાંચ ઝોન વાઈઝ કરવાની રહેશે. વિદ્યાર્થીઓએ પોતાની પસંદગી ની કોલેજો જે ઝોનમાં આવતી હોય તે જોઈ તે અનુસાર પ્રવેશ ફોર્મ ભરવાના રહેશે તથા જો કોઈ વિદ્યાર્થી એક કરતાં વધુ ઝોનની કોલેજો માટે પ્રવેશ ફોર્મ ભરવા માંગતા હોય તો પ્રત્યેક ઝોન માટે અલગ અલગ ફોર્મ ભરવાનું રહેશે. (કયા ઝોનમાં કઈ કઈ કોલેજો નો સમાવેશ કરવામાં આવેલ છે તેની વિગતો વેબસાઈટ પર ઉપલબ્ધ કરાવવી જેથી વિદ્યાર્થી તે વિગતો જોયા બાદ જ ફોર્મ ભરવાની કાર્યવાહી કરે).

9. વિદ્યાર્થી ડેસ્કટોપ કોમ્પ્યુટર, લેપટોપ અથવા મોબાઈલ થી પોતે જ પોતાનું ફોર્મ ભરી શકે તેવી વ્યવસ્થા ગોઠવવી તથા વિદ્યાર્થીઓ સાયબર ક્રાફ્ટમાં ન જાય અને પોતે ફોર્મ ભરે અથવા નજીકની કોલેજ, પોતાની શાળા અથવા નજીકની અન્ય શાળામાં જઈ ફોર્મ ભરે તેવું શક્ય બનાવવા કોલેજો તથા શાળાઓ વિદ્યાર્થીઓ પાસે થી ફોર્મ દીઠ રૂ. ૫૦ લઈ ફોર્મ ભરવાની સુવિધા ઉપલબ્ધ કરાવે તેવી વ્યવસ્થા કરવી.

આ હેતુ માટે વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી કાર્ય વિસ્તારમાં આવેલ તમામ શાળાઓ અને વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી સંલગ્ન તમામ કોલેજો ફોર્મ ભરવા માટે હેલ્પ સેન્ટર તરીકે કાર્યરત રહે તેવી વ્યવસ્થા કરવી. હેલ્પ સેન્ટરો ઉપરાંત ઓનલાઇન ફોર્મ ભરવામાં થતી મૂંઝવણ માટે હેલ્પલાઇન નંબર ૦૨૬૧ ૨૩૮૮૮૮૮ પરથી પણ વિદ્યાર્થીઓને ફોર્મ ભરવા બાબતે માર્ગદર્શન મળી રહે તેવી વ્યવસ્થા ગોઠવવી.

10. સમગ્ર ઓનલાઇન પ્રવેશ પ્રક્રિયા દરમિયાન વિદ્યાર્થીને દરેક માહિતી એસ.એમ.એસ. કે ટેલિફોન કે વેબસાઇટ ને બદલે પોતાના કેશબોર્ડ પર જ મળી રહે તેવી વ્યવસ્થા ગોઠવવી. પ્રવેશ ફોર્મ ભરતા સમયે વિદ્યાર્થી નો મોબાઇલ નંબર તથા ઈ-મેઇલ આઈ.ડી બંને સ્વતંત્ર રીતે વેરીફાઇ થાય તે માટે મોબાઇલ તેમજ ઈ-મેઇલ વેરિફિકેશન ની વ્યવસ્થા ઓનલાઇન સિસ્ટમમાં ઓનલાઇન ફોર્મ ભરતા સમયે જ કરવી જેથી મોબાઇલ નંબર કે ઈ-મેઇલ ખોટું હોવાનો પ્રશ્ન ઉપસ્થિત ન થાય.

11. ઓનલાઇન ફોર્મ ભરતી વખતે વિદ્યાર્થી કોઈ જ કોલેજની પસંદ ન કરે અને જે પ્રોગ્રામ માટે પ્રવેશ ફોર્મ ભરે તે તમામ કોલેજો (જ્યાં ઝોન હોય ત્યાં તે ઝોન ની તમામ કોલેજો) આપોઆપ વિદ્યાર્થીની ચોઈસ ગણી લેવામાં આવે તથા દરેક કોલેજ ઈ.આર.પી. સિસ્ટમના પોતાના લોગિનમાંથી મેરીટ અનુસાર પ્રવેશ પ્રક્રિયા કરે તેવી વ્યવસ્થા ગોઠવવી. (કોલેજોએ પોતાના લોગિનમાંથી ઓનલાઇન પ્રવેશ પ્રક્રિયા કઈ રીતે કરવી તે અંગેનું મેન્યુઅલ આ સાથે સામેલ છે) (Annexure - 2)

12. પ્રવેશ પ્રક્રિયા મેરીટ અનુસાર જ થાય તે હેતુસર મેરિટના ક્રમ અનુસાર જ કોલેજ રાઉન્ડ પાડી શકે. દાખલા તરીકે મેરીટ ક્રમાંક ૧ થી મેરીટ ક્રમાંક ૧૦૦ નો એક રાઉન્ડ કર્યા બાદ ૧૦૧ ને બાકાત રાખીને બીજો રાઉન્ડ ૧૦૨ થી ન કરી શકે એટલે કે વધુ મેરીટ વાળા વિદ્યાર્થીઓને બાકાત રાખી ને ઓછા મેરિટવાળા વિદ્યાર્થીઓને પ્રવેશ ફાળવી જ ના શકે તેવી વ્યવસ્થા ગોઠવવી.

13. સંબંધિત કોલેજ ખાતે રાઉન્ડના સમયગાળા દરમિયાન જ વિદ્યાર્થીએ પહોંચવું જરૂરી છે અથવા અનિવાર્ય સંજોગોમાં ઓથોરિટી લેટર સાથે પોતાના પ્રતિનિધિ ને પ્રવેશ કન્ફોર્મ કરાવવા માટે મોકલવા જરૂરી છે. જો રાઉન્ડના સમયગાળા દરમિયાન વિદ્યાર્થીઓ કોલેજ પર પહોંચશે નહીં તો વિદ્યાર્થીનો પ્રવેશ માટે કોઈ હકદાવો રહેશે નહીં. આમ છતાં શક્ય હોય તો વિદ્યાર્થીઓના હિતમાં રાઉન્ડના સમયગાળા દરમિયાન જે વિદ્યાર્થીઓ પહોંચી ન શકે તે વિદ્યાર્થીઓને પ્રવેશ વંચિત રાખવાના બદલે જે વિદ્યાર્થી જ્યારે પહોંચે ત્યારે જે રાઉન્ડ ચાલુ હોય તે રાઉન્ડ પૂરો થયા બાદ જો સંબંધિત કેટેગરીની બેઠકો ખાલી હોય તો આ વિદ્યાર્થીને ઓનલાઇન જ પ્રવેશ આપી શકાય તેવી વ્યવસ્થા કરવી.

14. પ્રવેશ ફોર્મ ભરાવતા સમયે એફિલિએશન ની કાર્યવાહી પૂર્ણ થયેલ ન હોય તેવા સંજોગોમાં પ્રવેશ ફોર્મ ભરવા સમયે વિદ્યાર્થી ને કોલેજો અને તેની બેઠકોની સંખ્યા ની સચોટ માહિતી આપવી શક્ય ના બને તે સંજોગોમાં વિદ્યાર્થીઓને ગત વર્ષની માહિતી આપવી તથા આ માહિતી ગત વર્ષની હોવા અંગેની તથા વાસ્તવિક માહિતી એફિલિએશન ની પ્રક્રિયા પૂર્ણ થયેથી જાહેર કરવામાં આવશે એમ સ્પષ્ટતા સાહિતિ માહિતી આપવી.

15. વર્ગ દીઠ બેઠકો ની ગણતરી:

EWS (આર્થિક નબળા વર્ગો) માટે ૧૦% અનામત નો અમલ મૂળ વર્ગદીઠ બેઠકોમાં ૨૫% બેઠકોનો વધારો કરીને કરવો.

(A) બી.એસ.સી.માં ગ્રાન્ટ ઇન એઇડ તથા સરકારી કોલેજોમાં મૂળ ઇન્ટેક ૧૨૦ ગણી ૨૫% બેઠકોનો વધારો કરી વર્ગ દીઠ ૧૫૦ સંખ્યા મુજબ પ્રવેશ કાર્યવાહી કરવી.

(B) બીએસ.સી.માં સેલ્ફ ફાઇનાન્સ કોલેજોમાં મૂળ ઇન્ટેક ૧૦૦ ગણી ૨૫% બેઠકોનો વધારો કરી વર્ગ દીઠ ૧૨૫ સંખ્યા મુજબ પ્રવેશ કાર્યવાહી કરવી.

(C) બી.કોમ માં ગ્રાન્ટ ઇન એઇડ તથા સરકારી કોલેજોમાં મૂળ ઇન્ટેક ૧૨૦ ગણી ૨૫% બેઠકોનો વધારો કરી વર્ગ દીઠ ૧૫૦ સંખ્યા મુજબ પ્રવેશ કાર્યવાહી કરવી.

(D) બી.કોમ માં સેલ્ફ ફાઇનાન્સ કોલેજોમાં મૂળ ઇન્ટેક ૧૨૦ ગણી ૨૫% બેઠકોનો વધારો કરી વર્ગ દીઠ ૧૫૦ સંખ્યા મુજબ પ્રવેશ કાર્યવાહી કરવી.

(E) બી.બી.એ માં મૂળ ઇન્ટેક ૬૦ ગણી ૨૫% બેઠકોનો વધારો કરી વર્ગ દીઠ ૭૫ સંખ્યા મુજબ પ્રવેશ કાર્યવાહી કરવી.

(F) બી.સી.એ.માં મૂળ ઇન્ટેક ૬૦ ગણી ૨૫% બેઠકોનો વધારો કરી વર્ગ દીઠ ૭૫ સંખ્યા તથા તેમાં ૧૦ બેઠકોનો વધારો એમ વર્ગ દીઠ કુલ ૮૫ બેઠકો મુજબ પ્રવેશ કાર્યવાહી કરવી.

(G) બી.આર.એસ માં ગ્રાન્ટ-ઇન-એઇડ કોલેજમાં મૂળ ઇન્ટેક ૫૦ ગણી તેમાં ૨૫% વધારો કરી વર્ગ દીઠ ૬૩ ની સંખ્યા મુજબ પ્રવેશ કાર્યવાહી કરવી.

(H) બી.આર.એસ માં સેલ્ફ ફાઇનાન્સ કોલેજમાં મૂળ ઇન્ટેક ૬૦ ગણી તેમાં ૨૫% વધારો કરી વર્ગ દીઠ ૭૫ ની સંખ્યા મુજબ પ્રવેશ કાર્યવાહી કરવી.

(II) બી.એ માં ગ્રાન્ટ-ઇન-એઇડ તથા સરકારી કોલેજમાં મૂળ ઇન્ટેક ૧૩૦ ગણી તેમાં ૨૫% વધારો કરી વર્ગ દીઠ ૧૬૩ ની સંખ્યા મુજબ પ્રવેશ કાર્યવાહી કરવી.

(I) બી.એ માં સેલ્ફ ફાઇનાન્સ કોલેજમાં મૂળ ઇન્ટેક ૧૩૦ ગણી તેમાં ૨૫% વધારો કરી વર્ગ દીઠ ૧૬૩ ની સંખ્યા મુજબ પ્રવેશ કાર્યવાહી કરવી.

(K) આ સિવાયના તમામ પ્રોગ્રામોમાં મંજૂર થયેલ મૂળ ઇન્ટેકમાં ૨૫% બેઠકોનો વધારો કરી પ્રવેશ કાર્યવાહી કરવી.

16. ગુજરાત માધ્યમિક શિક્ષણ બોર્ડ ગાંધીનગર તથા અન્ય બોર્ડમાં થી ઉત્તીર્ણ થયેલ વિદ્યાર્થીઓ વચ્ચે બેઠકોની વહેંચણી:

કુલ બેઠકો પૈકી GSEB માંથી ધોરણ ૧૨ પાસ કરનાર વિદ્યાર્થીઓ (ડિપ્લોમા અથવા આઈ.ટી.આઈ થયેલ જે વિદ્યાર્થીઓને GSEB દ્વારા ધોરણ ૧૨ ને સમકક્ષ હોવા અંગેનું પ્રમાણપત્ર મળેલ હોય તેવા વિદ્યાર્થીઓને પણ GSEB ના વિદ્યાર્થીઓ ગણવા તેમજ આ વિદ્યાર્થીને ૧૨ સાયન્સ A ગુપના વિદ્યાર્થીઓ તરીકે ગણતરીમાં લેવાના રહેશે) ને કુલ બેઠકો પૈકી ૮૦% બેઠકો અને એ સિવાયના માન્ય બોર્ડમાંથી ઉત્તીર્ણ થનાર વિદ્યાર્થીઓ માટે કુલ બેઠકોના ૨૦% બેઠકોની ફાળવણી કરવી. જો GSEB નું પરિણામ જાહેર થઈ જાય તેવા સંજોગોમાં GSEB ના વિદ્યાર્થીઓની પ્રવેશ પ્રક્રિયા ચાલુ કરી શકાશે તથા સી.બી.એસ.ઈ. બોર્ડ નું પરિણામ જાહેર થયેથી અધર બોર્ડના વિદ્યાર્થીઓની પ્રવેશ પ્રક્રિયા ચાલુ કરી શકાશે.

17. અનામત બેઠકોની ફાળવણી:

(A) EWS (આર્થિક નબળા વર્ગો) માટે ૧૦% અનામત નો અમલ મૂળ વર્ગદીઠ બેઠકોમાં ૨૫% બેઠકોનો વધારો કરીને કરીએ. મૂળ વર્ગદીઠ બેઠકોમાં ૨૫% નો વધારો કર્યા બાદ મળતી કુલ બેઠકો ની સંખ્યા માંથી એસ.સી. (૭%), એસ.ટી. (૧૫%), એસ.ઈ.બી.સી. (૨૭%) તથા જનરલ કેટેગરી તેમજ મૂળ ઇન્ટેક માંથી ૧૦% ઈ.ડબ્લ્યુ એસ. માટે ફાળવવી. (Annexure - 3)

(B) શારીરિક રીતે વિકલાંગ વિદ્યાર્થીઓ માટે ૩% બેઠકો અનામત રહેશે.

(C) કાશ્મીર નિવાસી/સ્થળાંતરિત વિદ્યાર્થીઓ માટે કોલેજ / પ્રોગ્રામ દીઠ બે બેઠકો સુપર ન્યુમરી રહેશે.

(D) રાષ્ટ્રીય કક્ષાએ અથવા રાજ્ય કક્ષાએ ખેલફૂદ (સ્પોર્ટ્સ ક્લોટા) માટે ગ્રાન્ટ - ઈન - એઈડ તથા સ્વનિર્ભર સંસ્થાઓમાં વર્ગદીઠ ૪ બેઠકોની ફાળવણી કરવાની રહેશે. ગ્રાન્ટ - ઈન - એઈડ કોલેજોમાં સ્પોર્ટ્સ ક્લોટા સુપર ન્યુમરી રહેશે તથા સ્વનિર્ભર સંસ્થાઓ માં કુલ બેઠકોના ભાગ તરીકે ગણાશે અને તે જનરલ ક્લોટા માંથી બાદ થશે. (સિન્ડિકેટ તારીખ ૦૯/૦૬/૨૦૨૧ નો ઠરાવ ક્રમાંક: ૨૫ અને સિન્ડિકેટ તારીખ ૧૬/૦૬/૨૦૨૧ નો ઠરાવ ક્રમાંક: ૪૯)

(E) જે અભ્યાસક્રમો ની ઇન્ટેક એપેક્ષ બોડી દ્વારા નિર્ધારિત ન થતી હોય તેવા તેવા અભ્યાસક્રમોમાં "ઈન સર્વિસ મેન" અથવા "એક્સ સર્વિસ મેન" ના આશ્રિતો માટે સરકારી, ગ્રાન્ટ-ઈન-એઈડ તેમજ સ્વનિર્ભર કોલેજોમાં વધારાની ૧% બેઠક ફાળવવાની રહેશે.

(F) પરદેશથી આવતા વિદ્યાર્થીઓ કે જેમને માટે સરકારશ્રીનું વિદેશ ખાતું ભલામણ કરે તેવા કિસ્સામાં અથવા આઈ.સી.સી.આર. મારફતે આવે તેવા વિદેશી વિદ્યાર્થીઓને નિયત સંખ્યા ઉપરાંત ની બેઠકો પર પ્રવેશ ફાળવણી કરી શકાશે.

18. યુનિવર્સિટી ઓનલાઇન ફોર્મ સ્વીકારી તેનું વેરિફિકેશન કરી, પ્રોવિઝનલ મેરીટ યાદી તૈયાર કરી, પ્રોવિઝનલ મેરીટ યાદી અંગે રજૂઆતો મેળવી મળેલ રજૂઆતો બાબતે જરૂરી સુધારા કરીને ફાઇનલ મેરીટ યાદી પ્રસિદ્ધ કરશે. આ મેરીટ યાદી તમામ સંબંધિત કોલેજો / વિભાગો ને તેમના ઈ.આર.પી. સિસ્ટમના લોગીનમાં આપશે, ત્યારબાદ સમગ્ર પ્રવેશ પ્રક્રિયા સંબંધિત કોલેજ ખાતે આચાર્યશ્રીની રાહબરી હેઠળ / યુનિવર્સિટી ડિપાર્ટમેન્ટ ખાતે જે તે વિભાગના વડા શ્રી ની રાહબરી હેઠળ થશે. કેટેગરી વાર પ્રવેશ પ્રક્રિયા નીચેના ક્રમમાં જ કરવાની રહેશે:

(1) તમામ પ્રકારની મેરીટ યાદી પૈકી સૌ પ્રથમ સામાન્ય (જનરલ) કેટેગરીની બેઠકો પર પ્રવેશ કાર્યવાહી કરવી, સામાન્ય કેટેગરીની બેઠકો ભરાયા બાદ જ અન્ય કેટેગરીની બેઠકો પર પ્રવેશ કાર્યવાહી કરવી.

(2) અનામત કેટેગરીના જે વિદ્યાર્થીઓ સામાન્ય કેટેગરીની બેઠકો પર પ્રવેશ નું મેરીટ ધરાવતા હોય તેમને સામાન્ય (જનરલ) કેટેગરીની બેઠકો પર જ પ્રવેશ ફાળવવાના રહેશે.

(3) એક વાર સામાન્ય કેટેગરીની બેઠકો ભરાઈ ગયા બાદ કોઈ અનામત કેટેગરીના વિદ્યાર્થીઓ અનામત કેટેગરીની બેઠકો પર પ્રવેશ મેળવે અને જો ત્યારબાદ સામાન્ય કેટેગરીની બેઠકો ખાલી પડે તેવા સંજોગોમાં

પણ જો સામાન્ય કેટેગરી ની ખાલી પડેલી બેઠક પર મેરીટ મુજબ અનામત કેટેગરીની બેઠકો પર પ્રવેશ મેળવી ચૂકેલા વિદ્યાર્થીઓ પ્રવેશ માટે જરૂરી મેરીટ ધરાવતો હોય તો આ સામાન્ય કેટેગરીની બેઠકો પર અનામત કેટેગરીની બેઠકો પર પ્રવેશ મેળવી ચુકેલો વિદ્યાર્થીઓનો પ્રવેશ તબદીલ કરવા અને જે અનામત કેટેગરીના વિદ્યાર્થીઓને આવો પ્રવેશ ફાળવવામાં આવ્યો હોય તે કેટેગરી ની જગ્યા ખાલી ગણી એ કેટેગરીના આગળના મેરીટ ક્રમાંક ના વિદ્યાર્થી ને આવી બેઠકો પર પ્રવેશ ફાળવવાનો રહેશે.

(4) SC અથવા ST પૈકી જે કેટેગરીમાં બેઠક ખાલી હોય અને વિદ્યાર્થીઓ ઉપલબ્ધ ના હોય (તે કેટેગરી નું મેરીટ લિસ્ટ એક્ઝોસ્ટ થઈ ચૂક્યું હોય) તેવા સંજોગોમાં ખાલી પડેલી બેઠકો અરસપરસ ટ્રાન્સફર કરવી (SC કેટેગરીની બેઠકો ખાલી પડે તો ST કેટેગરીને અને ST કેટેગરીની બેઠક ખાલી પડે તો SC કેટેગરીમાં) અરસપરસ ટ્રાન્સફર કર્યા બાદ જો કોઈ બેઠક ખાલી રહે તો આવી બેઠકો સામાન્ય કેટેગરીને ટ્રાન્સફર કરવી.

(5) EWS કે SEBC કેટેગરીમાં બેઠક ખાલી હોય અને વિદ્યાર્થીઓ ઉપલબ્ધ ના હોય તેવા સંજોગોમાં ખાલી પડેલી બેઠકો જનરલ કેટેગરીમાં ટ્રાન્સફર કરવી.

(6) અનામત કેટેગરીની બેઠકો ભરાયા બાદ ખાલી પડેલી બેઠકો જનરલ કેટેગરીમાં ટ્રાન્સફર કરી જનરલ કેટેગરીના પ્રવેશ ફાળવવાના રહેશે. ટ્રાન્સફર / કન્વર્ટ કરેલી સીટોની વિગતો આ સાથે સામેલ પત્રક માં કોલેજ / વિભાગ ખાતે સહી સિક્કા કરીને નિભાવવાની રહેશે તથા યુનિવર્સિટી કાર્યાલય ખાતે માગવામાં આવે તો રજૂ કરવાની રહેશે. (Annexure - 4)

(7) પ્રથમ તબક્કામાં ભરાયેલ ફોર્મ ની પ્રવેશ પ્રક્રિયા ચાલુ થાય ત્યાર બાદ તરત પ્રવેશ ફોર્મ ભરવાનું ચૂઈ ગયેલા વિદ્યાર્થીઓ માટે બેચ - ૨ ના પ્રવેશ ફોર્મ ભરાવવાની પ્રક્રિયા ચાલુ કરવી તથા જે કોલેજો નું પ્રથમ બેચ નું મેરીટ લિસ્ટ એક્ઝોસ્ટ થઈ જાય તે કોલેજોને બેચ - ૨ માં પ્રવેશ ફોર્મ ભરનાર વિદ્યાર્થીઓની પ્રવેશ કાર્યવાહી કરે તેવી વ્યવસ્થા ગોઠવવી

19. દરેક રાઉન્ડ અંગેની વિગત આ સાથે સામેલ પત્રક માં કોલેજ / વિભાગ ખાતે સહી સિક્કા કરીને નિભાવવાની રહેશે તથા યુનિવર્સિટી કાર્યાલય ખાતે માગવામાં આવે તો રજૂ કરવાની રહેશે. (Annexure - 5)

20. ઉમેદવારે એક કોલેજમાં પ્રવેશ મેળવ્યા બાદ તેની પસંદગીની બીજી કોલેજમાં પ્રવેશ મેળવવા માટે આગાઉની કોલેજમાં મળેલ પ્રવેશ રદ કરાવ્યા બાદજ અન્ય કોલેજમાં પ્રવેશ મળશે. જોકે અગાઉની કોલેજમાં પ્રવેશ રદ કરાવવા માટે વિદ્યાર્થીએ અગાઉની કોલેજમાં જવાની જરૂર રહેતી નથી પરંતુ વિદ્યાર્થીઓ જે કોલેજમાં પ્રવેશ મેળવવા માંગે છે ત્યાં જઈ પ્રવેશ રદ કરાવવાની પ્રક્રિયા કરવાની રહેશે. જે કોલેજમાં પ્રવેશ મેળવવા માંગે છે ત્યાં રાઉન્ડમાં નંબર આવે ત્યારે રાઉન્ડના સમયગાળા દરમિયાન સમયસર પહોંચી કોલેજ પ્રવેશ કાર્યવાહી કરે તે દરમિયાન અગાઉની કોલેજમાં પ્રવેશ રદ કરાવવા માટેનો ઓ.ટી.પી. મળશે તે નવી કોલેજમાં આપવાથી અગાઉની કોલેજમાં પ્રવેશ રદ થશે તથા નવી કોલેજમાં પ્રવેશ મળશે. પ્રવેશ પ્રક્રિયા દરમિયાન રાઉન્ડના સમયગાળા દરમિયાન કોલેજની રૂબરૂ મુલાકાત સમયે વિદ્યાર્થીએ પોતાના રજિસ્ટર્ડ મોબાઈલ નંબર વાળો ફોન (હેન્ડ સેટ) પોતાની પાસે અવશ્ય રાખવાનો રહેશે.

21. પ્રવેશ પ્રક્રિયા દરમિયાન રાઉન્ડનો ઓછામાં ઓછો સમયગાળો ૪૮ કલાકનો રાખવાનો રહેશે (સમય સંજોગો અને અનુકૂળ વાસ્તવિક પરિસ્થિતિ અનુસાર માનનીય કુલપતિશ્રી તેમાં પરિપત્ર કરીને ફેરફાર કરી શકશે). પ્રવેશ પ્રક્રિયા દરમિયાન કોલેજો તથા યુનિવર્સિટી વિભાગો પોતાના કામકાજ ના સમય દરમિયાન સીમિત સમયમાં કામકાજ કરવાને બદલે ઓછામાંઓછા સવારના ૮.૦૦ કલાકથી સાંજના ૫.૦૦ કલાક દરમિયાન કામગીરી કરશે.

22. કોલેજો/વિભાગો પોતાના લોગીનમાંથી મેરીટ લિસ્ટ ઓપરેટ કરશે તથા ઓનલાઇન અરજી કરનાર વિદ્યાર્થીઓનું મેરીટ લિસ્ટ પૂર્ણ થઈ જાય (એકઝહોસ્ટ થઈ જાય એટલેકે મેરીટ યાદી પૈકીના દરેક વિદ્યાર્થીને પ્રવેશ ઓફર કરી દેવામાં આવે ત્યાર બાદ જે બેઠકો ખાલી રહે તે બેઠકો તથા આવી કોલેજોમાં પ્રવેશ મેળવીને વિદ્યાર્થીઓ પ્રવેશ રદ કરાવે તે રીતે બેઠકો ખાલી પડે તેવી બેઠકો પર કોલેજ પોતે ખાલી બેઠકોની માહિતી જાહેર કરી આ સાથે સામેલ નૂમના મુજબના ફોર્મમાં (Annexure - 6) અરજીઓ મેળવે અને જો બેઠકો કરતા વધુ અરજીઓ મળે તો આવેલી અરજીઓનું આ સાથે સામેલ નૂમના મુજબના ફોર્મમાં (Annexure - 7) મેરીટ બનાવી મંજૂર થયેલ બેઠકોની મર્યાદામાં મેરીટ અનુસાર પ્રવેશ આપે અને ત્યાર બાદ પણ જો બેઠકો ખાલી રહે તો જેકોઈ એલિજિબલ વિદ્યાર્થી પ્રવેશ માટે કોલેજ ખાતે ઈન્કવાયરી કરે તેને કોલેજ પ્રવેશ આપી શકે. તથા આવા વિદ્યાર્થીઓનું એનરોલમેન્ટ કોલેજ પોતાના લોગીનમાંથી ડાયરેક્ટ એન્ટ્રી પદ્ધતિથી કરે તેમજ આવા વિદ્યાર્થીઓ પાસેથી નિયત પ્રોસેસિંગ ફી સ્વીકારી એનરોલમેન્ટ સમયે યુનિવર્સિટી ખાતે જમા કરાવે.

23. વિવિધ પ્રોગ્રામો (અભ્યાસક્રમો) ની પ્રવેશ લાયકાત (એલિજિબિલિટી) સ્ટેચ્યુટ - ૨૨૩ તથા તેને અનુસંધાને નક્કી થેયલ વિસ્તૃત નિયમો અનુસાર ની રહેશે. આંતર વિદ્યાશાખાકીય (ઇન્ટર ડીસીપ્લીનરી)

પ્રવેશ ના કિસ્સામાં કોઈ પણ તબક્કે યુનિવર્સિટી તરફથી બ્રિજ કોર્સ કે પ્રવેશ કન્ફર્મ કરવા માટેની યોગ્યતા કસોટી કે એન્ટ્રન્સ ટેસ્ટ (પ્રવેશ પરીક્ષા) લેવામાં આવે તો વિદ્યાર્થીઓને તે બંધનકર્તા રહેશે.

24. સ્નાતક કક્ષાના અભ્યાસક્રમો માં મેરીટની ગણતરી:

A - ધોરણ ૧૨ ના ટકાને આધારે મેરીટ ની ગણતરી થશે (કુલ ગુણમાંથી મેળવેલ ગુણ પરથી જે ટકા નીકળશે તે વિદ્યાર્થી ના મેરીટ માર્ક્સ ગણાશે)

જે વિદ્યાર્થીઓએ ધોરણ ૧૨ ની પરીક્ષા એક કરતાં વધુ પ્રયત્ને પાસ કરેલ હોય તો નીચે મુજબ ના ટકા મેરીટ માર્ક્સ માંથી કપાશે

પ્રથમ પ્રયત્ને - ૦

બીજા પ્રયત્ને - ૨

ત્રીજા પ્રયત્ને - ૪

ચોથા પ્રયત્ને - ૬

પાંચ તથા તેથી વધારે ગમેતેલા પ્રયત્નો હોય - ૮

જે કિસ્સાઓમાં મેરીટ માર્ક્સ સરખા થાય તે કિસ્સાઓમાં ટાય બ્રેકર નીચે મુજબ રહેશે.

B - (બી.એસ.સી તથા બી.એસ.સી કોમ્પ્યુટર સાયન્સ)

૧. જે વિદ્યાર્થી ના પ્રેક્ટિકલ માર્ક્સ વધુ હશે તેને અગ્રીમતા અપાશે.

૨. જો પ્રેક્ટિકલના માર્ક્સ પણ સરખા હોય તે જે વિદ્યાર્થીએ ગણિત/બાયોલોજી વિષય વધારે માર્ક્સ મેળવ્યા હોય તેને અગ્રીમતા અપાશે.

૩. ક્રમ ૧ અને ક્રમ ૨ બાદ પણ જો ટાઈ હોય તો નીચેના અનુક્રમ વિષયોમાં વધુ માર્ક્સ હશે તેને અગ્રીમતા આપવામાં આવશે:

બાયોલોજી / મેથ્સ

ફિઝિક્સ

કેમેસ્ટ્રી

૪. ક્રમ ૧, ૨ અને ૩ બાદ જો ટાઈ યથાવત રહે તો જે વિદ્યાર્થી ઉંમરમાં મોટો હોય તેને અગ્રીમતા આપવામાં આવશે.

C - (બી.કોમ તથા બી.કોમ ઓનર્સ)

૧. બે વિદ્યાર્થીઓના મેરીટમાર્ક્સ સરખથાય તો નીચેના અનુક્રમિત વિષયોના માર્ક્સના આધારે ટાઈ બ્રેક કરવાની રહેશે.

એકાઉન્ટન્સી

સ્ટેટિસ્ટિક્સ

ઇકોનોમિક્સ

અંગ્રેજી

૨. ક્રમ ૧ બાદ જો ટાઈ યથાવત રહે તો જે વિદ્યાર્થી ઉંમરમાં મોટો હોય તેને અગ્રીમતા આપવામાં આવશે.

D - (અન્ય તમામ સ્નાતક કક્ષાના અભ્યાસક્રમો)

૧. વિદ્યાર્થીના ધોરણ ૧૦ ના માર્ક્સ

૨. ક્રમ ૧ બાદ જો ટાઈ યથાવત રહે તો જે વિદ્યાર્થી ઉંમરમાં મોટો હોય તેને અગ્રીમતા આપવામાં આવશે.

E - જે અભ્યાસક્રમોમાં ધોરણ - ૧૨ ના માર્ક્સ ઉપરાંત અન્ય કોઈ માર્ક્સ જેવા કે એન્ડ્રન્સ ટેસ્ટ, ગ્રુપ ડિસ્કશન, પર્સનલ ઇન્ટરવ્યૂ કે અન્ય એ પ્રકારનો માપદંડ હોય તે સંજોગોમાં ટાઈ બ્રેક ના નિયમો નીચે મુજબ રહેશે:

નિર્ધારિત મેરીટ માર્ક્સ માં જો ટાઈ થાય તો પ્રથમ એન્ડ્રન્સ ટેસ્ટ, ગ્રુપ ડિસ્કશન, પર્સનલ ઇન્ટરવ્યૂ (જે લાગુ પડતું હોય તે) ના માર્ક્સ ને અગ્રીમતા આપવી, ત્યાર બાદ ધોરણ - ૧૦ ના માર્ક્સ ને અગ્રીમતા આપવી અને ત્યારબાદ પણ ટાઈ થાય તો જે વિદ્યાર્થી ઉંમરમાં મોટો હોય તેને અગ્રીમતા આપવામાં આવશે.

અપલોડ કરેલ ડોક્યુમેન્ટ ને આધારે ઓનલાઇન એડમિશન ફોર્મ ના વેરિફિકેશનની પ્રક્રિયા

- 1) vnsqu.net માં જઈ પોતાના લોગીન આઈ.ડી. તથા પાસવર્ડ થી લોગીન કરવું.
- 2) લોગીન થયા બાદ ડેશબોર્ડ પર Admissions પર ક્લિક કરવું.
- 3) Application Verification મેનુમાં જઈ Verify Application પર ક્લિક કરીને Application Details પેજ ખુલશે.
- 4) Admission Process Batch માં જે ફોર્મ વેરીફાય કરવાનાં હોય તો બેચ સિલેક્ટ કરવી.
- 5) ત્યારબાદ Admission Process માં લાગુ પડતી એડમિશન પ્રોસેસ સિલેક્ટ કરવી.
- 6) Date માં જે તારીખ થી જે તારીખ વચ્ચે આવેલી અરજી નું વેરિફિકેશન કરવું હોય તે date ની રેન્જ પસંદ કરવી
- 7) ત્યારબાદ Category મેનુમાં જો કોઈ ચોક્કસ કેટેગરીના ફોર્મ વેરીફાય કરવા હોય તો તે કેટેગરી સિલેક્ટ કરવી જો કોઈ કેટેગરી સિલેક્ટ કરવામાં નહિ આવે તો તમામ કેટેગરીના ફોર્મ દેખાશે.
- 8) ઉપરોક્ત વિગતો સિલેક્ટ કર્યા બાદ Application Number માં ડ્રોપ ડાઉન માં જે ફોર્મ વેરીફાય કરવા ના બાકી હશે તેવાં ફોર્મના એપ્લિકેશન નંબર દેખાશે. જે નંબરો પૈકી કોઈ એક નંબર સિલેક્ટ કરી તે એપ્લિકેશન ફોર્મ વેરિફિકેશન કરવા આગળ વધવું.
- 9) વેરિફિકેશન આઈટમ Basic માં Last Qualifying H.S.C Exam Board *, Exam Month / Year *, Seat No * Surname * Name * તથા Father/Husband/Mother Name * ની વિગતો અપલોડ કરેલ HSC ની માર્કશીટ ઓપન કરી વેરીફાય કરવી. Birth Date * અપલોડ કરેલ SSC ની માર્કશીટ ઓપન કરી વેરીફાય કરવી જો SSC ની માર્કશીટમાં જન્મતારીખ ન દર્શાવેલ હોય તો વિદ્યાર્થીએ લખેલી જન્મતારીખ વેરીફાય કરી દેવી. જે Category * દર્શાવેલ છે તેનું સર્ટિફિકેટ એટેચ કરેલ છે કે કેમ તે ઓપન કરી વેરીફાઈ કરવું. Do You Have Any Disability (PH) માં જો None દર્શાવેલ હોય તો કોઈ ડોક્યુમેન્ટ ઓપન કર્યા વગર વેરીફાઈ કરવું પરંતુ જોઈ None સિવાય કંઈ દર્શાવેલ હોય તો અપલોડ કરેલ સર્ટિફિકેટ ઓપન કરી વેરીફાઈ કરવું (PH નું સર્ટિફિકેટ સિવિલ સર્જન દ્વારા ઇસ્યુ થયેલ હોવું જોઈએ તથા વિકલાંગતા ઓછામાં ઓછી ૪૦% હોવી જોઈએ), Region of Last School

/ College * માં વિદ્યાર્થીએ જે માહિતી આપી હોય તે માન્ય ગણી વેરીફાય કરી દેવું અને Save and Verify પર ક્લિક કરવું.

10) વેરિફિકેશન આઈટમ Personal ની વિગતો પૈકી માત્ર Cast Certificate Date* વેરીફાય કરવાની થાય. જે અપલોડ કરેલ Caste Certificate ઓપન કરી વેરીફાય કરવી તથા અન્ય વિગતો વિદ્યાર્થી જે ભરી હોય તે વેરીફાય પર ટીક કરી Save and Verify પર ક્લિક કરી દેવું.

11) વેરિફિકેશન આઈટમ Academic માં Previous Stream * HSC ના વિષય વાર marks, HSC. TOTAL OBTAIN MARKS DETAILS, NO OF ATTEMPTS (H.S.C.) વગેરે ધોરણ ૧૨ ની અપલોડ કરેલ માર્કશીટ ઓપન કરી તેમાં દર્શાવેલ વિગતને આધારે વેરીફાય કરવી. ત્યારબાદ S.S.C. SEAT NUMBER, S.S.C. TOTAL MARKS, ની વિગતો ધોરણ ૧૦ ની અપલોડ કરેલ માર્કશીટ ઓપન કરી તેમાં દર્શાવેલ વિગતને આધારે વેરીફાય કરવી અને Save and Verify પર ક્લિક કરી દેવું.

12) વેરિફિકેશન આઈટમ Attachments માં વિદ્યાર્થીનો ફોટો બરાબર છે કે કેમ તે વેરીફાય કરવું. ત્યાર બાદ અન્ય અપલોડ કરેલ દસ્તાવેજો બરાબર વાંચી શકાય તેજ છે કે કેમ ચકાસવું. જો ધોરણ ૧૨ એક કરતાં વધુ પ્રયત્નો એ પાસ કરેલ હોય તો જેટલા ધોરણ ૧૨ ની પરીક્ષા પાસ કરી હોવાનું દર્શાવેલ છે તેટલી માર્કશીટો અટેચ કરેલી છે કે કેમ તે ખાસ ચકાસવું. જો SEBC કેટેગરીનો વિદ્યાર્થી હોય તો એસ.સી.બી.સી નું જાતી અંગેનું પ્રમાણપત્ર તથા નોન-કીમીલેયર સર્ટીફિકેટ બંને અટેચ કરેલ છે કે કેમ તે ખાસ ચકાસવું. અને અને Save and Verify પર ક્લિક કરી આગળ વધવું.

13) વિદ્યાર્થીએ તમામ ડોક્યુમેન્ટ અપલોડ કરેલાં હોય પરંતુ ૧૦ મા ધોરણ ની માર્કશીટ અપલોડ કરવાની જગ્યાએ ધોરણ ૧૨ ની માર્કશીટ અને ૧૨ મા ધોરણ ની માર્કશીટ અપલોડ કરવાની જગ્યાએ ધોરણ ૧૦ ની માર્કશીટ. તથા ૧૦ મા ધોરણ ની માર્કશીટ અપલોડ કરવાની જગ્યાએ જાતિનું પ્રમાણપત્ર એમ ઉલટ સુલટ જગ્યાએ ડોક્યુમેન્ટ અપલોડ કરેલ હોય. આવા સંજોગોમાં જો બધા ડોક્યુમેન્ટ ઉલટસૂલટ જગ્યાએ હોવા છતાં તમામ ડોક્યુમેન્ટ અપલોડ કરેલ હોય તો ફોર્મ વેરીફાઈ કરવું.

14) વિદ્યાર્થીએ સ્પોર્ટ્સ કેટેગરી સિલેક્ટ કરેલ હોય પરંતુ તે જોડેલ પ્રમાણપત્ર રાજ્ય કક્ષા કે રાષ્ટ્રીય કક્ષા સિવાયની રમતમાં સહભાગિતા અંગેનું હોય તેવા કિસ્સામાં "Please upload state level or national level certificate" ની રિમાર્ક સાથે ની કવેરી મોકલવી રીમાર્કસ લખવી.

15) જો ફોટો ની જગ્યાએ અન્ય કોઈ ભલતી ઇમેજ અપલોડ કરેલી હોય તો અથવા જો ફોટો બરાબર જોઈ શકાય તેમ ના હોય તો વિદ્યાર્થીને "uploaded image of the photograph is not visible, please upload a visible image of photograph within 2 days" ની રિમાર્ક સાથે ની કવેરી મોકલવી.

16) અપલોડ કરેલ માર્કશીટમાં દર્શાવેલ નામ અને ઓનલાઈન ફોર્મમાં વિદ્યાર્થીએ દર્શાવેલ નામમાં વિસંગતતા જણાય તો ધોરણ ૧૨ ની માર્કશીટમાં દર્શાવ્યા અનુસાર નું નામ સુધારી દેવું અને "your name has been rectified in accordance to your 12th standard mark sheet" ની રિમાર્ક સાથે ફોર્મ વેરીફાઈ કરવું.

17) અપલોડ કરેલ ૧૦મા ધોરણની માર્કશીટમાં દર્શાવેલ જન્મ તારીખ અને ઓનલાઈન ફોર્મમાં વિદ્યાર્થીએ દર્શાવેલ જન્મ તારીખમાં વિસંગતતા જણાય તો ધોરણ ૧૦ ની માર્કશીટમાં દર્શાવ્યા મુજબની જન્મતારીખ સુધારી લેવી અને "your date of birth has been rectified in accordance to your 10th standard mark sheet" ની રિમાર્ક સાથે ફોર્મ વેરીફાઈ કરવું.

18) અપલોડ કરેલ માર્કશીટમાં દર્શાવેલ માર્ક્સ અને ઓનલાઈન ફોર્મમાં વિદ્યાર્થીએ દર્શાવેલ માર્ક્સમાં વિસંગતતા જણાય તો જે તે માર્કશીટમાં દર્શાવ્યા અનુસાર ના માર્ક્સ સુધારી દેવા અને "your marks have been rectified in accordance to your 10th standard mark sheet" અથવા "your marks have been rectified in accordance to your 12th standard mark sheet" આ બે (૨) પૈકી જે લાગુપડતી હોય તે રિમાર્ક સાથે ફોર્મ વેરીફાઈ કરવું.

19) અપલોડ કરેલ માર્કશીટમાં દર્શાવેલ માર્ક્સમાં ગ્રેસ મળેલી હોય અને ઓનલાઈન ફોર્મમાં વિદ્યાર્થીએ દર્શાવેલ માર્ક્સ ગ્રેસ સહિતના માર્ક્સ દર્શાવેલા હોય તો ગ્રેસ માર્ક્સ સિવાયના માર્ક્સ મુજબનો સુધારો કરવો તથા "your marks have been rectified in accordance to your 10th standard mark sheet, deducting grace marks" અથવા "your marks have been rectified in accordance to your 12th standard marksheet, deducting grace marks" આ બે (૨) પૈકી જે લાગુપડતી હોય તે રિમાર્ક સાથે ફોર્મ વેરીફાઈ કરવું.

20) અપલોડ કરેલ માર્કશીટો મુજબના પ્રયત્નો અને ઓનલાઈન ફોર્મમાં વિદ્યાર્થીએ દર્શાવેલ પ્રયત્નો ની સંખ્યામાં વિસંગતતા જણાય તેવા કિસ્સાઓમાં:

a. જો ફોર્મમાં દર્શાવેલ પ્રયત્નો ની સંખ્યા કરતાં વધારે માર્કશીટો અપલોડ કરેલ હોય તો માર્કશીટો ની સંખ્યા અનુસાર પ્રયત્નોની ગણતરી કરી તે મુજબ પ્રયત્નો ની સંખ્યા સુધારી દેવી અને “number of attempts have been ratified in accordance to your 10th standard mark sheets” અથવા “number of attempts have been ratified in accordance to your 12th standard mark sheets” આ બે (૨) પૈકી જે લાગુ પડતી હોય તે રિમાર્ક સાથે ફોર્મ વેરીફાઈ કરવું.

b. જો ફોર્મમાં દર્શાવેલ પ્રયત્નો ની સંખ્યા કરતાં ઓછી માર્કશીટો અપલોડ કરેલ હોય તો “please attach all 10th standard mark sheets of each and every attempt” અથવા “please attach all 12th standard mark sheets of each and every attempt” આ બે (૨) પૈકી જે લાગુ પડતી હોય તેની રિમાર્ક સાથે ની ક્વેરી મોકલો.

21) અપલોડ કરેલ માર્કશીટમાં દર્શાવેલ ગ્રુપ (A, B or AB) અને ઓનલાઈન ફોર્મમાં વિદ્યાર્થીએ ગ્રુપમાં વિસંગતતા જણાય તો માર્કશીટમાં દર્શાવ્યા અનુસાર નું ગ્રુપ સુધારી દેવું અને “your group has been rectified in accordance to your 12th standard mark sheet” ની રિમાર્ક સાથે ફોર્મ વેરીફાઈ કરવું.

22) ઓનલાઈન ફોર્મમાં વિદ્યાર્થીએ દર્શાવેલ કેટેગરી ને લાગુ પડતું પ્રમાણપત્ર વિદ્યાર્થીએ અપલોડ ન કર્યું હોય અથવા અપલોડ કરેલ પ્રમાણપત્ર સુવાચ્ય ના હોય અથવા પ્રમાણપત્ર સક્ષમ અધિકારી એ આપેલ ન હોય. તથા વિદ્યાર્થીએ જે કેટેગરી માટે એપ્લાય કર્યું હોય તે કેટેગરી માટે જરૂરી પ્રમાણપત્ર અપલોડ કરવા ને બદલે પ્રમાણપત્ર મેળવવા માટે કરેલ અરજીની પહોંચ રજૂ કરેલ હોય. તેવા સંજોગોમાં નીચે દર્શાવ્યા પૈકી જે લાગુ પડતી હોય તે ની રિમાર્ક સાથે ની ક્વેરી મોકલવી

- Please upload visible image of 10th Mark Sheet
- Please upload visible image of 12th Mark Sheet
- Please upload visible image of SC certificate
- Please upload visible image of ST certificate
- Please upload visible image of SEBC certificate
- Please upload visible image of Non Creamy Layer certificate
- Please upload visible image of EWS certificate
- Please upload visible image of PH certificate

- i. Please upload visible image of SC certificate issued by competent authority
- j. Please upload visible image of ST certificate issued by competent authority
- k. Please upload visible image of SEBC certificate issued by competent authority
- l. Please upload visible image of Non Creamy Layer certificate issued by competent authority
- m. Please upload visible image of EWS certificate issued by competent authority
- n. Please upload visible image of PH certificate issued by competent authority

નોંધ:

1. ઉપરોક્ત પ્રક્રિયા પૂર્ણ કરી જે વિદ્યાર્થી ના ફોર્મમાં જે કોઈ કવેરી હોય તે બાબતની માહિતી વિદ્યાર્થીને ફોન કરીને આપવી અને સત્વરે તે સોલ કરવા જણાવવું તેમજ ખૂંટતા ડોક્યુમેન્ટ અપલોડ કરવા વિદ્યાર્થીને મદદરૂપ થવું અને કવેરી સોલ થયા બાદ જ જે તે વિદ્યાર્થીનું ફોર્મ વેરીફાય કરવું.
2. વિદ્યાર્થીને કવેરી મોકલ્યા બાદ વિદ્યાર્થી કોઈ ડોક્યુમેન્ટ અપલોડ કરે ત્યારે તે જોયા બાદ જે તે વિગત ચકાસી પુનઃ વેરીફાય કરવી. તથા વિદ્યાર્થીએ અપલોડ કરેલ ડોક્યુમેન્ટ આપણા કોમ્પ્યુટરમાં ડાઉનલોડ કરીને વિદ્યાર્થીની ઓરિજિનલમાં જે તે જગ્યાએ અપલોડ કરવું.

Help Manual

De-Centralize Admission Module

Document No. DCAM-VNSGU-WC-100-HM-T-001

Total Pages : 8

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1. Merit Iteration Master

Insert Functionality:

- This Form Allow colleges to add Merit Iteration for different Merit list published by University
- Form Contains fields like Merit Head, Merit Iteration No and Merit List Name, Category.

Merit Iteration Master

College * A N PATEL COMMERCE COLLEGE SURAT

Admission Batch * B COM 2019-20

Admission Process * ADMISSION FOR BACHELOR OF COMMERCE 2019-20 SURAT

Merit Head * MERIT LIST FOR BACHELOR COMMERCE

Merit Iteration * 1

Published Merit Details

Sl No.	Merit List Name	College	Category
1	ADMISSION FOR BACHELOR OF COMMERCE 2019-20 SURAT	A N PATEL COMMERCE COLLEGE SURAT	SC/ST
2	ADMISSION FOR BACHELOR OF COMMERCE 2019-20 SURAT	A N PATEL COMMERCE COLLEGE SURAT	SC/ST
3	ADMISSION FOR BACHELOR OF COMMERCE 2019-20 SURAT	A N PATEL COMMERCE COLLEGE SURAT	SC/ST
4	ADMISSION FOR BACHELOR OF COMMERCE 2019-20 SURAT	A N PATEL COMMERCE COLLEGE SURAT	SC/ST
5	ADMISSION FOR BACHELOR OF COMMERCE 2019-20 SURAT	A N PATEL COMMERCE COLLEGE SURAT	SC/ST

Edit Functionality:

- College can edit particular record.
- College can also mark Exhaust Iteration if Round for particular Category is completed.

View Functionality:

- College can View all records.
- College can also Export/ Delete Multiple records.

Merit Iteration Master

College * A N PATEL COMMERCE COLLEGE SURAT

Admission Batch * B COM 2019-20

Admission Process * ADMISSION FOR BACHELOR OF COMMERCE 2019-20 SURAT

Merit Head * MERIT LIST FOR BACHELOR COMMERCE

Merit Iteration * 1

Published Merit Details

Sl No.	Merit List Name	College	Category	Round	Exhaust	Completed	Max Round	Max Exhaust
1	ADMISSION FOR BACHELOR OF COMMERCE 2019-20 SURAT	A N PATEL COMMERCE COLLEGE SURAT	SC/ST	1	Yes	Yes	1	1

2. Round Master

Insert Functionality:

- This Form Allow colleges to add Round for different Merit list published by University
- Form Contains fields like Merit Iteration No, Round No and Round Name.

Edit Functionality:

- College can edit particular record.
- College can also complete Round if Allotment for particular round is completed.

View Functionality:

- College can View all records.
- College cans also Export/ Delete Multiple records.

Edit	Sr No.	College Name	Admission Batch Name	Admissi
☐	1	DEPARTMENT OF COMPUTER SCIENCE, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SUR	PG DIPC.A. 2019-20	ADMISS
☐	2	DEPARTMENT OF COMPUTER SCIENCE, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SUR	PG DIPC.A. 2019-20	ADMISS
☐	3	DEPARTMENT OF COMPUTER SCIENCE, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SUR	PG DIPC.A. 2019-20	ADMISS
☐	4	DEPARTMENT OF COMPUTER SCIENCE, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SUR	PG DIPC.A. 2019-20	ADMISS

3. Merit Cut-off for College

Insert Functionality:

- This form Allow colleges to create Merit Cutoff Merit Marks wise or Merit Rank wise.
- Form contains fields like Round No, Merit Iteration No, Merit Cutoff Type, From Cutoff Rank and to Cutoff Rank.

Edit Functionality:

- College can edit particular record.
- If Round Completed, then colleges cannot edit Merit cutoff for colleges
- Colleges also Publish Cutoff for Student with Date Range functionality.

View Functionality:

- College can View all records.
- College can export Merit Cutoff Lists.
- Colleges can also publish multiple merit cutoffs from View Form.
- Colleges also send SMS to students for particular Merit Cutoff.

S.No.	Edit	Export To Excel	College Name	Admission Batch	Admission Process Name	Merit List Name	College Program Intake Name	Round
1			DEPARTMENT OF COMPUTER SCIENCE, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT	PG DIPLOMA 2019-20	ADMISSION FOR POST GRADUATE DIPLOMA IN COMPUTER APPLICATION 2019-20	GENERAL GRADUATE REGULAR FINAL MERIT LIST FOR PG DIPLOMA IN COMPUTER APPL 2019-20	PG DIPLOMA IN COMPUTER APPLICATION-Graduate Regular	100
2			DEPARTMENT OF COMPUTER SCIENCE, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT	PG DIPLOMA 2019-20	ADMISSION FOR POST GRADUATE DIPLOMA IN COMPUTER APPLICATION 2019-20	GENERAL GRADUATE REGULAR FINAL MERIT LIST FOR PG DIPLOMA IN COMPUTER APPL 2019-20	PG DIPLOMA IN COMPUTER APPLICATION-Graduate Regular	100
3			DEPARTMENT OF COMPUTER SCIENCE, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT	PG DIPLOMA 2019-20	ADMISSION FOR POST GRADUATE DIPLOMA IN COMPUTER APPLICATION 2019-20	GENERAL GRADUATE REGULAR FINAL MERIT LIST FOR PG DIPLOMA IN COMPUTER APPL 2019-20	PG DIPLOMA IN COMPUTER APPLICATION-Graduate Regular	100
4			DEPARTMENT OF COMPUTER SCIENCE, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT	PG DIPLOMA 2019-20	ADMISSION FOR POST GRADUATE DIPLOMA IN COMPUTER APPLICATION 2019-20	GENERAL GRADUATE REGULAR FINAL MERIT LIST FOR PG DIPLOMA IN COMPUTER APPL 2019-20	PG DIPLOMA IN COMPUTER APPLICATION-Graduate Regular	100

4. Admission Allotment by College Based On Cutoff

Functionality:

- This form allows colleges to Allot admission to students.
- Only Published Merit Cutoff will be display for Admission Allotment.
- Colleges can also view Seat details and last allotted student form View Seat Details button.
- This form also allows colleges to allot admission to students who already allotted to other colleges with OTP Based Cancellation Functionality.

The screenshot shows a web application interface for VNSGU. On the left is a sidebar menu with options: Home, Dashboard, Applications, Admission Allotment, Allotment (De-Centralize), Auto Allotment (Centralize), Extended Allotment, and Download. The main content area is titled "Admission Allotment By College Based On Cutoff". It contains several fields for selection: College (DEPARTMENT OF COMPUTER SCIENCE, VEER NARAIAD SOUTH GUJARAT UNIVERSITY, SURAT), Admission Process (ADMISSION FOR POST GRADUATE DIPLOMA IN COMPUTER APPLICATION 2019-20), Merit List (GENERAL - Grant in Aid - Regular/FINAL MERIT LIST FOR PGE DIPLOMA IN COMPUTER APPU-2019), Cui-Off (GENERAL: Rank From 1,000 To 10,000), Allotment Category (General), Allotment Disability (No Disability), Allotment College Program Details (DEPARTMENT OF COMPUTER SCIENCE, VEER NARAIAD SOUTH GUJARAT UNIVERSITY, SURAT DIPLOMA IN COMPUTER APPLICATION, Grant in Aid - Regular), and Allotment Batch (P.G.DIPLOMA 2019-20). There are two buttons: "Unfreeze" and "View Seat Details". Below these fields is a section for "Eligible Applicants:" which contains a table with 7 columns: Sr No., Print Application Form, Applicant No., Applicant Name, Category, Disability, and Merit. The table lists three applicants.

Sr No.	Print Application Form	Applicant No	Applicant Name	Category	Disability	Merit
1		AD201900162392	Mukhalyee Disha Harish	General	None	63.7
2		AD201900267677	PATEL AM ANAND	General	None	34.5
3		AD201900204499	GORASDA PRINVA KIRAN GUPA SHIVAM BHAN	General	None	56.2

5. Admission Allotment Status

Functionality:

- This form allows colleges to cancel any students with OTP Functionality.
- This form also allows colleges to print Admission allotment and Cancellation letter.

VNSGU

Admission Allotment Status

College * DEPARTMENT OF COMPUTER SCIENCE, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SUR

Admission Process * ADMISSION FOR POST GRADUATE DIPLOMA IN COMPUTER APPLICATION 2019-20

Merit Type * PG DIPLOMA IN COMPUTER APPLICATION-2019

Merit List-Cutoff * FINAL MERIT LIST FOR PG DIPLOMA COMPUTER APPLI-2019 : General + Grant in Aid - Reg. Jee

Show Applicant * ☒ Admission Alloted ☐ Admission Cancelled

Alloted Applicant Details:

Show 10 entries

Print	Cancel	Application No.	Applicant Name	Category	Gender	Disability	Merit Mark
		AD201900181441	Musra Shivam Ajinkumar	General	Male	None	51.1875
		AD201900228018	Bhardwaj Anil Kumar Ratan	General	Male	None	86.9000
		AD201900227506	GAMIT SUSHABEN RAMESHBHAI	ST	Female	None	54.9000
		AD201900220902	CHAUDHARI PRIYABEN AJIBHAI	ST	Female	None	51.4000
		AD201900240586	RATHOD SHANKARBHAI KALIDASBHAI	ST	Male	None	58.4000
		AD201900241897	PATE NEHA SANJAY	General	Female	None	54.0000
		AD201900244726	PATEL METTA PRAYINKHAI	General	Female	None	79.1000
		AD201900247057	CHHABRA PRIYANKA KUMAR	General	Female	None	60.5714

6. Seat Transfer

Insert Functionality:

- This form allows colleges to Transfer seats from one Merit List to Another Merit List.

VNSGU 2018

Seat Transfer

Admission Batch: PG DIP.C.A. 2019-20

College: DEPARTMENT OF COMPUTER SCIENCE, VEER NARAYAN SOUTH GUJARAT UNIVERSITY, SURAT

From

Merit Type: PG DIPLOMA IN COMPUTER APPLICATIONS

Program Type: Grant in Aid - Regular - English

Category: SEBC

Disability: None

Vacant Seats: 7

Last Allotted Round: NA

Round Status: NA

Seat To Be Transferred: 2

Remarks:

Submit Reset

To

Merit Type: PG DIPLOMA IN CC

Program Type: Grant in Aid - Regu

Category: General

Disability: None

Vacant Seats: 1

Last Allotted Round: 1

View Functionality:

- Colleges can View all records.
- Colleges can also Export Multiple records.

VNSGU 2018

Seat Transfer

Admission Batch: PG.DIP.C.A. 2019-20

College: DEPARTMENT OF COMPUTER SCIENCE

Show to: entries

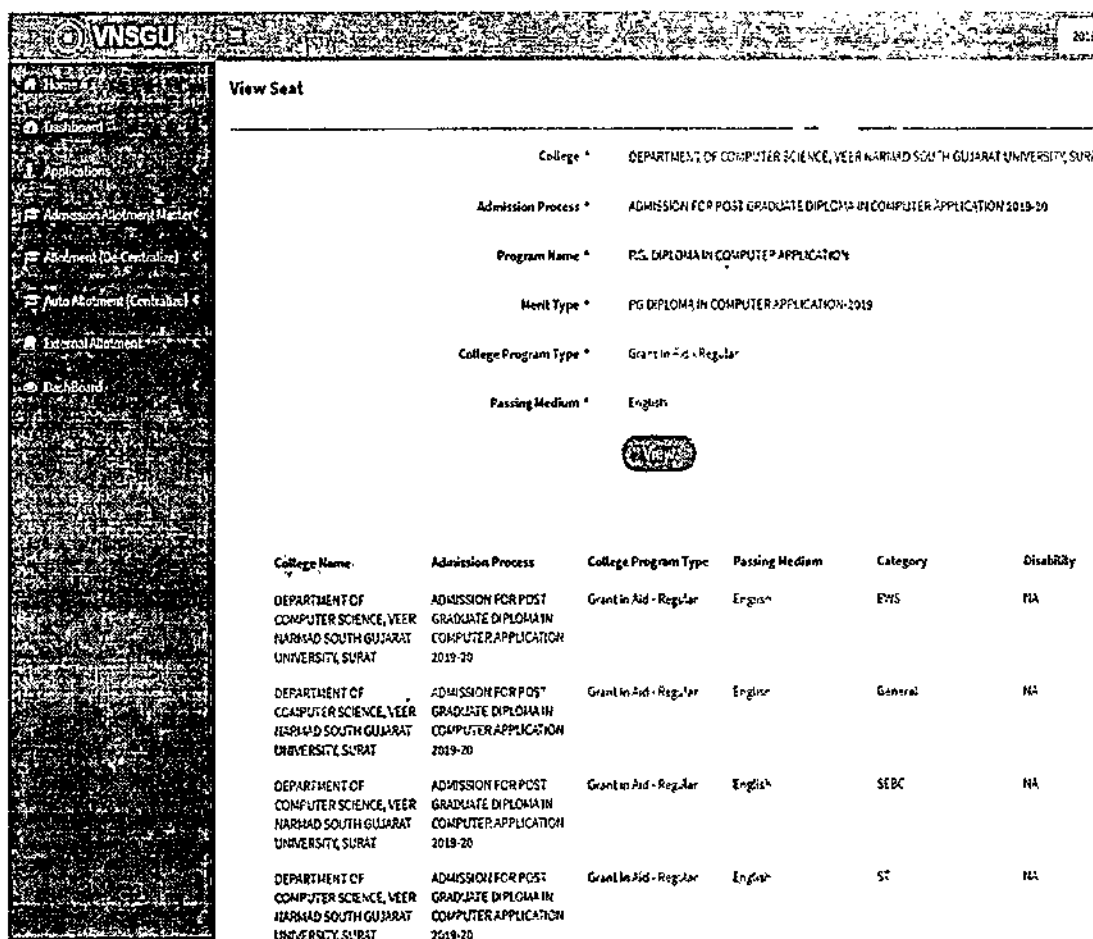
Sr.No.	College Name	Program	Batch Name	From Merit Type	To Merit Type	Ex. Pr.
1	DEPARTMENT OF COMPUTER SCIENCE, VEER NARAYAN SOUTH GUJARAT UNIVERSITY, SURAT		PG.DIP.C.A. 2019-20	PG DIPLOMA IN COMPUTER APPLICATIONS-2019	PG DIPLOMA IN COMPUTER APPLICATIONS-2019	Gr. Pr.
2	DEPARTMENT OF COMPUTER SCIENCE, VEER NARAYAN SOUTH GUJARAT UNIVERSITY, SURAT		PG.DIP.C.A. 2019-20	PG DIPLOMA IN COMPUTER APPLICATIONS-2019	PG DIPLOMA IN COMPUTER APPLICATIONS-2019	Gr. Pr.

Showing 1 to 2 of 2 entries

7. View Seat

Insert Functionality:

- This form allows colleges to View Seat Details for Each Merit List.



View Seat

College * DEPARTMENT OF COMPUTER SCIENCE, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Admission Process * ADMISSION FOR POST GRADUATE DIPLOMA IN COMPUTER APPLICATION 2019-20

Program Name * PG DIPLOMA IN COMPUTER APPLICATION

Merit Type * PG DIPLOMA IN COMPUTER APPLICATION-2019

College Program Type * Grant in Aid - Regular

Passing Medium * English

View Seat Details

College Name	Admission Process	College Program Type	Passing Medium	Category	Disability
DEPARTMENT OF COMPUTER SCIENCE, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT	ADMISSION FOR POST GRADUATE DIPLOMA IN COMPUTER APPLICATION 2019-20	Grant in Aid - Regular	English	EWS	NA
DEPARTMENT OF COMPUTER SCIENCE, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT	ADMISSION FOR POST GRADUATE DIPLOMA IN COMPUTER APPLICATION 2019-20	Grant in Aid - Regular	English	General	NA
DEPARTMENT OF COMPUTER SCIENCE, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT	ADMISSION FOR POST GRADUATE DIPLOMA IN COMPUTER APPLICATION 2019-20	Grant in Aid - Regular	English	SEBC	NA
DEPARTMENT OF COMPUTER SCIENCE, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT	ADMISSION FOR POST GRADUATE DIPLOMA IN COMPUTER APPLICATION 2019-20	Grant in Aid - Regular	English	ST	NA

8. End of Document

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
original Intake 100	25% increase in original intake to accommodate EWS i.e. 25	Total Intake with 25% increase i.e. 125	SC 7% of C	SC Non Ph. 97% of D	SC Ph. 3% of D	ST 15% of C	ST Non Ph. 97% of G	ST Ph. 3% of G	SEBC 27% of C	SEBC Non Ph. 97% of J	SEBC Ph. 3% of J	Gen 51% of C	Actual Seats to be allotted to General = M - O	Actual Seats to be allotted to EWS 10% of C	General non Ph. 97% of N	Gen. Ph 3% of N	EWS Non Ph. 97% of O	EWS Ph. 3% of O
100	25	125	8.75	8.84	0.26	18.75	18.18	0.56	33.75	32.73	1.01	63.75	51.2	12.5	49.664	1.536	12.12	0.375
			9	9	0	19	18	1	34	33	1	64	51	13	50	1	11	0

૨૭-૩ની વિગતો દર્શાવતું દરેક કોલેજે નિભાવવાનું પત્રક

[illegible]

Veer Narmad South Gujarat University, Surat.First Year Offline Admission Form

Programme Name :

Name of Student :

Address :

Contact No. 1 :

2 :

Email ID :

Date of Birth :

Gender :

Dis ability :

Passing Year :

No. of Attempt:

Passing Marks 10th : Total_____ Obtain_____ Percentage:Passing Marks 12th : Total_____ Obtain_____ Percentage:

Passing Stream :

Attachment: 1. Copy of 10th Mark sheet 2. Copy of 12th Mark sheet
3. Attempt Certificate 4. Leaving Certificate
5. Category Certificate

American

VEER NARMAD SOUTH GUJARAT UNIVERSITY SURAT

Admission Programme Name:

Academic Year:

Merit Header Name:

Merit Type:

[illegible]

Name of Program	Master of Science(Chemistry)
Abbreviation	M.Sc.
Duration	2 Years
Eligibility Criteria	M.Sc. Chemistry (Organic/Inorganic/ Analytical/Physical) ELIGIBILITY:(SC/ST- 35%, OPEN/SEBC-40%), A candidate who has obtained his/her Bachelor's Degree with chemistry shall be considered eligible for admission in M .Sc .Chemistry M.Sc. (Organic Chemistry) ELIGIBILITY :(SC/ST- 35%, OPEN/SEBC-40%), A candidate who has obtained his/her Bachelor's Degree with chemistry shall be considered eligible for admission in M.Sc.- Chemistry/Organic Chemistry. M. Sc .Environmental Chemistry ELIGIBILITY :(SC/ST- 35%, OPEN/SEBC-40%) A candidate who has obtained his/her Bachelor's Degree with chemistry shall be considered eligible for admission in M.Sc.- Chemistry/Organic Chemistry (SF.)/ Environmental Chemistry (S.F.) Course. M.Sc. Organic Chemistry (Evening) ELIGIBILITY :(SC/ST- 35%, OPEN/SEBC-40%) A candidate selecting M.Sc. Evening course (2 years) with Organic Chemistry as specialization must have passed the Bachelor's Degree examination with Chemistry and English as compulsory subject. Those who are in service will have to produce minimum one year's experience certificate from the Employer.
Objective of Program	The core objective of the M.Sc. programme is to prepare the students for dynamic career in industry and academia by providing an excellent environment of teaching and research in the core and emerging areas of the discipline.
Program Outcome	PO1: To enhance the knowledge of chemistry domains and become master in respective branch of chemistry. To be able to communicate clearly and effectively with in and across disciplinary lines. PO2: Built up entrepreneurship ability by taking advantage of industrial hub in periphery of our university. PO3: Establishment of research center with the aid of interdisciplinary subject being run in university. PO4: Persuasion of doctoral degree in the concern subject and further study. PO5 : Development of related short term courses related to demanded subject in anticipation of strengthening knowledge and application PO6: Training/internship of students for employment in public sector, private sector and national laboratories. PO7: Participation in scientific discussions showing respect and lead interdisciplinary work with experts from other fields. PO8: To understand and adopt the best safety practices in chemical research. PO9: Participation in scientific discussions showing respect and lead

	interdisciplinary work with experts from other fields. PO10: To understand and adopt the best safety practices in research.
Program Specific Outcomes	Students need to build up foundation in the fundamentals & application of current chemical and scientific theories in the concerned branches of Inorganic, Organic, Analytical, Physical, Environmental and Pharmaceutical Chemistry. PSO1 : Develop scientific temper, communicate scientific information in a clear, concise and precise manner. PSO2 : Find job opportunities at all level of chemical industries(dyes & pharmaceutical), national laboratories & research centers. PSO3 : Apply the knowledge in sustainable and eco friendly technologies. PSO4 : Inculcate logical thinking to address the problem and become result oriented. PSO5 : Development of research culture in preparation of Ph.D. program at national & international institute/university. PSO6 : Participate in specific competitive examination conducted by various public service commission and other public sector. PSO7 : Develop and apply the fundamental knowledge to build small scale industry in context to Atma Nirbhar Bharat. PSO8 : Scale up the synthetic product to a pilot level plant and gradually to bulk. PSO9 : Enhance the scientific temperament among the students in anticipation of developing research culture and implementation of policies at global & local level. PSO10 : Communicate scientific information clear in both writing and orally. PSO11 : Students shall start to become better readers, thinkers and learners in their discipline by processing their ideas through writing. PSO12 : Will build new scientific understanding as it provides students the opportunity to articulate their thinking as they engage in the science practices during an investigation.

Mapping between POs and PSOs		P S O 1	P S O 2	P S O 3	P S O 4	P S O 5	P S O 6	P S O 7	P S O 8	P S O 9	P S O 10	P S O 11	P S O 12
	PO1												
	PO2												
	PO3												
	PO4												
	PO5												
	PO6												
	PO7												
	PO8												
	PO9												
	PO10												
Medium of Instruction	English												

**Structure of M. Sc, Syllabus
Semester-I**

Sr. No.	Course Code	Course Title	L	T/C/S	Credit
1	1803080201010001	Inorganic Chemistry	4		4
2	1803080201020001	Organic Chemistry	4		4
3	1803080201030001	Physical Chemistry	4		4
4	1803080201040001	Instrumental and chemical analysis	4		4
5		Practicals + T/C/S	12	3	6 + 3
			28	3	25

Faculty Code: Science

Subject code:

Level code:

Name of program: M. Sc.

Subject: Chemistry

External Examination Time Duration: 03 hrs

Name of Exam	Semester	Paper No	Course group	Credit	Internal Marks	External Marks	Total Marks
M. Sc.	I	I	Core	04	30	70	100
		II	Core	04	30	70	100
		III	Core	04	30	70	100
		IV	Core	04	30	70	100
			Practical + T/C/S	06 +3	60	140	200
			Total	25	180	420	600

**Structure of M. Sc, Syllabus
Semester-II**

Sr. No.	Course Code	Course Title	L	T/C/S	Credit
1	1903080202010001	Inorganic Chem	4		4
2	1903080202020001	Organic	4		4
3	1903080202030001	Physical	4		4
4	1903080202040001	Instrumental and chemical analysis	4		4
5		Practicals + T/C/S	12	3	6 + 3
			28	3	25

Faculty Code: Science

Subject code:

Level code:

Name of program: M. Sc.

Subject: Chemistry

External Examination Time Duration: 03 hrs

Name of Exam	Semester	Paper No	Course group	Credit	Internal Marks	External Marks	Total Marks
M. Sc.	II	I	Core	04	30	70	100
		II	Core	04	30	70	100
		III	Core	04	30	70	100
		IV	Core	04	30	70	100
			Practical + T/C/S	06 + 3	60	140	200
			Total	25	180	420	600

M.Sc. Semester-III (INORGANIC CHEMISTRY)

Sr. No.	Course Title	L	T/C/S	Credit
1	Selected Topics in Inorganic Chemistry	4	1	4
2	Metallurgy, Bio-fertilizer & Ion exchange Chromatography	4	1	4
3	General Topics in Inorganic Chemistry	4	1	4
4	Co-ordination Chemistry (Special Paper)	4	1	4
5	Practicals	12		8
		28	4	24

External Examination Time Duration: 03 hrs

Name of Exam	Semester	Paper No	Course group	Credit	Internal Marks	External Marks	Total Marks
M. Sc.	III	I	Core	04	30	70	100
		II	Core	04	30	70	100
		III	Core	04	30	70	100
		IV	Core	04	30	70	100
			Practical	08	60	140	200
			Total	24	180	420	600

M.Sc. Semester-IV (INORGANIC CHEMISTRY)

Sr. No.	Course Title	L	T/C/S	Credit
1	Selected Topics in Inorganic Chemistry	4	1	4
2	Chemistry of Complexes	4	1	4
3	Spectroscopy & Agricultural Pollutants	4	1	4
4	Co-ordination Chemistry(Special paper)	4	1	4
5	Practicals	12		8
		28	4	24

M.Sc. Semester-III (ORGANIC CHEMISTRY)

Sr. No.	Course Title	L	T/C/S	Credit
1	Natural Products and Bio-molecules	4	1	4
2	Selected Topics In Organic Chemistry-I	4	1	4
3	Organic Chemistry in Industry	4	1	4
4	Medicinal Chemistry-I OR Dye and Intermediates-I	4	1	4
5	Practicals	12		8
		28	4	24

External Examination Time Duration: 03 hrs

Name of Exam	Semester	Paper No	Course group	Credit	Internal Marks	External Marks	Total Marks
M. Sc.	III	I	Core	04	30	70	100
		II	Core	04	30	70	100
		III	Core	04	30	70	100
		IV	Core	04	30	70	100
			Practical	08	60	140	200
			Total	24	180	420	600

M.Sc. Semester-IV (ORGANIC CHEMISTRY)

Sr. No.	Course Title	L	T/C/S	Credit
1	Advance Organic Chemistry	4	1	4
2	Selected Topics In Organic Chemistry-II	4	1	4
3	Advance Organic Synthesis	4	1	4
4	Medicinal Chemistry-II OR Dye and Intermediates-II	4	1	4
5	Practicals	12		8
		28	4	24

External Examination Time Duration: 03 hrs

Name of Exam	Semester	Paper No	Course group	Credit	Internal Marks	External Marks	Total Marks
M. Sc.	IV	I	Core	04	30	70	100
		II	Core	04	30	70	100
		III	Core	04	30	70	100
		IV	Core	04	30	70	100
			Practical	08	60	140	200
			Total	24	180	420	600

M.Sc. Semester-III (PHYSICAL CHEMISTRY)

Sr. No.	Course Title	L	T/C/S	Credit
1	Advanced Thermodynamics	4	1	4
2	Molecular Spectroscopy	4	1	4
3	Electro Analytical Techniques	4	1	4
4	Physical Chemistry of Materials	4	1	4
5	Practicals	12		8
		28	4	24

External Examination Time Duration: 03 hrs

Name of Exam	Semester	Paper No	Course group	Credit	Internal Marks	External Marks	Total Marks
M. Sc.	III	I	Core	04	30	70	100
		II	Core	04	30	70	100
		III	Core	04	30	70	100
		IV	Core	04	30	70	100
			Practical	08	60	140	200
			Total	24	180	420	600

M.Sc. Semester-IV (PHYSICAL CHEMISTRY)

Sr. No.	Course Title	L	T/C/S	Credit
1	Advanced Chemical Kinetics	4	1	4
2	Atomic Spectroscopy	4	1	4
3	Separation Techniques	4	1	4
4	Polymer Chemistry	4	1	4
5	Practicals	12		8
		28	4	24

External Examination Time Duration: 03 hrs

Name of Exam	Semester	Paper No	Course group	Credit	Internal Marks	External Marks	Total Marks
M. Sc.	IV	I	Core	04	30	70	100
		II	Core	04	30	70	100
		III	Core	04	30	70	100
		IV	Core	04	30	70	100
			Practical	08	60	140	200
			Total	24	180	420	600

M.Sc. Sem-III (Analytical Chemistry)

Sr. No.	Course Title	L	T/C/S	Credit
1	Analytical Methods of analysis	4	1	4
2	Molecular Spectroscopy	4	1	4
3	Electroanalytical Techniques	4	1	4
4	Applied Analysis	4	1	4
5	Practical	12		8
		28	4	24

External Examination Time Duration: 03 hrs

Name of Exam	Semester	Paper No	Course group	Credit	Internal Marks	External Marks	Total Marks
M. Sc.	III	I	Core	04	30	70	100
		II	Core	04	30	70	100
		III	Core	04	30	70	100
		IV	Core	04	30	70	100
			Practical	08	60	140	200
			Total	24	180	420	600

M.Sc. Semester-IV (Analytical Chemistry)

Sr. No.	Course Title	L	T/C/S	Credit
1	Advance Analytical Techniques	4	1	4
2	Atomic Spectroscopy	4	1	4
3	Separation Techniques	4	1	4
4	Applied Analysis	4	1	4
5	Practicals	12		8
		28	4	24

External Examination Time Duration: 03 hrs

Name of Exam	Semester	Paper No	Course group	Credit	Internal Marks	External Marks	Total Marks
M. Sc.	IV	I	Core	04	30	70	100
		II	Core	04	30	70	100
		III	Core	04	30	70	100
		IV	Core	04	30	70	100
			Practical	08	60	140	200
			Total	24	180	420	600

M.Sc. Semester-III (ENVIRONMENT CHEMISTRY)

Sr. No.	Course Title	L	T/C/S	Credit
1	Fundamentals of environment and ecology	4	1	4
2	Environmental pollution	4	1	4
3	Waste, waste management and toxicology	4	1	4
4	Environmental studies-instrumental techniques	4	1	4
5	Practicals	12		8
		28	4	24

External Examination Time Duration: 03 hrs

Name of Exam	Semester	Paper No	Course group	Credit	Internal Marks	External Marks	Total Marks
M. Sc.	III	I	Core	04	30	70	100
		II	Core	04	30	70	100
		III	Core	04	30	70	100
		IV	Core	04	30	70	100
			Practical	08	60	140	200
			Total	24	180	420	600

M.Sc. Semester-IV (ENVIRONMENT CHEMISTRY)

Sr. No.	Course Title	L	T/C/S	Credit
1	Water and Soil Analysis and Pollution Remedies	4	1	4
2	Air analysis and Pollution control methods	4	1	4
3	Green Technology	4	1	4
4	Audit, laws and case studies	4	1	4
5	Practical	12		8
		28	4	24

External Examination Time Duration: 03 hrs

Name of Exam	Semester	Paper No	Course group	Credit	Internal Marks	External Marks	Total Marks
M. Sc.	IV	I	Core	04	30	70	100
		II	Core	04	30	70	100
		III	Core	04	30	70	100
		IV	Core	04	30	70	100
			Practical	08	60	140	200
			Total	24	180	420	600

Master of Science, Inorganic Chemistry
M.Sc. Inorganic Chemistry, Semester I

Course Code	[1803080201010001]	Title of the Course	Inorganic Chemistry
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To understand concept of symmetry and group theory with its application. • To understand basics of Quantum mechanics, familiarize with various types of operators and implant the knowledge of orbital configuration. • To learn the inorganic reaction mechanism. Different types of reaction mechanism and also various types of transition state theory. • Understanding of concepts of metal cluster, classification of metal clusters, Wade's rule, Carboranes, low and high nuclearity carbonyl clusters.

Course Content		
Unit	Description	Weightage* (%)
1.	SYMMETRY AND GROUP THEORY IN CHEMISTRY AND ITS APPLICATIONS Representation of Group: preparation of matrices and vectors matrix notation for geometric transformation, Orthogonality theorem and its consequences, reducible and irreducible representation and their relation, preparation of character table for C_{2v} and C_{3v} point groups, applications of group theory transformation properties of atomic crystals.	25
2.	QUANTUM MECHANICS Discussion of solution of Schrodinger equation to same model system e.g. the one dimensional harmonic oscillator, two particle rigid rotator. Ordinary angular momentum, generalized angular momentum, Eigen functions of angular momentum, eigen values of angular momentum, different types of operators and their uses, addition of angular momentum, spin, Russell-Saunders terms and coupling scheme, term separation energies of the p^n and d^n configuration, magnetic effect: spin orbit coupling and Zeeman	25

	effect(splitting)	
3.	INORGANIC REACTION MECHANISM Labile and inert complexes, factors responsible for lability and inertness of complexes. Reactivity of metal complexes, ligand replacement reaction: classification of mechanism and energy profile of reaction. Inert and labile complexes, interpretation of lability and inertness of transition metal complex on the basis of reaction rate, VBT and CFT. Transition state or activated complex, substrate, attacking reagents electrophilic and nucleophilic, nature central atom. Kinetic application of CFT. Kinetics of octahedral substitution, acid hydrolysis, factor affecting acid hydrolysis, base hydrolysis conjugate base mechanism, direct and indirect evidences in favour of conjugate mechanism.	25
4.	METAL CLUSTERS Introduction, classification, carbonyl cluster, low nuclearity carbonyl clusters, high nuclearity carbonyl clusters, electron counting scheme for HNCSS, Wade's rules. Halides types clusters: dinuclear clusters, trinuclear clusters, tetranuclear clusters, hexanuclear cluster. Chevrel phases and zintl ions, Carboranes, metalloboranes, metallo carboranes, higher boranes(hexaborane-10, decaborane-14), number and types of bonds present in higher boranes.	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library books , IT tools, encouraging students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the of matrices and vectors matrix notations, reducible representation and their relation, applications of group theory
2.	Learn regarding quantum mechanics, angular momentum, understanding the solution of Schrodinger equation, Different types of operators and their uses
3.	Learn different types of inorganic reaction mechanism, acid hydrolysis, base hydrolysis . conjugate base mechanism their synthetic application
4.	Understand the introduction and classification of metal clusters, electron counting scheme for HNCCS and Wade's rule and their synthetic application

Suggested References:

Unit I:

1. Chemical applications of group theory by F.A Cotton (Second edition), Wiley Eastern Limited, 1976 New Delhi
2. Group theory and its application by P.K. Bhattacharya, Himalaya publishing hours, Mumbai, 1986
3. Group theory and symmetry by L. R. hall, McGraw hill, New York, 1989.
4. Quantum Chemistry by Ira N. Levine, Prentice-Hall of India Pvt. Lid, New Delhi, 1994.
5. Introductory Quantum Chemistry (Third edinion) by N. W. Hanna, Benjamin, Menlo Park, Calif, 1988.
6. Quantum Chemistry and Spectroscopy by M. S. Pathania, Vishal Publications, India, 1981.
7. Kinetic and Mechanism' by A. A. Frost and R. G. Pearson, Wiley, New York, 1953, 1961.
8. Mechanism of Inorganic Reactions by F. Basolo and R.G. Pearson, Second Edition, Wiley Eastern Limited, New Delhi, 1977.
9. Advanced Inorganic Chemistry by F. A Cotton and R.G. Wilkinson, John Wiley & Sons, N. Y.
10. Principales of Inorganic Chemistry, by Puri. Sharma and Kalia, 33rd Edition, Vishal publishing Co. Jalandhar, Dehli, 2017.
11. Advanced Inorganic Chemistry by S. K. Agarwala and Keemtilal, Pragati Prakashan, Meerut.
12. Advanced Inorganic Chemistry, Volume-II by Gurdeep Raj, Krishna Prakashan Media Lid., Meerut.
13. Inorganic Chemistry by Gary L Miessler and Donald A. Tarr, Pearson Education International

On-line resources to be used if available as reference material

Master of Science, Organic Chemistry
M.Sc. Organic Chemistry, Semester I

Course Code	[1803080201020001]	Title of the Course	Organic Chemistry
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To understand concept of reactive intermediate and their application in organic synthesis. • To understand basics of pericyclic reaction, familiarize with various theories of pericyclic reaction to access the feasibility of various pericyclic reaction and implant the knowledge to predict stereo chemical outcome of various pericyclic reactions. • To learn anchimeric assistance, stereo chemistry and internal substitution reaction of aliphatic and allylic compounds. Aromatic nucleophilic substitution, cine substitution, elimination reactions, their stereo chemistry and mechanisms. • Understanding of concepts of chirality, topicity, prochirality, dynamic resolutions, types of stereo selective and stereo specific reactions, conformation of substituted and fused aromatic rings along with respective strains theories.

Course Content		
Unit	Description	Weightage* (%)
1.	REACTION MECHANISM & REACTIVE INTERMEDIATES Detailed study of organic reaction intermediates. Generation, structure, stability and reactions of – Carbocations (Classical and non-classical): Phenonium ion, norbornyl system, common carbocation rearrangements- Demjanov, Pinacole-Pinacolone, Rupe. Carbanions: Mechanism of condensation involving enolates - Aldol, Claisen, Mannich, Dieckmann, Michael and Shapiro reactions. Carbenes: Mechanism of Arndt-Eistert reaction, Reimer-Tiemann reaction and Bamford Steven's rearrangement reaction. Free Radicals: Allylic halogenation (NBS), coupling of alkenes and arylation of aromatic compounds by diazonium salts. Sandmeyer reactions. Free radical rearrangements, Hunsdiecker reaction.	25

2.	PERICYCLIC REACTIONS Introduction - Definition, Characteristics and Classification Molecular orbitals and symmetry properties of ethylene, 1,3-butadiene, 1,3,5-hexatriene and allyl systems. Electrocyclic Reactions: Woodward-Hoffman Correlation diagram and derivation of selection rules, Conrotatory and disrotatory motions, FMO and PMO approach for $4n$ and $(4n+2)$ π electron system and allyl systems. Cycloaddition Reactions: Antarafacial and suprafacial additions. FMO and PMO approach for $4n$ and $(4n+2)$ π electron systems (No correlation diagram), Diels-Alder reaction, stereoselectivity, Effect of substituents. Sigmatropic rearrangements: Suprafacial and antarafacial shifts involving H & C moieties, retention and inversion of configurations. The Cope and Claisen rearrangements, Ene reaction, 1, 3-dipolar cycloadditions. Examples of electrocyclic, cycloaddition and sigmatropic rearrangements.	25
3.	SUBSTITUTION AND ELIMINATION REACTIONS A: Aliphatic Nucleophilic Substitution: The S_N1, S_N2, S_Ni mechanisms. Reactions of allylic halides, neighbouring group participation by $-OH$, $-NH_2$, $-COO^-$, $-RS$, $-halogen$, aromatic ring. B: Aromatic Nucleophilic Substitution: The S_N2, S_N1 and benzyne mechanisms, Reactivity - effect of substrate structure, leaving group and attacking nucleophile, The Von Richter rearrangement. C: Elimination reaction: Hoffmann and Zaitsev's rule of elimination, $E1$, $E2$ and $E1cB$ Reaction mechanism and orientation.	25
4.	A. Stereochemical principles; Enantiomeric relationships; Distereomeric relationship; R-S and E-Z nomenclature; Dynamic stereochemistry; Chiral-Prochiral relationships; Stereo selective and Stereo specific reactions; Racemates and racemic modification, Resolution of racemic modification, Optical activity in the absence of chiral carbons biphenyl, allenes, spiranes. B. Conformational Analysis: Interconversion of Fischer, Newman and Sawhorse projections. Newer method of asymmetric synthesis (including enzymatic and catalytic nexus), enantio and diastereo selective synthesis. Simple acyclic and cyclic (chair and boat cyclohexanes, Decalins, Perhydrophenanthrene) systems. Effects of conformation on reactivity in acyclic compounds and substituted cyclohexanes.	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library books , IT tools, encouraging students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand generation of reactive intermediates, their mechanism, rearrangement based on each intermediate, application of reactive intermediate in organic synthesis and industries application.
2.	Recognise pericyclic reactions, understanding of thermal and photochemical reaction, determination of mechanistic pathway, symmetry properties, aromaticity based on mobius method, application of pericyclic reactions in organic synthesis.
3.	Learn difference between eliminations and addition reaction, concept of anchimeric assistance in various groups like sulphide, halogen, phenyl, hydroxyl, tosylates & mesitates, amino group etc, aromatic nucleophilic substitution through addition elimination, elimination addition, cine substitution and their synthetic application.
4.	Detect chirality in molecular structure, recognize the relationship between enantiomeric and diastereomeric structures, understand & distinguish stereoselective and stereospecific reactions, dynamic resolution, confirmative study of various substituted aromatic and fused aromatic rings and their application in pharmaceutical industry.

Suggested References:

Unit I:

1. Carbenes, Benzyne and Nitrenes by Gilchrist, T. L. and Rees.
2. Advanced Organic Chemistry-Reactions, Mechanism and Structure, Jerry March, John Wiley.
3. Reaction Mechanism in Organic Chemistry by S. M. Mukherji and S. P. Singh (McMillan India Ltd., 1976).
4. Organic Chemistry (3/e) by J. B. Hendrickson, Donald J. Cram and George S. Hammond (McGraw-Hill Book Co. & Kogekusha Co. Ltd., 1970).
5. Organic Chemistry (5/e) by Morrison & Boyd (Prentice Hall).
6. Advanced Organic Chemistry by Carey & Sundberg (3rd edition).
7. A Guide Book to Mechanism in Organic Chemistry, Peter Sykes, Longman.
8. Advanced Organic Chemistry, F. A. Carey and R. J. Sundberg, Plenum.
9. Organic chemistry 2nd ed. Jonathan Clayden, Nick Greeves, Stuart Warren.
10. Reaction Mechanism and Reagents in Organic Chemistry by C. R. Chatwal (Himalaya Publishing House, Bombay, 1987).

UNIT II:

1. March's Advanced Organic Chemistry Reactions, Mechanisms, And Structure 7th ed. 2013 Michael B. Smith. Wiley.
2. Mechanism And Theory In Organic Chemistry-2007 by Thomas H. Lowry, Kathleen S. Richardson, Forbes. Harper & Row, Publishers. New York, Hagerstown, San Francisco, London.
3. Advanced Organic Chemistry Part A: Structure and Mechanisms by Carey & Sundberg (5th edition), 2000, Springer.
4. Pericyclic Reactions, S. M. Mukherji, Macmillan, India.
5. Photochemistry And Pericyclic Reactions 3rd ed. by Jagdamba Singh 2010. New Age International Publishers Ltd. New Delhi.
6. Pericyclic Reactions A mechanistic and problem solving approach Sunil Kumar, Vinod Kumar, S.P. Singh Academic Press 2015

UNIT III:

1. Advanced Organic Chemistry-Reactions, Mechanism and Structure, Jerry March, John Wiley.
2. Reaction Mechanism in Organic Chemistry by S. M. Mukherji and S. P. Singh (McMillan India Ltd., 1976).
3. Organic Chemistry (3/e) by J. B. Hendrickson, Donald J. Cram and George S. Hammond (McGraw-Hill Book Co. & Kogekusha Co. Ltd., 1970).
4. Organic Chemistry (5/e) by Morrison & Boyd (Prentice Hall).
5. Advanced Organic Chemistry by Carey & Sundberg (3rd edition).
6. A Guide Book to Mechanism in Organic Chemistry, Peter Sykes, Longman.
7. Physical organic chemistry by Jack Hyne
8. Reaction mechanism by Jagdambasingh.
9. organic chemistry - Reaction mechanism, by P.S. Kalsi, New age international publishers.

UNIT IV:

1. Advanced Organic Chemistry: Part A: Structure and Mechanisms; By Francis A. Carey, Richard J. Sundberg, fifth edition, Published by Springer.
2. Advanced Organic Chemistry: Part B: Reaction and Synthesis; By Francis A. Carey, Richard J. Sundberg, fifth edition, Published by Springer.
3. Stereochemistry of Carbon Compounds; By Ernest L. Eliel, Published by Tata McGraw- Hill Publishing Company Ltd.
4. Basic organic stereochemistry; By Ernest Ludwig Eliel, Samuel H. Wilen, Michael P. Doyle, Published by Wiley-Interscience.
5. Introduction to Stereochemistry; By Kurt Martin Mislow, Dover Publication INC.
6. Stereochemistry of Organic Compounds: Principles and Applications; By D. Nasipuri, New Age International (P) Ltd. Publisher.
7. Stereochemistry Conformation and Mechanism; By P.S. Kalsi, New Age International (P) Ltd. Publisher.
8. Basic Stereochemistry of Organic; By SubrataSen Gupta, First edition, Published by Oxford University Press.

On-line resources to be used if available as reference material

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Master of Science, Physical Chemistry
M.Sc.Physical Chemistry, Semester I

Course Code	[1803080201030001]	Title of the Course	Physical Chemistry
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To understand concept of thermodynamics in solution. • To understand type of interactions and orientation of molecules in solution. • To understand basic concept of statistical thermodynamics. • Understanding of concepts of kinetics of different types of chemical reaction. • To lean basic concept of synthesis of polymer and solution behaviour of polymer

Course Content		
Unit	Description	Weightage* (%)
1.	CHEMICAL KINETICS Theories of Unimolecular gas reactions: Lindemann theory, Kinetics of some complex reactions (i) Reversible reactions (only first order opposed by first order) (ii) Consecutive reactions ($A \rightarrow B \rightarrow C$); Steady state treatment or approximation, Enzyme catalysed reactions, Kinetics of general Chain reaction, Kinetics of photochemical reactions (H_2-Cl_2 and H_2-Br_2), Kinetics, Mechanism, determination of activation energy and chain length of some organic decomposition (i) decomposition of ethane (ii) decomposition of acetaldehyde, Effect of Ionic strength on rates of ionic reactions (Primary and secondary salt effect) Numerical.	25
2.	THERMODYNAMICS Introduction to Laws of thermodynamics, state and path functions and their applications, thermodynamic description of various types of processes, Maxwell's relations, Partial molar quantities, Calculation of partial molar quantities, determination of partial molar volume and partial molar enthalpy, Ideal and non-ideal liquid mixtures, Thermodynamics functions of mixing of non-ideal solutions (i) free energy of mixing (ii) entropy of mixing (iii) volume of mixing and (iv) enthalpy of mixing, Excess functions (μ^E, G^E, S^E, H^E and V^E) for non-ideal solutions and expression for excess thermodynamic functions. Numerical	25
3.	STATISTICAL THERMODYNAMICS Basics of Statistical thermodynamics (Assembly, Canonical ensemble, occupation number statistical weight factor, probability), Thermodynamic probability, Probability and entropy, Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics. Lagrange's methods of multipliers, Partition function, Thermodynamic properties in term of partition functions (i) Internal energy (ii) Heat Capacity (iii) Third law of thermodynamics (iv) Helmholtz free energy (v) Enthalpy (vi) Gibbs free energy (vii) Chemical potential (viii) Equilibrium constant Molecular partition functions for an ideal gas, Derivation for Translational, Rotational and Vibrational partition functions Numerical.	25

4.	POLYMER CHEMISTRY Types of polymers, Stereochemistry of polymers, Kinetics of polymerization (Addition and Condensation), Thermodynamics of polymerization, Phase techniques of polymerization (Bulk, solution, suspension and emulsion), Number & Mass average Molecular mass, Polydispersity Index (P.D.I) Molecular mass determination by Viscometry and Osmometry, Thermal transitions in polymer: glass transition temperature and its significance, Numerical	25

Teaching-Learning Methodology	classroom teaching, use of e-resources, library books , IT tools, encouraging students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course	
1.	Students learn thermodynamic terminology, fundamental thermodynamic properties, properties of solution, fundamental knowledge assist student to understand related topic in next semester.
2.	Understand kinetics of different types of reaction. Understand the factors responsible for behaviour of different kind of chemical reaction
3.	Learn relation between quantum chemistry and statistical thermodynamics. Understand basic terminology and their application in calculation of thermodynamic function.
4.	Understand the method for synthesis of polymer and their characterization

Suggested References:

Unit I:

1. Chemical Kinetics, Laidler K.J. TATAMcGRAW-HILL PUBLISHING COMPANY LTD
2. Principles of Chemical Kinetics, James E. House, Elsevier Publication
3. Kinetics and Mechanism of Chemical Transformations, Rajaraman, J. and Kuriacose, J., McMillan (2008)
4. Kinetics of chemical reactions, S.K. Jain, Vishal Publications
5. Engel, T. & Reid, P. Physical Chemistry, Pearson
6. Maron, S. & Prutton Physical Chemistry

UNIT II:

1. Thermodynamics for chemist Samuel Glasstone, East-West Press Pvt. Ltd. (2008)
2. Physical Chemistry, Volume 1: Thermodynamics and Kinetics (10th Edition) by Professor Peter Atkins, Julio De Paula
3. Principles of Physical Chemistry Puri B.R., Sharma L.R. and Pathania, M.S., Vishal Publishing Co
4. A Text Book of Physical chemistry K.L.Kapoor Vol-5 Macillan India Ltd. 2007
5. An Introduction to Chemical Thermodynamics R P Rastogi and R R Mishra VIKASH PUBLISHING HOUSE PVT LTD. 6th edition
6. Advanced Physical Chemistry D.N.Bajpai S.CHAND& COMPANY LTD. 2nd EDITION

UNIT III:

1. Statistical Thermodynamics BY M. C. Gupta, New Age International, 2007
2. An Introduction to Statistical Thermodynamics, Terrell L. Hill, ADDITION WESLAY PUBLISHING COMPANY
3. Principles of Physical Chemistry Puri B.R., Sharma L.R. and Pathania, M.S., Vishal Publishing Co
4. A Text Book of Physical chemistry K.L.Kapoor Vol-5 Macillan India Ltd. 2007

UNIT IV:

1. Polymer science by V.R.Gowarikar. WILEY EASTERN LTD
2. Principal of polymer chemistry by A. Ravve, Springer
3. A Textbook of Polymer Chemistry, M S Bhatnagar, S Chand Publications.
4. Principles of Physical Chemistry Puri B.R., Sharma L.R. and Pathania, M.S., Vishal Publishing Co

Master of Science, Instrumental and Chemical Analysis
M.Sc. Analytical Chemistry, Semester I

Course Code	[18030802010040001]	Title of the Course	Instrumental and Chemical Analysis
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	● To understand concept of electromagnetic radiation, auxochrome, chromophores, various factors affect the UV-Visible spectra and impart the knowledge to understand the spectra. ● To understand basics of concepts of chromatography, their classification and importance as well as working of various parts of the chromatography instruments. Use of this TLC and GC in various application. ● To learn the different types of errors occur in qualitative and quantitative and the validation of result obtained in experiments with the help of Q test and Students' t test. ● To learn the thermal methods, their instrumentation, various factors effect on the experimental results and their application in various field.

Course Content		
Unit	Description	Weightage* (%)
1.	UV-Visible Spectrophotometry Types of electronic transition, auxochrome, chromophore, Bathochromic effect, Hypso chromic effect, Hyper chromic effect, Hypo chromic effect, Factor affecting $\lambda_{\max}$ like resonance, hyper conjugation, hydrogen bonding, steric effect, Woodward's rules for α , β -unsaturated ketones, Diene systems, aromatic system, Effect of solvent on absorption bands, law of absorption with derivation, Elementary idea of double beam automatic recording, Spectrophotometer, Application.	25
2.	CHROMATOGRAPHY Thin-Layer Chromatography: Selection of stationary and mobile phase, Detection techniques – Elementary idea of HPTLC Gas Chromatography: Selection of mobile phase – Selection of stationary phase in GLC and GSC – Detectors: FID (with modifications), TCD and ECD, Their comparison, Packed column, WCOT, SCOT (advantages and disadvantages) –Temperature programming – Derivatisation in GC – Quantitative Analysis.	25
3.	CHEMICAL MATHEMATICS Errors in Chemical analysis, classification of errors, nature and origin of errors, Propagation of error, Accuracy and precision, Average deviation and standard deviation and its physical significance, Normal Distribution curve and its properties. Confidence limit and probability, Statistical treatment for error analysis, students't' test, rejection criteria and Q test, method of least square	25
4.	THERMAL METHODS OF ANALYSIS (A) THERMOGRAVIMETRY Thermogravimetry, Instruments for TGA- thermobalance and furnace, Calibration of temperature scale, Factors affecting TGA results instrumental and experimental, Applications. (B) THERMOMETRIC TITRATION: Thermometric Titration (TT), Advantages, Instrument, Applications of TT in Neutralization Titration, Precipitation Titration, Complexometry Titration and Redox Titration.	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library books, IT tools, encouraging students to participate in seminars/ workshops, presentations by students, assignments etc.

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the basic concept of electromagnetic radiation and their interaction with the matter and use of UV-Visible spectrophotometer in structure identification and quantitative determination.
2.	Recognize the use of different stationary and mobile phase for the separation of organic molecule and identify the problems and their solution during the analysis and learn the use of the chromatography for those whose don't identified by the techniques.
3.	Learn difference between different types of errors observed during analysis and use of statistical treatment of data. Also learn to accept and reject the data with help of different type of tests.
4.	Use of the thermometric techniques when the other methods are failed. The requirement of the techniques and identified the problems arise during the analysis.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Suggested References:

1. Fundamental of molecular spectroscopy, C. N. Banwell, Tata McGraw Hill Pub. Camp.
2. Spectrometric Identification of Organic Compounds (4th edition/5th edition), Silverstein, Bassler & Morrill, John Wiley & Sons.
3. Introduction to Molecular Spectroscopy, G. M. Barrow, McGraw – Hill.

4. Modern Spectroscopy, J.M.Hollas, John Wiley.
5. Basic Principles of Spectroscopy, R.Chang, McGraw-Hill.
6. Modern Methods of Chemical Analysis (2nd ed.), Pecsok, Shields, Cairns & McWilliam, John Wiley & Sons.
7. Instrumental Analysis by R. D. Braun, McGraw-Hill.
8. Mathematics for Chemistry, Doggett and Sucliffe, Longman.
9. Mathematical preparation for Physical Chemistry, F. Daniels, McGraw Hill.
10. Introduction to Instrumental Analysis by R. D. Braun, McGraw-Hill Book.
11. Fundamentals of Analytical Chemistry: Skoog D. R. and West D. M. (Holt, Rinehart & Winston, New York).
12. Chemical Analysis in Industry (in Gujarati) by M. N. Desai.
13. Instrumental Methods of Analysis by G. W. Ewing.
14. Modern Method of Chemical Analysis by Pecsok, Shield, Cairns, McWilliam, John Wiley and Sons.
15. Quantitative Analysis, 6th Ed., R. A. Day and A. L. Underwood, Prentice – Hall of India, 1993.
16. Instrumental Analysis: G. D. Caristian and J. E. O'Reilly (Allyn & Bacon Inc., New York, 2nd edition).
17. Instrumental Methods of Chemical Analysis: G. W. Ewing (McGraw-Hill, New York), 5th edition.
18. Instrumental Methods of Analysis: H. R. Willard, L. L. Merrit, J. A. Dean, F. A. Settle (Van Nostrand Reinhold Co., New York), 6th edition.
19. Modern Methods of Chemical Analysis: Pecsok, Shield & Cairns (John Wiley), 2nd edition.
20. Introduction to Instrumental Analysis (1987), R. D. Braun (McGraw-Hill Book Company), New Delhi.
21. Analytical Chemistry: Principles and Techniques: Larry G. Hargis (Prentice-Hall International edition).
22. Introduction to Modern Liquid Chromatography: L. R. Shyder & J. J. Kirkland (John Wiley & Sons, New York).
23. Treatise on Analytical Chemistry: I. M. Kohthoff & P. J. Elving (John Wiley & Sons, New York).
24. Handbook of Analytical Chemistry: L. Meites (McGraw-Hill, New York).

On-line resources to be used if available as reference material

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Master of Science, Inorganic Chemistry
M.Sc.Inorganic Chemistry, Practicals

Course Code	[1803081001050001]	Title of the Course	Inorganic Chemistry
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To impart basic knowledge of qualitative analysis of Inorganic mixture • To identify three anions and three cations including one rare earth element by group separation. • To impart knowledge of different radicals by confirmative test. • Preparation of inorganic metal salts and its crystallization • To confirm the structure and prepare the relevant derivative.

Course Content

1. Inorganic Qualitative Analysis: (Six elements including ONE rare element)
2. Inorganic Preparation.
 - I. Hexa-ammine nickel (II) chloride
 - II. Mohr's salt (Ferrous Ammonium sulphate)
 - III. Sodium trioxalato ferrate trihydrate
 - IV. Sodium cobaltinitrite
 - V. Tetra amine cupric sulphate
 - VI. Reineck's salt (Ammonium tetrathiocyanate diammine Chromate)

Teaching-Learning Methodology	Introduction, demonstration of handling equipments, reference books and frequent instruction according to the respective practical.	
Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%
Course Outcomes: Having completed this course, the learner will be able to		

1.	Understand basics analysis of Inorganic mixtures.
2.	Identify anions by dry test of the mixture.
3.	Separation of each anions by group test from mixture.
4.	Identify each cation and confirm it by confirmative test.
5.	Understand different methods of Preparations of inorganic salts.
6.	Appreciate good laboratory practices.

Suggested References:
1. Textbook of practical inorganic chemistry – A.I. Vogel 2. Practical Chemistry by Dr O. P. Pandey, D. N. Bajpai, Dr. S. Giri 3. Advance inorganic analysis by Agarwal, Keemti lal 4. Qualitative Inorganic analysis - Vogel 5. Inorganic practical by Chatwal and Anand
On-line resources to be used if available as reference material
On-line Resources

Master of Science, Organic Chemistry
M.Sc.Organic Chemistry, Practicals

Course Code	[1803081001050001]	Title of the Course	Organic Chemistry
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To impart basic knowledge for the separation of organic ternary mixture • To identify nature of mixture i.e., solid-solid, solid-liquid, liquid-liquid etc. • To impart knowledge of different purification techniques including distillation. • Separation and identification of component with their functional group test and M.P. /B.P. • To confirm the structure and prepare the relevant derivative.

Course Content

3. Mixture analysis: (Minimum eight mixtures) Ternary mixture to be given. (S+S+S), Semisolids or (L+L+L). Type, determination, Separation by physical and chemical methods. (both permitted in case of liquids)
4. Paper Chromatography

Teaching-Learning Methodology	Introduction, demonstration of handling equipments, reference books and frequent instruction according to the respective practical.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand basics of separation of organic tertiary mixtures.
2.	Identify and chemical nature of mixture.
3.	Separate of each component from mixture.
4.	Identify each component through their functional group test, elemental analysis and M.P/BP.
5.	Purify the compounds using different techniques including distillation, crystallization etc.

6.	Record physical constants for individual compounds.
7.	Appreciate good laboratory practices.

Suggested References:
1. A text book of practical organic chemistry – A. I. Vogel 2. Practical organic Chemistry – Mann and Saunders 3. A handbook of quantitative and qualitative analysis – H. T. Clarke 4. Comprehensive Practical Organic Chemistry : Qualitative Analysis V K Ahluwalia & S. Dhingra. 5. Comprehensive Practical Organic Chemistry : Preparations and Quantitative Analysis V K Ahluwalia & R. Aggarwal Universities Press. 6. An Advance Course in practical Chemistry, A K. Nad, B. Mahapatra and A. Ghoshal.
On-line resources to be used if available as reference material
On-line Resources

Master of Science, Physical Chemistry
M.Sc. Physical Chemistry, Practicals

Course Code	[1803081001050001]	Title of the Course	Physical Chemistry
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	● To study the physical chemistry parameters for reaction between acid and base. ● To study the behaviour of surfactant in aqueous solution ● To determine the concentration of solution by colorimetry ● To understand the conductivity behaviour of electrolytes solution. ● Partitioning behaviour of component in two phases

Course Content

1. Determine the dissociation constant and strength of borax solution pH-metrically.
2. Determine the velocity constant of the hydrolysis of ethyl acetate with sodium hydroxide at room temperature by conductance measurements.
3. Determine the solubility of silver chloride in water potentiometrically.
4. To determine the concentration of given components in a mixture colorimetrically.
5. Determine the equilibrium constant of the reaction $I^- + I_2 = I_3^-$ by distribution method.
6. Investigation the reaction between H_2O_2 and HI at two different temperatures and calculate the energy of activation for the reaction
7. Determine the formula of a complex between Cu^{+2} and NH_3 by distribution method.
8. Determine CST of Phenol -Water system
9. Determine CST of Phenol –NaCl system

Teaching-Learning Methodology	Introduction, explanation of theory and procedure of the experiments and interpretation of results.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand preparation of solutions.
2.	Qualitative analysis of compound
3.	calculate the concentration of unknown solution by pH, potentiometer and colorimeter
4.	Understand behaviour of surfactant and polymer
5.	Separation of solvent using phase diagram

Suggested References:

1. Advanced Practical Physical Chemistry by Yadav J. B., Krishna Prakashan Media
2. Practical Physical Chemistry, Dr. M. Satish Kumar Sankalp Publication
3. Gurtu, J. N., Kapoor, R., Advanced Experimental Chemistry S. Chand & Co. Ltd.
4. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Pearson

On-line resources to be used if available as reference material

On-line Resources

Master of Science, Inorganic Chemistry
M.Sc.Inorganic Chemistry, Semester II

Course Code	[1903080202010001]	Title of the Course	Inorganic Chemistry
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	● To learn the properties of non-transition metal elements. ● To learn the synthesis, bonding, properties and applications of main group elements. ● To understand the Bio inorganic chemistry of Hemoglobin, Myoglobin, Ferritin and Transferrin ● To understand the metal complexes in Medicine and anticancer activity of Platinum complexes

Course Content		
Unit	Description	Weightage* (%)
1.	ELEMENTS OF MAGNETOCHEMISTRY Definitions of magnetic properties, type of magnetic bodies, the source of paramagnetism, diamagnetism and pascal's constant, Example of pascals constant. Curie and Curie-Weiss law, Magnetic Properties of transition elements. Determination of magnetic susceptibility: (a) Gouy method (b) Faraday method (s) Null deflection method Application of magnetic susceptibility measurements, Temperature independent paramagnetism (TIP), Orbital contribution to magnetic moment	25
2.	METAL π - COMPLEXES Metal carbonyls: Introduction, classification of metal carbonyls, structure and bonding. vibrational spectra studies for bonding and structure elucidation. Preparation of metal carbonyls by (1) Direct synthesis and (2) From metal compounds. preparation Properties and structure of Ni(CO)_4 $\text{Fe}_2(\text{CO})_9$ and $\text{Co}_2(\text{CO})_8$, 18-electron rule and EAN of metal carbonyls Metal Nitrosyls: Introduction, coordination compounds of metal nitrosyls, preparation properties of nitrosyl compounds like nitrosyl halides, nitrosyl cyanides, hydroxides and nitrosyl aquo compounds Complex of NO^+ iron, EAN and structures of nitrosyls.	25
3.	INORGANIC POLYMERS Definition of polymers and their depiction. Characteristics of inorganic polymer. Characterization of inorganic polymers (physical properties) by molecular weight, number average and weight average. Structural features of polymers: (1) Backbone bonding (2) Branching and cross-linking (3) Chemical and Stereo chemical variability Classification of inorganic polymers, synthesis, properties, structures uses and application of polyphosphazenes and polysiloxanes.	25
4.	COORDINATION COMPOUNDS Classification of coordination compounds, Werner's theory of coordination, Electronic interpretation of coordination compounds, Factors effecting the formation of complex ions, Detection of complex ion in solution,	25

	Chelation, Factors influencing the stability of metal chelates, Importance of chelates, Role of metal chelates in living system and polynuclear complexes, Determination of composition of complex ions	
Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library, IT tools, encourages students to participate in seminars/ workshops, presentations by students, assignments etc.	

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the definitions of magnetic properties, type of magnetic bodies, determination of magnetic susceptibility and its applications.
2.	Understand, classification of metal carbonyls and nitrosyls, structure and bonding. Vibrational spectra studies for bonding and structure elucidation, preparation of metal carbonyls and nitrosyls.
3.	To learn the characteristics of inorganic polymer and characterization of physical properties by molecular weight, number average and weight average. Structural features of polymers by different bonding.
4.	Understand the classification of coordination compounds, Werner's theory, Electronic interpretation, factors effecting the formation of complex ions, detection of complex ion in solution, stability of metal chelates and Importance of chelates, role of metal chelates in living system

Suggested References:

1. Magneto chemistry by R. L. Carlin
2. Element of Magnetochemistry by A. Syamal and R. L. Dutta, Affiliated East-West press, new Delhi, 1993.
3. Introduction to metal pi-complex chemistry by M. Tsusui, M. Ichikwa, K. Mori, Plenum press, New york
4. Introductory polymer chemistry by G. S Mishra, Wiley Eastern Ltd, 1993.
5. Phosphorous-Nitrogen Compounds, H. R. Allock, Academic, New York, 1972.
6. Advanced in Inorganic Chemistry by S. K. Agarwal, Keemtilal, Pragati prakashan, Meerut
7. Coordination Chemistry by Ajaykumar, Aaryush Education publication, Thind publication
8. Principles of inorganic chemistry by Puri, Sharma and Kalia, Vishal publication Co. Jalandhar, Delhi
9. Coordination Chemistry by Gurdeep Chatwal, M.S. Yadav, Himalaya Publishing house
10. inorganic polymers by Prof G. R. Chatwal, Himalaya Publishing House

On-line resources to be used if available as reference material

On-line Resources

Master of Science, Organic Chemistry
M.Sc.Organic Chemistry, Semester II

Course Code	1903080202020001	Title of the Course	Organic Chemistry
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To learn transition metal catalyst based on C-C, C-N coupling reaction, formylation reaction, various acid base catalyzed condensation reactions, reactions which changes configuration etc. and their mechanism. • To learn aromaticity based on different concept, measurement of aromaticity through various parameters, annulenes, azzulene and

	types of aromaticity. • To understand the role of chemical reactants in oxidation, reduction, dehydration, cyclisation and transformation of various organic functional groups. • To understand photochemistry, various types of its reaction, photochemical cleavage of carbonyl compounds, their mechanism and application in synthesis.

Course Content		
Unit	Description	Weightage* (%)
1.	Organic Name Reactions General nature, method, mechanism and synthetic applications of the following reactions: (i) Heck reaction (ii) Dakin reaction (iii) Darzen'sglycidic ester synthesis (iv) Leuckart reaction (v) Suzuki reaction (vi) Willgerodt reaction (vii) Buchwald-Hartwig reaction (viii) H. V. Z reaction (ix) Vilsmeier-Hack reaction (x) Mitsunobu reaction (xi) Sonagashira reaction (xii) Dickmann reaction.	25
2.	AROMATICITY A. Aromaticity and Aromatic character; structure and stability of benzene, Frost circle diagram, concept of aromaticity; Resonance and chemical stabilization; criteria to checkaromatic character-IR, NMR, heat of hydrogenation; Huckel's rule; HMO method B. Antiaromaticity, homoaromaticity, nonaromaticity; aromaticity in benzanoid compounds: naphthalene, pyrene, acepleialdelene. C. Aromaticity non-benzenoid compounds: azulene, tropolones, charged rings,annulenes fullerenes, and hmesoionic compounds.	25
3.	ORGANIC TRANSFORMATION AND REAGENTS I. Sharplessepoxydation II. Umprung reagent (1,3-dithiane) III. Dess martin periodinane IV. DDQ V. Tri-n-butyltinhydride (C₄H₉)₃SnH	25

	VI. Diisobutyl aluminum hydride (DIBAL-H) VII. Lithium diisopropyl amide (LDA) VIII. OZONE / IX. $K_3Fe(CN)_6$ and DMSO X. Merrifield Peptide Synthesis XI. Crown ethers XII. Wilkinson's Catalyst	
4.	PHOTO CHEMISTRY A. Energy of molecules, photochemical energy, electronic excitation, Jablonski diagram, laws of photochemistry, quantum efficiency. B. Photochemistry of carbonyl compounds- α - cleavage of acyclic, cyclic and α - β unsaturated cleavage of carbonyl compounds, β -cleavage of, inter and intramolecular hydrogen abstraction, addition to carbon- carbon double bond, photo reduction of carbonyl compounds. C. Photo induce rearrangement of enones, dienones and alkenes. Photochemistry of alkenes and aromatic compounds- isomerization, dimerization and addition reactions D. Photochemistry of visib, singlet oxygen generations, solar energy conversion and storage	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library, IT tools, encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the role of transition metal in organic synthesis by studying Heck, Suzuki, Sonogashira and Buchwald Hartwing reaction, formylation by Vilsmeier Heck reaction, substituted amines, amides formation reaction, cyclisation through condensation reaction and inverted configuration through Mitsunobu reaction.
2.	Understand aromaticity, various parameters for the measurement of aromaticity, Frost circle method and calculation of energy for the determination of aromaticity. Aromaticity measurement through NMR, types of aromaticity and aromaticity measurement in fused rings, annulenes and azulenes etc
3.	To learn the chemistry involved in oxidation-reduction reactions by employing numerous reagents & appropriate chemo-selectivity of the reagents, suggest use of miscellaneous reagents in organic synthesis including Wilkinson catalyst, DIBAL-H, PTC-crown ether, 1,3-Dithiane etc.
4.	Get one self familiarize with usual photochemical reactions, terms of photochemistry, understanding fluorescence, phosphorescence by photoexcitation decay/dissipation of energy. Types photochemical reactions like Norrish type-I & II, Paterno-Buchi etc., Photodimerisation and their application in organic synthesis.

Suggested References:

1. Advanced Organic Chemistry-Reactions, Mechanism and Structure, Jerry March, John Wiley.
2. Reaction Mechanism in Organic Chemistry by S. M. Mukherji and S. P. Singh (McMillan India Ltd., 1976).
3. Organic Chemistry (3/e) by J. B. Hendrickson, Donald J. Cram and George S. Hammond (McGraw-Hill Book Co. & Kogakusha Co. Ltd., 1970).
4. Organic Chemistry (5/e) by Morrison & Boyd (Prentice Hall).
5. Advanced Organic Chemistry by Carey & Sundberg (3rd edition).
6. A Guide Book to Mechanism in Organic Chemistry, Peter Sykes, Longman.
7. Name Reactions by A. R. Parikh & H. A. Parikh
8. Name reaction: A collection of detailed reaction mechanisms by Jie Jack Li
9. Reaction Mechanism and Reagents in Organic Chemistry by C. R. Chatwal (Himalaya Publishing House, Bombay, 1987).
10. Organic Chemistry-Reactions and Mechanism by P S Kalsi
11. Advanced Organic Chemistry : Reactions and Mechanisms by M. S. Singh
12. Organic chemistry by Cram, Hammond, Pine and Hendrickson
13. Photochemistry and Pericyclic Reactions by Jagdamba Singh
14. Pericyclic reactions: A text book by S. Sankararaman
15. Excited states in Organic Chemistry by J. D. Coyle and J. A. Barltrop
16. March's Advanced Organic Chemistry: Reactions, Mechanisms and Structure by Michael B. Smith

17. Advanced Organic Chemistry: Part B: Reaction and Synthesis by Carey & Francis

18. Organic Chemistry by Jonathan Clayden

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Physical Chemistry
M.Sc. Physical Chemistry, Semester II

Course Code	[1903080202030001]	Title of the Course	Physical Chemistry
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	● To learn conductivity behaviour of strong electrolytes in solution, factors affecting electrolysis process. ● To learn basics and application of colloids. ● To understand the basics of surface chemistry. ● To understand basics of molecular spectroscopy.

Course Content		
Unit	Description	Weightage* (%)
1.	UNIT-I: THEORIES OF ELECTROLYTIC CONDUCTANCE AND OVER VOLTAGE Debye-Huckel theory of strong electrolytes, relaxation effect and electrophoretic effect, Debye Falkenhagen effect, Weineffect. Ionic strength and its determination, Debye-Huckel limiting law. Activity and activity coefficient, determination of activity coefficient by (i) solubility (solubility product principle) (ii) EMF method (cell without transference), Determination of dissociation constant of	25

	monobasic acid by conductance method and approximate EMF method, Electrolytic polarization, Dissolution and Decomposition potential, Concentration polarization, Decomposition potential and its determination, over voltage, determination of over voltage, theories of over voltage: combination of atom as slow process (Tafel theory) Numerical.	
2.	UNIT-II: SURFACE CHEMISTRY Adsorption Multilayer Adsorption, the BET adsorption isotherms, derivation of BET equation, determination of surface area and area of cross section of molecules by BET equation. Derivation of Langmuir equation from BET equation. Explanation of different adsorption isotherms, Change in enthalpy, entropy and free energy of adsorption, Adsorption at the surface of liquid : Gibbs adsorption isotherms (derivation). Thermodynamic treatment of adsorption, Surface –Active substances, orientations of surfactants on the surface of solution, surface inactive substances, surface pressure, Insoluble surface films on liquid Numerical	25
3.	UNIT-III: COLLOIDS: Types of colloidal systems, preparation of lyophobic colloidal, Properties of Colloidal systems: (i) electrical properties origin of charges on colloidal, electrical double layer, Zeta potential and its determination by electrophoresis, factor affecting zeta potential, explanation on DLVO theory of colloid stability (ii) Electrokinetic properties: Electrophoresis, electroosmosis. Surface active agents, critical micellar concentration (CMC), factors affecting the CMC of surfactants, thermodynamics of micellization: mass action and phase separation model, solubilisation, emulsion, types of emulsion, methods for determination of types of emulsion, microemulsion, types of microemulsion, theories of microemulsion.	25
4.	UNIT IV: MOLECULAR SPECTROSCOPY Molecular spectra, Microwave spectroscopy (Rotational spectroscopy): The Rotation of molecules, Linear molecule, Symmetric tops, Spherical tops, Asymmetric tops, Rotational spectra of rigid diatomic molecule, Intensities of spectral lines, Effect of isotopic substitution, Techniques and instrumentation of rotational spectrum, IR Spectroscopy: Classical frequency of harmonic oscillator, The classical potential energy of harmonic	25

	vibration of a diatomic molecule, Quantum expression of potential energy, energy level diagram, Relative population of energy levels, Mechanism of interaction with radiation, selection rule, determination of force constant, Amplitude of vibration, The anharmonic vibration or oscillator, Morse potential, Vibrational energy of diatomic molecule following the Morse potential, energy level diagram, vibrational transitions. Vibrational – Rotational spectra of diatomic molecule (CO molecule) Application of Vibrational rotational spectra Numerical	
Teaching - Learning Methodology	classroom teaching, use of e-resources, library, IT tools, encourages students to participate in seminars/ workshops, presentations by students, assignments etc.	

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the electrolytes in conductance of solutions. Importance of polarization decomposition potential and over voltage in electrolysis process and in industries
2.	Understand physical phenomena of surface chemistry. Application of surface active substance and factor affecting surface chemistry, adsorption of surface active materials
3.	Understand the solution behaviour of surfactants. Colloidal chemistry explain the importance of micelle formation for colloidal industry
4.	Identify the molecular interactions and concentration and identification of compounds

Suggested References:

UNIT : 1.

1. Atkins, P.W., Physical Chemistry, W.H. Freeman (2017) 10 th editon
2. Samuel Glsstone, Introduction to Electro chemistry, East-West Press Pvt. Ltd. (2008)
3. Puri, B.R., Sharma, L.R., and Pathania, M.S., Principles of Physical Chemistry, Vishal Publishing Co.
4. Engel, T. & Reid, P. Physical Chemistry, Pearson
5. Barrow, G.M. Physical Chemistry Tata McGraw Hill (2007)
6. Maron, S. & Prutton Physical Chemistry, Collier Macmillan Ltd

UNIT : 2

1. Puri, B.R., Sharma, L.R., and Pathania, M.S., Principles of Physical Chemistry, Vishal Publishing Co.
2. Engel, T. & Reid, P. Physical Chemistry, Pearson
3. Barrow, G.M. Physical Chemistry Tata McGraw Hill (2007)
4. Maron, S. & Prutton Physical Chemistry, Collier Macmillan Ltd

UNIT : 3

1. Puri, B.R., Sharma, L.R., and Pathania, M.S., Principles of Physical Chemistry, Vishal Publishing Co.
2. Engel, T. & Reid, P. Physical Chemistry, Pearson
3. Maron, S. & Prutton Physical Chemistry, Collier Macmillan Ltd
4. Colloid Science: Principles, Methods and Applications by T Cosgrove
5. Physical Chemistry of Surfaces” by A W Adamson and A P Gast

UNIT 4

1. Fundamentals of Molecular Spectroscopy C N Banwell TATA McGRAW-HILL15th edition
2. Handbook of Molecular Spectroscopy, by D.N. Sathyanarayana

3. Introduction to Spectroscopy by Donald L. Pavia, George S. Kriz, Gary M. Lampman, James R. Vyvyan
4. Fundamentals of molecular spectroscopy by Walter S. Struve
5. Barrow, G.M. Physical Chemistry Tata McGraw Hill (2007)

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Instrumental and Chemical Analysis
M.Sc. Analytical Chemistry, Semester II

Course Code	1903080202040001	Title of the Course	Instrumental and Chemical Analysis
Total Credits of the Course	[1903080202040001]	Hours per Week	4 hrs

Course Objectives:	● To understand theory and instrumentation of infra-red spectroscopy with working of various parts of instruments. Structure elucidation is also learnt with help of IR spectra. ● To learn liquid-liquid chromatography with special focus on the instrumentation of high-pressure liquid chromatography and their application in various field. ● To understand the basic concept twelve principle and green solvents and their application. Also learn the uses of various instrumental and classical method in the analysis of water for removal of toxicants. ● To understand units of solution their uses in numerical and solution preparation. To understand the uses of non-aqueous titration when aqueous titration fails and also analysis of C, H, N, O, S with various techniques.

Course Content		
Unit	Description	Weightage* (%)
1.	IR Spectroscopy: Introduction: Theory, Instrumentation: single beam, double beam spectrophotometers, FTIR: principle, instrument design, and function of beam splitter, radiation sources, sample cells, monochromators, detectors, sample handling, Resolution, wave number measurement, Advantages of FTIR vs. IR. Useful terms: IR region, types of vibrations: fundamental and overtones, linear and nonlinear molecule, equation for vibrational frequency, selection rule, coupling interactions, hydrogen bonding information, Fermi resonance. IR spectra: group frequency, group frequency region, finger print region, spectra interpretations and structure elucidation.	25
2.	LIQUID CHROMATOGRAPHY Principle of Liquid – Solid chromatography, Comparison with GC, Column chromatography, Gradient elution, Displacement chromatography, Principle of HPLC, Instrument and significance of each component, Pumps, Guard column Criteria in selection of mobile phase, Stationary phases (solid, liquid), Bonded phase supports, Detectors: UV absorption, RI detectors – Normal phase and Reversed phase. Method of introducing sample.	25
3.	GREEN CHEMISTRY AND WATER ANALYSIS (A) Green Chemistry Twelve principles, green solvents and their applications: Ionic liquids, types, properties and applications, ILs as solvents, Supercritical fluids, Supercritical CO ₂ , its properties and applications in dry cleaning and decaffeination of coffee. (B) Water analysis Sources of water pollution, Sewage and industrial effluents, Analysis of water pollutants, Sampling, Preservation, Measurement of parameters such as COD, BOD, DO, TDS, suspended solids, TCC, phenols, fluoride.	25
4.	TITRIMETRIC METHODS AND ELEMENTAL ANALYSIS Solution and Their Concentration: Molarity, Molality, Normality, ppm, ppb, ppt, %w/v, %w/w, %v/v, Formality, Primary and Secondary standard, Acid Value, Density and Specific Gravity, Numerical.	25

	Non-Aqueous Titration: Protic and Aprotic Solvent, Solvent system, Dielectric constant, Titrant, Titration Curve, Determination of Equivalence point, Karl Fisher Titration, Numerical. Elemental Analysis: Step on Analysis, C and H Analysis, N Analysis, Halogen Analysis and Sulphur Analysis, Numerical.	

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library books, IT tools, encouraging students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the basic concept of Infrared radiation and their interaction with the matter and use of FTIR spectrophotometer in structure identification and quantitative determination.
2.	Recognize the use of different stationary and mobile phase for the separation of organic molecule in liquid chromatography and identify the problems and their solution during the analysis.
3.	Learn different principles of green chemistry and their use in various techniques, also learn the determination of various pollutants in water by different techniques available such as classical and instrumental techniques.
4.	Understand the making of different solution with the help of different concentration and learn the non-aqueous titration when aqueous titration fails. Also learn the determination of various elements in organic compounds.

Suggested References:

1. Fundamental of molecular spectroscopy, C.N. Banwell, Tata McGraw Hill Pub. Camp.
2. Spectrometric Identification of Organic Compounds (4th edition/5th edition), Silverstein, Bassler & Morrill, John Wiley & Sons.
3. Introduction to Molecular Spectroscopy, G.M. Barrow, McGraw – Hill.
4. Modern Spectroscopy, J.M. Hollas, John Wiley.
5. Basic Principles of Spectroscopy, R. Chang, McGraw-Hill.
6. Modern Methods of Chemical Analysis (2nd ed.), Pecsok, Shields, Cairns & McWilliam, John Wiley & Sons.
7. Instrumental Analysis by R. D. Braun, McGraw-Hill.
8. Mathematics for Chemistry, Doggett and Sucliffe, Longman.
9. Mathematical preparation for Physical Chemistry, F. Daniels, McGraw Hill.
10. Introduction to Instrumental Analysis by R. D. Braun, McGraw-Hill Book.
11. Fundamentals of Analytical Chemistry: Skoog D.R. and West D.M. (Holt, Rinehart & Winston, New York).
12. Chemical Analysis in Industry (in Gujarati) by M. N. Desai.
13. Instrumental Methods of Analysis by G. W. Ewing.
14. Modern Method of Chemical Analysis by Pecsok, Shield, Cairns, McWilliam, John Wiley and Sons.
15. Quantitative Analysis, 6th Ed., R.A. Day and A.L. Underwood, Prentice– Hall of India, 1993.
16. Instrumental Analysis: G. D. Caristian and J. E. O'Reilly (Allyn & Bacon Inc., New York, 2nd edition).
17. Instrumental Methods of Chemical Analysis: G. W. Ewing (McGraw-Hill, New York), 5th edition.
18. Instrumental Methods of Analysis: H. R. Willard, L. L. Merrit, J. A. Dean, F. A. Settle (Van Nostrand Reinhold Co., New York), 6th edition.
19. Modern Methods of Chemical Analysis: Pecsok, Shield & Cairns (John Wiley), 2nd edition.
20. Introduction to Instrumental Analysis (1987), R. D. Braun (McGraw-Hill Book Company), New Delhi.
21. Analytical Chemistry: Principles and Techniques: Larry G. Hargis (Prentice-Hall International edition).
22. Introduction to Modern Liquid Chromatography: L. R. Snyder & J. J. Kirkland (John Wiley & Sons, New York).
23. Treatise on Analytical Chemistry: I. M. Kolthoff & P. J. Elving (John Wiley & Sons, New York).
24. Handbook of Analytical Chemistry: L. Meites (McGraw-Hill, New York).
25. Environmental Chemistry: B. R. Sharma, H. Kaur (Goel Publishing House, Meerut).
26. Environmental Chemistry by A.K. de
27. Spectrometric Identification of Organic Compounds; By Robert M. Silverstein, Francis X. Webster, David J. Kiemle, David L. Bryce, Eight edition, Published by Wiley

28. Introduction to Spectroscopy; By Donald L. Pavia, Gary M. Lampman, George S. Kriz, James A. Vyvyan, Fourth edition, Published by Brooks cole.
29. Spectroscopic Methods in Organic Chemistry; By D.H Williams, I. Fleming, Sixth edition, Published by Tata Mcgraw Hill Education.
30. Spectroscopy of Organic Compounds; By P S Kalsi, Sixth edition, Ne Age International Publisher.
31. Organic Spectroscopy: Principles and Applications; By Jag Mohan, Second edition, Published by Alpha Science International Ltd.
32. Organic Spectroscopy (NMR, IR, Mass and UV); By Dewan S.K., First edition, CBS Publisher & Distributors Pvt Ltd.
33. Basic Principles of Spectroscopy; By Raymond Chang, Published by McGraw-Hill Inc.
34. Elementary Organic Spectroscopy; By Y R Sharma, S. Chand & Company Pvt. Ltd.
35. Organic Spectroscopy; By William Kemp, Published by Palgrave Macmillan.

36. Green chemistry by V. K. Ahluwalia, Narosa Pub New Delhi
37. Green Chemistry, Theory and Practice, P. T. Anastas and John C. Warner, Oxford University Press, 2000, New York, USA.
38. Green Chemistry: An Introductory Text, Mike Lancaster, Green Chemistry Network, University of York, RSC, 2002.

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Inorganic Chemistry
M.Sc. Inorganic Chemistry, Practicals

Course Code	[19030811002050001]	Title of the Course	Inorganic Chemistry
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	● To impart basic knowledge for carrying out analysis of alloy. ● Understand the types of complexometric titrations ● To understand and calculate the percentage purity of salt. ● Determination of physical constant and confirmation of product. ● Concept of estimation and determination of each radical quantitatively and qualitatively.

Course Content

Quantitative Analysis :

1. Analysis of Solder and Type metal (Alloy Analysis)
2. Determine the amount of Ca as $\text{CaC}_2\text{O}_4\cdot\text{H}_2\text{O}$ or as CaCO_3 , in limestone
3. Estimation of Cu^{+2} as CUSCN
4. Estimation of Iron in Iron ore
5. Estimation of available chlorine in bleaching powder
6. Estimation of Ca^{+2} and Pb^{+2} in Admixture
7. Determine the amount of Fe^{+3} and Cr^{+3} Present in given Admixture
8. Determine the percentage purity of the given sample of Manganese salt
9. Estimation of Aluminium by back titration.

Teaching- Learning Methodology	Introduction, interaction with students in calculation of mole ratios, Carrying out experiments at each step according to the respective practical.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the analysis of alloy and ore and calculation of molarity and mole ratio.
2.	Learn to methods to find copper, zinc gravimetrically and volumetrically.
3.	Learn to find available chlorine bleaching powder.
4.	Learn to determine calcium, lead, Iron and chromium in admixture,
5.	Appreciate good laboratory practices.

Suggested References:

1. A textbook of practical inorganic chemistry - A.L.Vogel
2. Practical Chemistry by Dr.O.P.Pandey, D.N.Bajpai, Dr.S.Giri
3. Advance inorganic analysis by Agarwal, Keemti lal
4. Qualitative Inorganic analysis – Vogel
5. Inorganic practical by Chatwal and Anand

On-line resources to be used if available as reference material

On-line Resources

Master of Science, Organic Chemistry
M.Sc.Organic Chemistry, Practicals

Course Code	[19030811002050001]	Title of the Course	Organic Chemistry
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	● To impart basic knowledge for carrying out preparation. ● Understand nature of reaction and establishment of reaction condition with mechanism. ● To understand calculation of mole and mole ratio for each reaction. ● Isolation of product from individual step and purification by crystallization. ● Determination of physical constant and confirmation of product. ● Concept of estimation and determination of each component quantitatively.

Course Content

Preparation of organic compounds :

- i) Nitration
- ii) Bromination
- iii) Acylation
- iv) Reduction
- v) Oxidation
- vi) Condensation reaction
- vii) Diazotization reaction
- viii) Friedl-Craft's reaction
- ix) Cannizzaro reaction
- x) Aldol condensation

Quantitative Estimations

- a. Estimation of ester + acid
- b. Estimation of formaldehyde
- c. Estimation of glycine
- d. Estimation of amide + acid

Teaching- Learning Methodology	Introduction, interaction with students in calculation of mole ratios, Carrying out experiments at each step according to the respective practical.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the basics to carry out reactions, nature of reaction and calculation of mole and mole ratio.
2.	Establish mechanism and monitor a reaction at specified condition.
3.	Work-up after the completion of reaction and purification.

4.	Confirmation of product through the references.
5.	Appreciate good laboratory practices.

Suggested References:

1. A text book of practical organic chemistry – A. I. Vogel
2. Practical organic Chemistry – Mann and Saunders
3. A handbook of quantitative and qualitative analysis – H. T. Clarke
4. Comprehensive Practical Organic Chemistry : Qualitative Analysis V K Ahluwalia & S. Dhingra.
5. Comprehensive Practical Organic Chemistry : Preparations and Quantitative Analysis V K Ahluwalia & R. Aggarwal Universities Press.
6. An Advance Course in practical Chemistry, A K. Nad, B. Mahapatra and A. Ghoshal.

On-line resources to be used if available as reference material

On-line Resources

Master of Science, Physical Chemistry
M.Sc. Physical Chemistry, Practicals

Course Code	[19030811002050001]	Title of the Course	Physical Chemistry
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	● To study the physical chemistry parameters for reaction between acid and base. ● To study the behaviour of surfactant in aqueous solution ● To determine the concentration of solution by colorimetry ● To understand the conductivity behaviour of electrolytes solution. ● Partitioning behaviour of component in two phases

Course Content

1. Determine the dissociation constant and strength of borax solution pH-metrically.
2. Determine the velocity constant of the hydrolysis of ethyl acetate with sodium hydroxide at room temperature by conductance measurements.
3. Determine the solubility of silver chloride in water potentiometrically.
4. To determine the concentration of given components in a mixture colorimetrically.
5. Determine the equilibrium constant of the reaction $I^- + I_2 = I_3^-$ by distribution method.
6. Investigation the reaction between H_2O_2 and HI at two different temperatures and calculate the energy of activation for the reaction
7. Determine the formula of a complex between Cu^{+2} and NH_3 by distribution method.
8. Determine CST of Phenol -Water system
9. Determine CST of Phenol –NaCl system

Teaching-Learning Methodology	Introduction, explanation of theory and procedure of the experiments and interpretation of results.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand preparation of solutions.
2.	Qualitative analysis of compound
3.	Calculate the concentration of unknown solution by pH, potentiometer and colorimeter

4.	Understand behaviour of surfactant and polymer
5.	Separation of solvent using phase diagram

Suggested References:

1. Advanced Practical Physical Chemistry by Yadav J. B., Krishna Prakashan Media
2. Practical Physical Chemistry, Dr. M. Satish Kumar Sankalp Publication
3. Gurtu, J. N., Kapoor, R., Advanced Experimental Chemistry S. Chand & Co. Ltd.
4. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Pearson

On-line resources to be used if available as reference material

On-line Resources

Master of Science, Inorganic Chemistry
M.Sc.Inorganic Chemistry, Semester III
PAPER-I

Course Code	[1903080203010002]	Title of the Course	Selected Topics in Inorganic Chemistry
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To learn the properties of non-transition metal elements. • To learn the synthesis, bonding, properties and applications of main group elements. • To understand the Bio inorganic chemistry of Hemoglobin, Myoglobin, Ferritin and Transferrin • To understand the metal complexes in Medicine and anticancer activity of Platinum complexes

Course Content		
Unit	Description	Weightage* (%)
1.	CHEMISTRY OF NON-TRANSITION ELEMENTS General discussion on the properties of the non-transition elements, Polymorphism in carbon, phosphorus and sulphur, Synthesis, properties and structure of boranes, carboranes, silicates. carbides, phosphazenes, sulphur-nitrogen compounds, peroxo compounds of boron, carbon, sulphur, structure and bonding in oxyacids of nitrogen, phosphorus, sulphur and halogens, interhalogen, pseudohalides	25
2.	ORGANOMETALLIC COMPOUND 1. Introduction, definition and scope of organometallic Chemistry. 2. Metal-Carbon multiple bonded compounds: Synthesis, bonding. Properties and applications of: (a) Carbenes (b) carbynes 3. $\eta^n C_n R_n$ carbocyclic polyenes: Synthesis, bonding. Properties and applications of a) allyls $\eta^3-C_3R_5$, b) pentadienyls $\eta^5-C_5R_7$, c) cyclobutadienyls $\eta^4-C_4R_4$ d) cyclopentadienyls $\eta^5-C_5R_5$ e) arenes $\eta^6-C_6R_6$ f) cycloheptatrienyls $\eta^7-C_7R_7$ 4. Synthetic applications of Main group organometallic compounds. a) Organolithium b) Organomagnesium c) Organozinc d) Organoboron e) Organothallium	25

3.	BIOINORGANIC CHEMISTRY-I 1. Biological Chemistry of Iron: a) Transport of Iron b) Hemoglobin and Myoglobin c) Storage and Transport Proteins of Iron viz Fermitin and Transferrin d) Cytochromes e) Iron-Sulfur Proteins. 2. Biochemistry of Cobalt a) B₁₂ coenzymes and Model compounds b) Actions of Cobalmins and Cobinamides c) Adenosylcobalmin as a coenzyme d) Ribonucleotidereductase e) Methylcobalamin as cofactor.	25
4.	BIOINORGANIC CHEMISTRY-II 1. Biological Chemistry of Copper a) Type I, II and III b) Blue Copper Proteins (plastocyanins, Arurins and Blue Oxidases) c) Models of Blue Copper compounds d) Non-blue copper proteins (Tyrosinase, Galactose Oxidase, SOD) 2. Biochemistry of Zinc a) Carboxypeptidase and carbonic anhydrase 3. Metal complexes in Medicine. a) Disease due to Metal deficiency and its treatment: Fe, Cu, Zn and Mn b) Metals used in diagnosis: MRI c) Anticancer activity of Platinum complexes.	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library, IT tools,, encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	To learn the properties, synthesis, structure and bonding of the non-transition elements,
2.	To learn the M-C multiple bonded compounds and synthetic applications of main group organometallic compounds.
3.	To learn the biological chemistry of Iron and Cobalt
4.	To understand the biological chemistry of Copper and Zinc, Metal complexes in medicine and anticancer activity of complexes.

Suggested References:

Reference Books Recommended:

1. A. F. Wells, Structural Inorganic Chemistry - 5th edition (1984)
2. J. D. Lee, Concise inorganic Chemistry, Elbs with Chapman and Hall, London
3. M. C. Day and J. Selbin, Theoretical Inorganic Chemistry, Reinhold, EWAP
4. F. A. Cotton, R. G. Wilkinson. Advanced Inorganic chemistry
5. Willam L. Jooly, Modern Inorganic Chemistry
6. Advanced Inorganic Chemistry, Bahl and Tuli, S. Chand and Company
7. Inorganic Chemistry 3rd edn. D. F. Shriver and P. W. Atkins, Oxford University Press, 1999, Chapter 16.
8. Organotransition Metal Chemistry, Anthony F. Hill, Royal Society of Chemistry, Tutorial Chemistry Text, 2002. Chapters 1 to 7.
9. Organometallics: A concise Introduction, Ch. Elshebroicn and A. Salzer, VCH, Chapters 12 to 16.
10. Organotransition Metal Chemistry: Applications to Organic Synthesis, S. G. Davies, Pergamon 1982.

11. Bioinorganic Chemistry: A Short Course -Rosette M.Roat-Malone, Wiley Interscience, 2002.
12. Biological Inorganic Chemistry -An Introduction, Robert Crichton, Elsevier Science, 2007
13. The Biological Chemistry of the Elements- The Inorganic Chemistry of Life J. J. R. Frausto da Silva and R. J. P. Williams Clarendon Press, Oxford, 1991. 1
14. Bioinorganic Chemistry, Dr. Asim. K. Das, Books Allied Lid, Kolkata

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Inorganic Chemistry
M.Sc.Inorganic Chemistry, Semester III
PAPER-II

Course Code	[1903080203020002]	Title of the Course	Metallurgy, Bio-fertilizer & Ion exchange Chromatography
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	● To understand the classification, methods of production, chemical properties and uses of different fertilizers. ● To learn the different types of magnetic bodies and its magnetochemistry ● To learn types of corrosion principles and corrosion inhibitors ● To understand the synthesis, characterization and properties of ion exchangers.

Course Content		
Unit	Description	Weightage* (%)
1.	CHEMICAL AND BIOFERTILIZERS Definition, classification, methods of production, chemical properties and uses of urea, Ammonium sulphate, ammonium sulphate nitrate, ammonium chloride, single super phosphate, triple super phosphate, biofertilizers, types of biofertilizers, nitrogen fixing biofertilizers, phosphate-solubilizing biofertilizers, preparation of a biofertilizers	25
2.	MAGNETO CHEMISTRY Introduction, definition, types of magnetic bodies, Russel-saunders and LS coupling. Derivation of Russel-Saunders terms, spin-orbit interaction, thermal energy and magnetic property, magnetic moment for different multiple widths, multiple width large compared to KT, multiple width small compared to KT, multiple width comparable to KT, stereo chemical application of magnetic properties of the first transition series, lanthanides and actinides. Determination of magnetic susceptibility by different methods	25
3.	CORROSION INHIBITORS Introduction, types of corrosion principles of corrosion inhibitors, corrosion as an electrochemical process, practical aspects of corrosion inhibition, anion inhibitor properties in neutral electrolytes, some application of corrosion inhibitors (cooling water circulation-once through and open systems engine radiation and cooling systems, central heating systems, refrigeration plants and high chloride systems, water for steam raising corrosion inhibitors for paint coating)	25
4.	ION EXCHANGE Synthesis, characterization and properties of Ion exchangers, mechanism of ion exchange: equilibria-rate theory, Donnan equilibria, liquid ion exchangers and chelate ion-exchange resins, Separation of metal and non-metals using ion exchangers. Inorganic	25

	ion exchangers: The clay minerals, zeolites, heteropolyacid salts, hydrous oxides and insoluble salts and their applications.	

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library, IT tools, encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	To understand the classification, methods of production, chemical properties and uses of urea, Ammonium sulphate, ammonium sulphate nitrate, ammonium chloride, single super phosphate, triple super phosphate, bio fertilizers. Learn the types of biofertilizers like nitrogen fixing and phosphate-solubilizing.
2.	To learn types of magnetic bodies, Russell-Saunders and LS coupling. Derivation of Russell-Saunders terms, spin-orbit interaction, thermal energy and magnetic property, magnetic moment for different multiple widths, multiple width large and small compared to KT, lanthanides and actinides. To understand the determination of magnetic susceptibility by different methods
3.	Learn the types of corrosion principles of corrosion inhibitors, corrosion as an electrochemical process, practical aspects of corrosion inhibition, anion inhibitor properties in neutral electrolytes, some application of corrosion inhibitors
4.	To understand the synthesis, characterization and properties of Ion exchangers, mechanism of ion exchange, equilibria-rate theory, Separation of metal and non-metals using ion exchangers. To learn the Inorganic ion exchangers and their applications

Suggested References:

Reference Books Recommended:

1. CE Harland 1994 Ion exchange theory and practice, second Edn, Royal society of chemistry Cambridge.
2. J.Korkisch 1989 Handbook of ion exchange resins, their application to inorganic chemistry CRC press, Boca Raton FL.
3. An introduction to metallic corrosion: U. R. Evans, Cambridge, England
4. UHLIG'S Corrosion hand book, R. Winston Revie., John Wiley & Sons JNC.
5. Vogel's text book of quantitative chemical analysis, sixth Edn. J.Mendham R C Denney, J.D.Barnes, M J K Thomas.
6. Advanced in inorganic chemistry vol. 1 & 2, Gurdeep Raj, Krishna Publication Meerut.
7. Collings G. H., Commercial Fertilizers, 5th edition, McGraw Hill, New York, 1955.

On-line resources to be used if available as reference material

On-line Resources

Master of Science, Inorganic Chemistry
M.Sc.Inorganic Chemistry, Semester III
PAPER-III

Course Code	[1903080203030002]	Title of the Course	General Topics in Inorganic Chemistry
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To learn different theories to understand shape and geometry of different molecules. • To learn about nature of nucleus and theory of radio activity • To learn about principles, different forms and prevention of corrosion chemistry. • To understand basic requirement of titration and types of EDTA titration.

Course Content		
Unit	Description	Weightage* (%)
1.	STEREOCHEMISTRY AND BONDING COMPOUND Wave mechanical treatment of covalent bond, valence bond theory, molecular orbital theory, VSEPR theory, walsh diagrams, shapes of molecules having regular and irregular geometry, orbital configuration of some triatomic molecules, hybridization, bent's rule and energetics of hybridization, $d\pi-p\pi$ bonds, structure of some adducts.	25
2.	NUCLEAR CHEMISTRY The nature of the nucleus, nuclear stability, packing fraction, magic number, isotopes, isobars, isotones and isomers, natural radioactivity, theory of radioactivity disintegration, radioactive equilibrium, radioactive series, units of radioactivity, measurement of radioactivity, nuclear transmutation, artificial radioactivity, nuclear reaction, nuclear fission and fusions, trace elements, application of radioactive isotopes	25
3.	CORROSION CHEMISTRY Principle of corrosion and rate expressions, different forms of corrosion, corrosion by sea water and boilers, contact and crevice corrosion, stress corrosion, cracking and related phenomena, hydrogen cracking corrosion prevention-corrosion inhibitors and passivators, cathodic and anodic protection, metallic coating, role of paints, plastic linings, alloying for corrosion resistance.	25
4.	VOLUMETRIC TITRIMETRY Terminology, basic requirements of a titration reaction, standard and primary standard solution, expressing concentration of standard solution, volumetric titration co-relation, p-functions, acid-base titration, theory of acid base indicators, redox titration, complexometric titration, EDTA titration, indicators for EDTA titration, titration curves, EDTA titration methods, cautions in volumetric titrimetry, correction for unavoidable errors.	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library, IT tools, encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Learnt the wave mechanical treatment of covalent bond, valence bond theory, molecular orbital theory, VSEPR theory, Walsh diagrams, shapes of molecules having regular and irregular geometry, orbital configuration of different molecules
2.	Learnt the nature of the nucleus, natural radioactivity, theory of radioactivity disintegration and its equilibrium, series, units, measurement and application of radioactive isotopes
3.	Understood the principles of corrosion, different forms of corrosion, prevention-corrosion inhibitors and passivators, cathodic and anodic protection, metallic coating, role of paints, plastic linings, alloying for corrosion resistance
4.	Gained knowledge of basic requirements of a titration reaction, standard and primary standard solution, expressing concentration of standard solution, volumetric titration co-relation, p-functions, acid-base titration, theory of acid base indicators, redox titration, complexometric titration, indicators for EDTA titration, cautions in volumetric titrimetric

Suggested References:

Reference Books Recommended

1. Principle of Inorganic Chemistry: Puri Sharma, Kalia, Thirty Third Edn. (Vishal Publishing Co.)
2. Advanced in Inorganic Chemistry: S. K. Agrawal, Keemti Lal, Fifteenth Edn. (Pragati Edition)
3. An introduction to metallic corrosion: U. R. Evans, Cambridge, England
4. UHLIGS Corrosion hand book, R. Winston Revie., John Wiley & Sons JNC
5. Vogel's text book of quantitative chemical analysis, sixth Edn.
6. Advanced in Inorganic chemistry vol. 1& 2, Gurdeep Raj, Krishna Publication Meerut
7. Selected topics in inorganic chemistry: Malik, Tuli, Madan

On-line resources to be used if available as reference material

On-line Resources

Master of Science, Inorganic Chemistry
M.Sc. Inorganic Chemistry, Semester III
PAPER-IV

Course Code	[1903080203040002]	Title of the Course	Co-ordination Chemistry(Special Paper)
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• Understand theoretical principle valence bond theory, Crystal field theory. • Learn the Advanced theory Molecular orbital theory for complex ions. • Understand the theoretical aspects of spectra of complexes. • Learn the Crystal field diagram for d^1 and d^{10} configuration, Orgel diagram for Oh and Td complexes (d^1-d^9 states)

Course Content		
Unit	Description	Weightage* (%)
1.	THEORIES OF METAL LIGAND BONDING-I a) Valence bond theory(VBT) Theoretical principle of VBT Inner orbital complexes and outer orbital complexes, example of complexes of co-ordination number 2 to 6, advantages and limitation of valence bond theory b) Crystal field theory (CFT) Theoretical principles of CFT CFT to weak and strong field compounds: splitting pattern in octahedral(O_h), tetrahedral(T_d), square planar(D_{4h}), trigonal bipyramidal (TBP), and square planar(SP) complexes, limitation of crystal field theory, structural effects of orbital splitting	25
2.	THEORIES OF METAL LIGAND BONDING –II a) Advanced theory: Jahn teller effects and distortions in O_h complexes. Ligand field theory(LFT), experimental evidences in support of metal ligand overlap. Adjusted crystal field theory (ACFT), determination of ligand group of orbitals, σ bonding and π bonding, b) Molecular orbital theory for complex ions. Qualitative molecular orbital energy level diagrams and their interpretation of O_h, T_d and square planar complexes with examples	25
3.	ELECTRONIC SPECTRAL PROPERTIES OF TRANSITION METAL AND METAL COMPLEXES-I Theoretical aspects of spectra of complexes Spectroscopic terms, coupling of terms, microstates for the p, d and f configurations. Hund's rule for ground state term, derivation of ruseel-saunders terms, the correlation of spectroscopic term in mulliken symbols, electronic transition selection rules, spin-orbit coupling. Crystal field diagram for d^1 and d^{10} configuration. Orgel diagram for O_h and T_d complexes (d^1-d^9 states)	25

4.	ELECTRONIC SPECTRAL PROPERTIES OF TRANSITION METAL AND METAL COMPLEXES-II Tanabe Sugano energy level diagram for Oh and Td complexes (d^1 - d^9 states). Charge transfer spectra and interligand spectra, factors affecting charge spectra, calculation of Dq , B' and β , parameters for Co(II) and Ni(II) complexes using electronic spectral data under different geometries Spectrochemical series and nephelauxetic series, intensity of spectral peak: oscillator strength and band width.	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library, IT tools, encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Learnt the theoretical principle of VBT Inner orbital complexes and outer orbital complexes, example of complexes of co-ordination number 2 to 6, advantages and its limitations.
2.	Learnt Advanced theories like Jahn teller effects and distortions in Oh complexes, Ligand field theory(LFT), Adjusted crystal field theory (ACFT), Qualitative molecular orbital energy level diagrams and their interpretation of Oh, Td And SP.
3.	Understand Spectroscopic terms, coupling of terms, microstates for the p, d and f configurations, Hund's rule for ground state term, electronic transition selection rules, spin-orbit coupling. Crystal field diagram for d^1 and d^{10} configuration. Orgel diagram for Oh and Td complexes (d^1 - d^9) states

4.	Understand the Tanabe Sugano energy level diagram for Oh and Td complexes (d^1 - d^9 states). Charge transfer spectra and interligand spectra, factors affecting charge spectra, calculation of Dq , B' and β , spectrochemical series and nephelauxetic series.

Suggested References:

Reference Books Recommended

1. Inorganic chemistry(principle of structure and coordination compounds) J.E Huheey , Harper and Row International series, New York(1983)
2. Advanced inorganic chemistry F.A. Cotton and G.Wildinson, Interscience, New York (1988)
3. Theoretical Inorganic Chemistry (new edition) M.C.Day And J.Selbin East-West Press Pvt.Ltd (New Delhi) 1971
4. A Modern Introduction Chemistry, T. Moeller John Wiley And Sons, New York
5. Principle of inorganic chemistry, Puri, Kalia And Sharma, Vishal Publishing Co. Jalandhar
6. Advanced inorganic chemistry, S. K Agrawal And Keemtilal, Pragati Prakashan
7. Co-Ordination Chemistry Pimplapure, Jain, Pragati Prakashan
8. General and Inorganic chemistry, R Sarkar, New Central Book Agency
9. Advanced inorganic chemistry, Tulibasus And Madan (Volume-II)
10. Inorganic electronic spectroscopy (II edition), A.B.P. Lever, Elsevier, Amsterdam
11. Introduction to ligand field, B.N.Feggis, Interscience, New York (1966).
12. Physical Methods in Inorganic chemistry (both edition), R.S.Drago, W.B.Saunders, Philadelphia (1977)
13. Introduction to ligand field theory, C.G. Ballhenson, Mcgraw-Hill, New York(1962)
14. Electron absorption spectroscopy and related techniques, D.N. Sathyanarayana Compound, Indrajeetkumar, Pragati Prakashan

On-line resources to be used if available as reference material

On-line Resources

Master of Science, Inorganic Chemistry
M.Sc.Inorganic Chemistry, Practicals
Semester- III

Course Code	[1903080203050001]	Title of the Course	
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	● To impart basic knowledge of constituents of Ores, alloys and sample ● Understand the opening of alloy and ores ● To learn the analysis of constituents in alloys and ores. ● To learn methods practically for estimation of different metals in ores, alloys gravimetrically and volumetrically ● To learn mole-ratio method by Job's method.

Course Content			
		Estimation of Ore-Alloy	4- Credit
		Analysis of Sample	
		Job's Method	4- Credit
		Viva-Voce	

1. Analysis of Brass alloy
2. Analysis of Ultramarine sample
3. Analysis of Hydrogen peroxide (H_2O_2)
4. Analysis of Dolomite Ore
5. Analysis of fertilizer sample
6. Analysis of Stainless Steel
7. Analysis of German Silver
8. Analysis of Portland Cement.
9. Analysis of Available lime

10. Analysis of PO_4^{3-} for K_2HPO_4 spectrometrically
11. Determine the λ_{max} for Cu-en complex[(1:1), (1:2),(1:3)] complex
12. Determine the composition of Cu-en complex by Job's method
13. Determine the λ_{max} for Ni-en complex[(1:1), (1:2),(1:3)] complex
14. Determine the composition of Ni-en complex by Job's method.

Teaching-Learning Methodology	Introduction, interaction with student for analysis of Ore/Alloy, Sample and estimation of metal-ligand by Mole-ratio method and performing the experiment according to the respective method.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the basics of opening of ores and alloys
2.	Learn the percentage of constituents in different samples, alloys and ore by different methods.
3.	Learnt to perform experiments using different references.
4.	Learn to perform practicals by qualitative methods.
5.	Learn Mole-ratio of metals and ligands.
6.	Understand the calculation using different references.
8.	Appreciate good laboratory practices.

Suggested References:

Reference Books Recommended

1. Comprehensive Practical Organic Chemistry by V.K. Ahluwalia and Ren Aggarwal
2. Monograph on Green Chemistry Laboratory Experiments by Green Chemistry Task Force Committee, DST
3. Quantitative analysis by Arther I.Vogel
4. Quantitative analysis by V.K.Ahluwalia
5. Quantitative analysis by Mann and sanders

On-line resources to be used if available as reference material

On-line Resources

Master of Science, Organic Chemistry
M.Sc.Organic Chemistry, Semester III
PAPER-I

Course Code	[1903080203010003]	Title of the Course	Natural Products and Bio-molecules
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	● To understand the concept of biomolecules and natural products, structural elucidation of natural pigment and alkaloids of different class, their interrelation to each other, synthesis of intermediates and their confirmation through synthetic pathways. ● To learn steroids and their respected sex hormones, structural elucidation of steroid molecules, biosynthetic pathways, synthesis of intermediates, steroid based sex hormones and their interrelation to each other, physiological importance and their synthesis. ● To understand biochemical function of vitamins, classification and structural elucidation of vitamins & terpenoids through analytical and synthetic evidences. ● To learn about nucleic acid and enzymes. Structural elucidation of DNA, RNA and their role in biochemical function, classification of enzymes & their catalytic activities.

Course Content		
Unit	Description	Weightage* (%)
1.	NATURAL PIGMENTS and ALKALOIDS (A) Natural Pigments and Porphyrins Derivatives Porphyrins: General structures, Synthesis and Spectral properties. Synthesis of cryptopyrrole, Phytopyrrole, Opsopyrrole and Haemopyrrole and their carboxylic acid derivatives. Structural elucidation of Haemoglobin and Chlorophyll (Analytical evidences only) (B) Alkaloids Classification of alkaloids; Structural elucidation of Morphine, Reserpine and Colchicine (Analytical evidences only)	25
2.	STEROIDS and SEX HORMONES (A) Steroids Introduction to Sterols: Structure determination of cholesterol and ergosterol (no synthesis), Bile acids: Introduction, Structural elucidation and Synthesis of Cholanic acids (α and β both). (B) Sex Hormones Classification of hormones: Structure and synthesis of Androgens, Oestrogens and Gestrogens. Name and structures of Adrenocortical hormones, Partial synthesis of cortisone.	25
3.	VITAMINS and TERPENOIDS (A) Vitamins Structure determination, Synthesis and biochemical functions of Vitamin A, Vitamins B1 and B2, Vitamin H (B) Terpenoids	25

	Classification, nomenclature and isolation Structure determination and synthesis of Farnesol, Zingiberene, Cadinene, Gibrellic acid and Abietic acid.	
4.	Nucleic Acids & Enzymes (A)Nucleic Acids Purine and pyrimidine bases of nucleic acids, base pairing via H-bonding, Chemical and enzymatic hydrolysis of nucleic acids, Structure of nucleosides and nucleotides, DNA, RNA(Basics structures only), DNA replication, Transcription, Translation, Protein Biosynthesis. (B) Enzymes Classification, nomenclature and inhibition, factors affecting catalytic activity and specificity in action, regulation of enzyme activity	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library, IT tools,, encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the nature of natural pigments & alkaloids, spectral properties of porphyrins, generation of various pyrrole and their carboxylic acid derivatives and their synthesis, structural elucidation of pigments and alkaloids, their analytical evidences for the confirmation of structure including intermediates.

2.	To learn basic skeleton of steroids, structural elucidation of cholesterol, ergosterol, bile acids, male, female sex hormones, their interrelation of each other, corticoids and their physiological activities.
3.	To learn biochemical function of vitamins, classification & structural elucidation, through analytical and synthetic evidences of vitamins and terpenoids, confirmation of intermediates through respective synthetic pathway, their respective oxidation, reduction, hydrolysis etc. and rearrangement reactions.
4.	To understand nucleic acids, respective purine and pyridine bases, their interrelation to each other, structural elucidation of DNA & RNA, their classification & nomenclature of enzymes, their next generation, protein synthesis, catalytic activities through various parameters.

Suggested References:

Reference Books Recommended:

1. Organic Chemistry, Vol. I & II (Sixth edition), I. L. Finar.
2. S.W. Pelletier, Chemistry of the Alkaloids, Van Nostrand Reinhold Co., New York (1970).
3. K.W. Bentley, The Alkaloids, Vol. I., Interscience Publishers, New York (1957).
4. Chemistry of Organic Natural Products, Vol. I & II, O. P. Agrawal.
5. Organic Chemistry of Natural Products, Vol. I & II, Chatwal.
6. Organic Chemistry (5/e) by Morrison & Boyd.
7. Chemistry of Vitamins – S. F. Dyke.
8. Natural Products Chemistry, Vol. I & II, K. Nakanishi.
9. The Molecules of Nature, J. B. Hendrickson.
10. Selected Organic Synthesis: Ian Fleming.
11. Chemistry of Natural Products, N. R. Krishnaswamy.
12. The Chemistry of Natural Products, K. W. Bentley. Vol. I – V.
13. J.W. Apsimon, Total Synthesis of Natural Products, Vol. 1-6, Wiley-Interscience Publications, New York (Vol. 1, 1973).
14. Principles of biochemistry –Donald J.Voet, Judith G.Voet, charlotte w. pratt (John willey and sons)
15. Lehninger principles of biochemistry- David L.Nelson and Michael M.wx (Palgrave Macmillan / w.h. freeman company new york)
16. Biochemistry – U.Satyanarayana Baro and allied P.Ltd., kolkata

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Organic Chemistry
M.Sc.Organic Chemistry, Semester III
PAPER-II

Course Code	[1903080203020003]	Title of the Course	Selected Topics in Organic Chemistry-I
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	● To understand the familiarize with the basic properties, theory & interpretation of ^1H NMR, ^{13}C NMR and 2D NMR spectrometry, to impart knowledge in the theory & principals of spectroscopic techniques for characterization & differentiation of various molecules. ● To learn about various pollution-water & air and effluent treatment. Contamination of water through heavy minerals, halogens, pathogens, air pollution, detection of various components and hydrocarbons, effluent treatment of sugar, peeper & pulp and distilleries. ● To learn monocyclic, fused and bridged heterocyclic compounds, their nomenclature, synthesis, aromatic character, reactivity and application in the preparation of building blocks, fine chemicals and dye industry. ● To understand the role of chemical reagents in oxidation, reduction, cyclisation and transformation of various organic functional groups, their synthesis and industrial application.

Course Content		
Unit	Description	Weightage* (%)
1.	NMR SPECTROSCOPY Theory and principles of NMR spectroscopy, Theory of Fourier Transform (i) ¹H NMR Spectroscopy Proton resonance condition, Aspects of PMR spectra – number of signals, chemical shift, factors influencing chemical shift, deshielding, chemical shift values and correlation for protons bonded to carbons (aliphatic, olefinic, aldehydic, aromatic) and other nuclei (alcohols, phenols, enols, acids, amides and mercaptans), effect of deuteration, spin- spincoupling, (n+1) rule, factors effecting coupling constant “J” (ii) ¹³C NMR spectroscopy Types of ¹³C NMR Spectra: proton coupled and decoupled ¹³C spectra, chemical shift, calculations of chemical shifts of aliphatic, olefinic, alkyne, aromatic, hetero aromatic and carbonyl carbons, factors affecting chemical shifts (iii) 2D NMR Techniques Preliminary idea of 2D NMR ,	25
2.	ENVIRONMENTAL CHEMISTRY (i) Water Pollution: Basic Concepts of Eutrophication, Water Quality, Water contaminants, Heavy minerals, Organic contaminants, PCBs and other Halogens materials, PAH, Pesticides, Waterborne Pathogens, Aquatic toxicology, Water Purification Methods, Sewage treatment. (ii) Air Pollution: Air pollution sources and emissions- Particulates, Aerosols, Photochemical smog, Determination of SO_x, NO_x, CO_x and hydrocarbons, Air pollution control technologies of particulate and gaseous pollutants (iii) Effluent treatment: Industrial pollution of sugar, distillery, drug, pulp & paper and their analysis. Effluent treatment plants of above industries.	25

3.	HETEROCYCLIC CHEMISTRY-I (i) Nomenclature of Heterocycles: Hantzsch-Widman nomenclature systems for monocyclic and fused heterocycles and bridged heterocycles (ii) Five and six membered heterocycles with two hetero atoms: Synthesis, reactivity, aromatic character and importance of following heterocyclic rings: Oxazole, Thiazole, Pyrazole, Imidazole, Pyridazine, Pyrimidine, Pyrazine (iii) Condensed five membered heterocycles: Synthesis, reactivity, aromatic character and importance of following heterocyclic Rings: Benzoxazole, Benzthiazole, Benzopyrazole, Benzimidazole.	25
4.	REAGENTS FOR ORGANIC SYNTHESIS Introduction, Preparation and Industrial Applications of the following, (1)N-Bromosuccinimide (NBS) (2)Grubbs 1 st and 2 nd generation catalyst (3)N,N-dicyclohexylcarbodiimide (DCC) (4)Lead tetra-acetate (LTA) (5)Baker's yeast (6)n- butyl lithium (7)K ₃ Fe(CN) ₆ and DMSO (8)Grignard Reagent (9)Diazomethane (10)Polyphosphoric acid	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library, IT tools, encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand fundamental & basic terms involved in ^1H NMR, ^{13}C NMR & 2D NMR spectroscopy, know effects of various factors on the spectra, interpretation from spectral data, identify structure of organic compounds by using combined spectral data, distinguish isomers and other closely related compounds by using spectral techniques.
2.	Learn water & air pollution, basic concepts of Eutrophication, water contamination with heavy materials, halogens, hydrocarbons and water purifying techniques and purification of water, sewage treatment, determination of air pollutants SOX, NOX, COX and hydrocarbons. Development of technologies to control gaseous pollutants, effluent treatment of various paper pulp & distillation.
3.	To understand the basic concept of name reaction for the heterocyclic chemistry, aware about all heterocyclic ring systems such as mono, bi, tri and fused ring systems with all backgrounds in terms of naming of new compounds, application of heterocycles in medicinal chemistry.
4.	Understand the chemistry involved in oxidation, reduction, transformation, cyclisation etc by employing numerous reactants to appreciate the chemo-selectivity of the reagents, synthesis of reagents with respective mechanism and their application in industry. Suggest the use of miscellaneous reagents in organic synthesis.

Suggested References:

Reference Books Recommended:

1. R.M. Silverstein and F.X. Webster, Spectroscopic Identification of Organic Compounds, 6th Edition (2003) John Wiley, New York.
2. D.H. Williams and I.F. Fleming, Spectroscopic Methods in Organic Chemistry, 4th Edition (1988), Tata-McGraw Hill, New Delhi.
3. P.Y Bruice, Organic Chemistry, 2nd Edition (1998) Prentice – Hall, New Delhi.
4. Nuclear Magnetic Resonance – Basic Principles- Atta-Ur-Rehman, Springer- Verlag (1986).
5. One and Two dimensional NMR Spectroscopy – Atta-Ur-Rehman, Elsevier (1989).
6. Organic structure Analysis- Phillip Crews, Rodriguez, Jaspars, Oxford University Press (1998).
7. G.W. Vanloon, S.J. Duffer, Environmental Chemistry - A Global Perspective, Oxford University Press (2000).

8. F.W. Fifield and W.P.J. Hairens, Environmental Analytical Chemistry, 2nd Edition (2000), Black Well Science Ltd.
9. Colin Baird, Environmental Chemistry, W.H. Freeman and Company, New York (1995).
10. A.K. De, Environmental Chemistry, 4th Edition (2000), New Age International Private Ltd., New Delhi.
11. Peter O. Warner, Analysis of Air Pollutants, 1st Edition (1996), John Wiley, New York.
12. S.M. Khopkar, Environmental Pollution Analysis, 1st Edition (1993), Wiley Estern Ltd., New Delhi.
13. S.K. Banerji, Environmental Chemistry, 1st Edition (1993), Prentice-Hall of India, New Delhi.
14. An introduction to the chemistry of heterocyclic compounds-R M Acheso
15. Heterocyclic Chemistry- J A Joule and Smith
16. Heterocyclic Chemistry-II- R R Gupta, M Kumar, V Gupta, Springer (India) pvt
17. Heterocyclic Chemistry, 4th Edition by J. A. Joule & K. Mills, Published by Chapman & Hall (1995)
18. Principles of modern heterocyclic chemistry, Edited by Leo A. Paquette, Published by Pearson Benjamin Cummings (1968)
19. Heterocyclic Chemistry, 3rd Edition by Thomas L. Gilchrist, Published by Prentice Hall (1997)
20. The Structure & Reactions of Heterocyclic Compounds, Edited by Michael Henry Palmer, Published by Edward Arnold (1967)
21. Heterocyclic chemistry by V. K. Ahluwalia, Narosa publishing house.
22. Organic synthesis using transition metals-Roderick Bates (Wiley).
23. Organic chemistry – J. Clayden, N. Greeves, S. Warren and P. Wothers (Oxford Press).
24. Advanced organic chemistry, Part B – F. A Carey and R. J. Sundberg, 5th edition (2007).
25. Guidebook to organic synthesis-R K Meckie, D M Smith and R A Atken.

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Organic Chemistry
M.Sc.Organic Chemistry, Semester III
PAPER-III

Course Code	[1903080203030003]	Title of the Course	Organic Chemistry in Industry
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To understand process chemistry and research, basic knowledge of drug discovery, preclinical trail of medicines. Classes of agrochemicals and their properties. • To learn about colour industry-dyes and pigments, nomenclature and colour index, types of dyes, theories of dyes, properties, various types of fibre and miscellaneous applications. • To learn about drug & medicines, nomenclature, generic and trivial name. Various theories of drug action, administration of dyes and determination of physiochemical properties. • To understand unit processes and implementation in industry, determination of various agents in unit process and their synthetic route.

Course Content		
Unit	Description	Weightage* (%)
1.	ORGANIC CHEMISTRY IN INDUSTRY Introduction, Process Chemistry versus Research Chemistry Pharmaceutical Industry: Drug Discovery, Drug development, Preclinical and clinical testing, Medicine, Future Problems and Opportunities Agrochemical Industry: Classification, Biodegradable and	25

	Persistent Pesticides, Toxicity, Chemical Classification of Pesticides-Herbicides and Insecticides	
2.	BASIC CONCEPTS OF DYE AND DYE INTERMEDIATES Introduction of Dyes and Pigments, Absorption of visible light, colour of wavelength absorbed, complementary colour. Relation between color and chemical Constitution, Witt's theory, Armstrong's theory, Nietzki's theory, Valence bond theory, Molecular orbital theory, Fastness Properties, Exhaustion and fixation properties. Natural Dyes, Nomenclature of Dye Intermediates, Colour Index Classification of Dyes: Based on structure, based on mode of application to fibres, Non- Textile uses of dyes: Dyes in medicine, leather, paper, colour photography and electro photography, food, cosmetics, displays and laser dyes.	25
3.	BASIC CONCEPT OF DRUGS Introduction, Classifications: On the basis of their chemical structure and therapeutic action, Nomenclature: Proprietary and Non-proprietary name, Nomenclature of new drugs by WHO, Names of drugs: Generic and brand names Theories of drug action: Occupancy theory, Rate theory and induced fit theory Biological defence, chemical defences, Furguson principle Absorption of drugs: Routes of administration, factors that affect on absorption Physico chemical properties: Solubility, Partition coefficients, Ionization constant, Electronic effect, Steric effect, Stereochemical consideration	25
4.	UNIT PROCESSES (i) Nitration: Nitrating agents. Mechanism of aromatic nitration. Industrial chemicals derived from Benzene, Naphthalene, Anthracene using Nitration. (ii) Sulphonation and Sulfation: Sulphonating and Sulfating agents. Mechanism of aromatic Sulphonation. Industrial chemicals derived from Benzene, Naphthalene, Anthracene using Sulphonation. (iii) Amination: Aminating agents, Amination by reduction, Amination by Ammonolysis. Industrial chemicals derived from Benzene using Amination. (iv) Alkylation: Alkylating agents. Industrial important alkyl compounds derived by various routes	25

	(v) Halogenation: Halogenating agents. Industrial important halogenated compounds derived by various routes	

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library, IT tools, encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand process chemistry versus research chemistry, concept of clinical trials on various phases, FDA, ADMET, classes of agrochemical-pesticides, herbicides, insecticides and toxicity studies.
2.	Learn colour and chemical constitution, various theories, fastness properties of dyes through various parameters. Application of dyes on various fibres, miscellaneous application of dyes like- non textiles, leather, medicines, photography, cosmetics etc.
3.	Understand of drugs, nomenclature & classification, generic and trivial/brand names of drugs, various theories of drug action, biological defence, administration of drug and study their various physico chemical parameters.
4.	Understand unit process & operation. Various unit processes, determination of agents employed in unit process on the basic motif & analogous, establishment of mechanism and their application in industry with different routes.

Suggested References:

Reference Books Recommended

1. Organic Chemistry: A Mechanism Approach; Penny Chaloner, CRC Press, Taylor and Francis; Florida.
2. Pharmaceutical Process development: Current Chemical and Engineering Challenges, J. Blacker and M. T. Williams, RSC Cambridge, UK.
3. Fine Chemicals: The Industry and Its Business, P. Pollak, 2nd Edition, Wiley.
4. The chemistry of synthetic Dyes, Vol. I to VII by Venkataraman, Academic Press, New York.
5. Chemistry of Synthetic Dyes & Pigments by Lubs.
6. Dyes and their intermediates by E. N. Abrahart.
7. Handbook of synthetic dyes and pigments, Vol. I & II by K. M. Shah.
8. Industrial Dyes by Klans Hunger, Germany by Wiley-VCH.
9. Development in the Chemistry and technology of Organic Dyes by J.Griffiths, Blackwell Sci. Pub., Oxford, London.
10. Principles of colour Technology by Fred W. Billmeyer and Max Saltzman, John Wiley & Sons.
11. Medicinal Chemistry by G. R. Chatwal.
12. A textbook of Pharmaceutical Chemistry by Jayshree Ghosh.
13. Chemical Process Industries by R. N. Shreve.
14. Riegel's Hand-Book of Industrial Chemistry, Ed. by James A. Kent.
15. Industrial Chemicals by Faith, Keyes, Clark.

On-line resources to be used if available as reference material

On-line Resources

Master of Science, Organic Chemistry
M.Sc.Organic Chemistry, Semester III
PAPER-IV

Course Code	[1903080203040003]	Title of the Course	Medicinal Chemistry-I
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	- To understand drug design. Different parameters for drug design, concept of drug design & optimization, SAR, receptor, administration, role of enzymes in biotransformation and relevant parameters. - To understand types of psychoactive drugs, their division, classification, general structure, effect of substituent, their SAR, MOA and synthesis. - To learn about diuretics, hypoglycemic and cardiovascular agents/drugs. Classification, general structure, effect of substituent, their SAR, MOA and synthesis. - To understand Analgesic, antipyretic, NSAIDs Agents, classification, general structure, effect of substituent, their SAR, MOA and synthesis.

Course Content		
Unit	Description	Weightage* (%)
1.	DRUG DESIGN, PHARMACOKINETICS AND PHARMACODYNAMICS Drugs and Drug Design Introduction, drug targets, procedure for drug design, pro- drug, concepts of lead compounds, lead modification, structure activity relationship (SAR), LD50, ED50, therapeutic index, Concepts of drug receptors, Elementary treatment of drug receptor interactions. Introduction to Pharmacokinetic and Pharmacodynamic, Drug administration, Drug absorption, drug distribution, drug metabolism (general pathway of drug metabolism: Phase-I and Phase-II), elementary treatment of enzyme stimulation, biotransformation, Drug excretion.	25
2.	PSYCHOACTIVE DRUGS (i) General anaesthetics: General classification and Structural variations (ii) Local Anaesthetics: General classification and SAR (iii) Sedatives and Hypnotics: General classification, Structural variations and mode of action Synthesis and therapeutic uses of only the following: Thiopental (Pentothal), Amobarbital (Amytal), Diazepam, Chlorazepam, alprazolam, glutethimide, Nikethamide, Benzocaine, Procaine, Lidocaine (xylocaine), Dibucaine (Nupercaine),	25

	Phenacaine (Holocaine).	
3.	Antipyretic Analgesics and NSAIDs Agents General classification of Antipyretic Analgesics, Narcotic Analgesics and Non-Steroidal Anti- Inflammatory Drugs Structural variations in Morphine, Morphan and 4-Phenylpiperidine Analogues. Opioid Receptors (Name only), Limitations of Opoids, Synthesis and therapeutic uses of only the following: Meperidine (Pethidine), Ibuprofen, Meclofenamate sodium, Oxyphenbutazone, Diclofenac Sodium, Mefanamic acid,	25
4.	DIURETICS, ANTI-DIABETIC AGENTS AND CARDIOVASCULAR DRUGS (i) Diuretics: General classification. Structural variation and SAR of Thiazide Diuretics Synthesis and therapeutic uses of only the following: Chlorothiazide, Furosemide, Ethacrynic acid, Triamterene (ii) Insulin and Oral Hypoglycemic Agents (Anti-diabetic agents or drugs affecting sugar metabolism): General classification, Synthesis and therapeutic uses of only the following: Glipizide, Glybomuride Troglitazone, Chlorporpamide, Glibenclamide (iii) Cardiovascular Drugs: General introduction of Antiarrhythmic agents and Antihypertensive drugs Structure variation in β -adrenergic blockers and Dihydropyridines, Structure – activity Relationship of ACE Inhibitors Synthesis and therapeutic uses of only the following: Verapamil, Methyldopa, Atenolol, Lisinopril, Losartan	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library, IT tools, encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand drug design, procedure of drug design, preparation of library of compounds-leads to identification and optimization. Various concept like pro drug, soft drug, SAR, MOA, ADMET and receptor, drug administration, pharmacokinetics and pharmacodynamics, role of enzyme in biotransformation etc.
2.	Learn general classification of psychoactive agents, difference between sedative and hypnotics, general structure of each class of drugs with substituent, their SAR and trivial/generic name, synthesis and uses of selective drug.
3.	Understand general classification of analgesic, antipyretic, NSAIDs Agents, general structure of each class of drugs with substituent, their SAR and trivial/generic name, synthesis and uses of selective drug.
4.	General classification of diuretics, general structure of each class of drugs with substituent, their SAR and trivial/generic name, synthesis and uses of selective drug method..

Suggested References:

Reference Books Recommended

1. Burger's Medicinal Chemistry and Drug Discovery (5/e), 1997, Vol. 1, 2, 3, 4,5, Edited by ManFred E. Wolff (John Wiley & Sons, inc., New York).
2. Principles of Medicinal Chemistry, Vol. I & II (5/e), by S. S. Kadam, K. R. Mahadik, K. G. Bothra (Nirali Prakashan).
3. Principles of Medicinal Chemistry by William O. Foye (ed.), Lea and Febiyer, Philadelphia.
4. Wilson and Gisvold's Text-book of Organic Medicinal and Pharmaceutical Chemistry (5/e, 1982) by Robert F. Doerge (J. B. Lippincott Company, Philadelphia/Toppan Co. Ltd., Tokyo).

5. Essential of Medicinal Chemistry (2/e) by Andrejus Korolkovas (A Wiley Interscience Publication, 1988, John Wiley & Sons, Canada).
6. Medicinal Chemistry by Ashutoshkar (Wiley Eastern Ltd., 1993).
7. The Pharmaceutical Basis of Therapeutics by Goodman and Gilman (The Macmillan Co.).
8. The Organic Chemistry of Drug Synthesis, Vol. I, II & III (1980), Ed. By D. Lednicer and L.A.Mitscher (John Wiley and Sons, New York).
9. Topics in Medicinal Chemistry, Vol. I & II by Rabinowitz and Myerson (Editor) (Interscience, 1968).
10. Adhunik Sanshleshit Aushodhonu Rasayanvighyan, Dr. Anamik Shah, University Granth Nirman Board, Ahmedabad.
11. Medicinal Chemistry, D. Sriram and P. Yogeeswari, 1st edi., Pearson Education, 2007.
12. Handbook of pharmaceutical chemicals by Dr. A. R. Shenoy and Dr. V. R. Shenoy Multitech Publishing Co., 15-Yogesh, Hingwala Lane, Ghatkopar (East) Mumbai.
13. Fundamentals of Medicinal Chemistry by G Thomas.

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Organic Chemistry
M.Sc.Organic Chemistry, Semester III
PAPER-IV

Course Code	[1903081003040003]	Title of the Course	DYES AND INTERMEDIATES-I
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	● To understand azo dyes, diazotization and coupling, methods of diazotization, types of azo dyes and synthesis. ● To learn about fluorocent dye. ● To understand classification of dyes according to application and chemical constituents, application of various non-textile dyes, medicinal, indicator, laser dyes etc. ● To understand pigment,types of pigment & their application, heterocyclic dyes and their synthesis.

Course Content		
Unit	Description	Weightage* (%)
1.	AZO DYES General Introduction: Diazotization, mechanism and different methods of diazotization and laws of coupling, General introduction, classification and synthesis of Monoazo dyes, Bisazo dyes and Azoic dyes. Synthesis of the following: Disperse Red 13, Acid Blue 92, Mordant Black 3, Acid Black 1, Acid Blue 113, Direct Blue 15, Direct Violet 1, Direct Red 28, Naphthol AS-BR, Fast Orange GGD.	25
2.	Fluorescent Whitening Agents Introduction, Theory of fluorescence, Classification of FWA and synthesis of important member of each class and their uses. Types of Fibres and Basic Operations in Dyeing Process Types of fibres: Natural, semisynthetic and synthetic, Dyeing and Interactions: Ionic Interactions, Hydrogen bond, Van der Waal's Interactions and Covalent Interactions. Basic Operations in Dyeing Process: Preparation of the fibres, Preparation of the dyebath, application of the dyebath and finishings, Various methods of dyeing: Direct dyeing, Vat dyeing, Mordant dyeing, Disperse dyeing and Formation of dye on the fibre, Dyeing of wool with the acid dyes, Dyeing with the reactive dyes, Fastness properties: Colour fastness, Light fastness, Sublimation fastness and Burnt gas fumes fastness.	25
3.	(A) Classification of Dyes according to application and chemical constitution. (B) Evaluation of dyes (C) Dyes for Non-Textile Application Leather dyes, Paper dyes, Hair dyes, Food dyes, Ink dyes, Photographic dyes, Indicator dyes, Laser dyes, Liquid crystal dyes, Solar cell, biological uses of dyes. Synthesis of the following: Eriochrome Black T, Sunset Yellow FCF, Acridine Yellow G, Safranin B, Prontosil, Methylene Blue, Nile Blue 2B, Tartrazine	25

4.	(A) Pigments Different classes of organic and inorganic pigments and their applications with examples. (B) Heterocyclic Dyes Pyrazolone dyes, cyanine dyes, dyes containing azine, oxazine and thiazine ring systems, Thiazole Dyes Synthesis of only the following: Basic Yellow 11, Basic Orange 21, Safranin B, Rosinduline GG, Sirius Supra Blue FFRL, Brilliant Alizarin Blue 3R, Sirius Supra Yellow RT, Acid Yellow 19, Copper Phthalocyanine, Sirius Supra Light Green FFGL	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library, IT tools, encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand azo and azoic dyes, methods of diazotization & their mechanism, concepts, position of coupling, classification of dyes-mono, bio azo dyes & synthesis.
2.	Understand various FBA, classification of FBA, types of fibres and mechanism of dyeing on different parameters, various methods of dyeing and their fastness properties.
3.	Understand classification of dyes according to their chemical constitution,

	application, application of non textile application-like stanning,, laser, liquid crystal etc and synthesis.
4.	Understand pigments, Inorganic and Organic heterocyclic dyes, classification and synthesis.

Suggested References:

1. The chemistry of synthetic Dyes, Vol. I to VII by Venkataraman, Academic Press, New York.
2. Chemistry of Synthetic Dyes & Pigments by Lubs.
3. Dyes and their intermediates by E. N. Abrahart.
4. Handbook of synthetic dyes and pigments, Vol. I & II by K. M. Shah.
5. Industrial Dyes by Klans Hunger, Germany by Wiley-VCH.
6. Development in the Chemistry and technology of Organic Dyes by J.Griffiths, Blackwell Sci. Pub., Oxford, London.
7. Principles of colour Technology by Fred W. Billmeyer and Max Saltzman, John Wiley & Sons.
8. Advance in colour chemistry, series vol.-3, Modern colourants: Synthesis and structure, edited by A.T.Peters and H.S. Freeman, Blackie Academic & Professional(1995).
9. Colour chemistry: Synthesis, properties and applications of organic dyes and pigments, Heinrich Zollinger VCH, Germajy(1987).
10. Organic Chemnistry in Colour V., P.F.Gordan, P. Gregory, Spinger-Verlag(1983).
11. Textile Auxiliaries, J.W. Batty
12. The production and applications fluorescent brightening agents, Milos Zahradnik, John Wiley & Sons (1982).
13. Chemistry of Dyes and Principles of dyeing-V.A. Shenai
14. Synthetic dyes- G.R. Chatwal
15. Critical reports on Applied chemistry, Vol-7, Developments in chemistry and Technology of organic dyes, Edited by : J. Griffths, Blackwell

On-line resources to be used if available as reference material

On-line Resources

Master of Science, Organic Chemistry
M.Sc.Organic Chemistry, Practicals
Semester- III

Course Code	[1903080203050001]	Title of the Course	
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To impart basic knowledge for carrying out multistep synthesis based on some name reactions. • Understand nature of reaction and establishment of reaction condition with mechanism • To learn about the calculation of mole ratio for each reaction. • Isolation of product from individual step, purification and confirmation of the product. • Preparation of reagent to carry out estimation. • To understand the purpose of estimation and establishment of respective condition.

Course Content				
		Green Synthesis	4- Credit	
		Preparation (From Given Name reactions)		
		Estimation	4- Credit	
		Viva-Voce		

Green Synthesis (Any four)

1. Preparation of acetanilide from aniline and acetic acid using Zn dust.
2. Base catalyzed aldol condensation using LiOH.H₂O as a Catalyst.
3. Bromination of *trans*-stilbene using sodium bromide and sodium bromated.
4. [4+2] cycloaddition reaction in aqueous medium at room temperature.
5. Benzil Benzilic acid rearrangement under solvent free condition

Preparation of industrially important compounds by following Name reactions (Any four)

1. Sandmayer reaction
(P-chloro toluene from p-toluidine)
2. Fischer indole synthesis
(1, 2, 3, 4-tetrahydrocarbazole from cyclohexanone and phenylhydrazine)

3. Riemer-Tiemann reaction (Salicylaldehyde from phenol)
4. Skraup synthesis (Quinoline from aniline)
5. Gabriel phthalimide synthesis
(Anthranilic acid from phthalic anhydride and phthalimide)
6. 2-hydroxy 1-naphthaldehyde from β naphthol

Organic Estimations (Any Six)

1. Determination of Sulphonamides with Silver Nitrate solution by Volumetrically.
2. Determination of aromatic primary amines by either diazotization or indirect diazotization.
3. Estimation of Benzyl Penicillin.
4. Determination of coupling value (C.V.) of Dye intermediates.
5. Non-aqueous titration of Sodium Benzoate.
6. Estimation of Isonazid.
7. Enzyme inhibition
8. $-\text{NO}_2$ and $-\text{OH}$ group

Teaching-Learning Methodology	Introduction, interaction with students in calculation of mole ratios, carrying out experiments at each step according to the respective practical.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the basics to carry out reactions, nature of reaction and calculation of mole ratio.
2.	Establish mechanism of reaction and monitoring specified reaction condition.
3.	Learn to work-up after the completion of reaction, purification.

4.	Confirm the product through the references.
6.	Learn to set up reaction condition for individual estimation of compound.
7.	Understand the calculation with reference to respective factors.
8.	Appreciate good laboratory practices.

Suggested References:

Reference Books Recommended

1. Comprehensive Practical Organic Chemistry by V.K. Ahluwalia and Ren Aggarwal
2. Monograph on Green Chemistry Laboratory Experiments by Green Chemistry Task Force Committee, DST
3. Quantitative analysis by Arther I. Vogel
4. Quantitative analysis by V.K. Ahluwalia
5. Quantitative analysis by Mann and sanders

On-line resources to be used if available as reference material

On-line Resources

**Master of Science, Physical Chemistry
M.Sc. Physical Chemistry, Semester III
PAPER-I**

Course Code	[19030802010004]	Title of the Course	Advanced Thermodynamics
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• Application of statistical thermodynamics to gas, liquid and solid • To learn the calculation of partition function for different ensembles and gaseous systems. • Theoretical explanation on thermodynamic function of liquid mixtures. • The behaviour of gaseous stems in terms of empirical equations

Course Content		
Unit	Description	Weightage* (%)
1.	Statistical Thermodynamics of Ensembles Phase Space, The Liouville theorem, Ergodic Hypothesis, Ensemble and probability, ensemble averages and postulates. Details of types of ensemble: Canonical and Microcanonical and Grand canonical ensemble. Probability distribution, partition function and thermodynamic function of canonical ensemble, Equilibrium constant and canonical ensemble, Partition function for Grand canonical ensemble, Fluctuations, Mean distribution and mean square deviation, Fluctuation in energy in a canonical ensemble	25
2.	Statistical Thermodynamics of Ideal Gases and Solid Ideal mono atomic gas, Thermodynamic function for mono atomic gas (statistical derivation of Helmholtz free Energy function, pressure, Internal energy, Entropy) Gibbs Paradox, Partition function and Thermodynamic function for diatomic and polyatomic gas (Helmholtz free energy, Internal energy, heat capacity, entropy). Derivation of Sackur-Tetrode equation. Treatment of diatomic and polyatomic molecules – entropy, vibrational entropy and rotational entropy, Internal rotation in polyatomic molecules, Statistical thermodynamic of solid, characteristic of crystalline solid, Einstein model.	25
3.	Thermodynamics of Liquid Mixtures Types of molecular interactions in solution of electrolytes and non-electrolyte, Fugacity and activity coefficient in solution, ideal and non-ideal behaviour of phase equilibria (isothermal and isobaric), semi empirical equations explaining multi component thermodynamics properties for binary data, Theories of solutions non-electrolyte liquids:	25

	van Laar theory, van der Waals theory, Scatchard- Hildebrand theory, Lattice theory. Theory of electrolytes: limitations/modifications of Debye Huckle limiting law, Bromley's Method, Pitzer's Method	
4.	Thermodynamics of Gas State Ideal Gas law, empirical equation for ideal gas, deviation of real gas from ideal behaviour, Adiabatic expression of ideal gas, thermodynamic representation of real gas: Fugacity, Reference state for real gas, Determination of activity coefficient for real gas: Approximate method, graphical method, virial expression representation of real gas, The van der Waals equation : correction due to excluded volume, force of attraction, internal pressure, Second Virial Coefficient, van der Waals equation as function of pressure and temperature, intermolecular forces, critical phenomena, phase transition and van der Waals, Reduced van der Waals equation, other equation of state	25

Teaching-Learning Methodology	classroom teaching, use of e-resources, library, IT tools,, encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the contribution of different partition function to the assigned system. Calculation of thermodynamic functions for the systems
2.	Understand sets of partition functions and calculation for various gaseous systems. The fluctuations in calculation of thermodynamic functions
3.	To learn different types of interactions in liquid mixtures the derivation of empirical equation for excess thermodynamic functions for liquid mixtures
4.	To understand critical phenomena of gaseous systems.

Suggested References:

1. Statistical Thermodynamics by M. G. Gupta, New Age Publication
2. Statistical Thermodynamics : Fundamental and Applications by Normanad Laurendeau, Cambridge Press
3. Molecular Thermodynamics of Fluid Phase Equilibria by J.M.Prausnitz, R.N. Lichtenthaler, E.G. Azevedo
4. Thermodynamic Properties of Nonelectrolyte Solutions By William Acree, Academic Press
5. Physical Chemistry : Concepts and Theory: Kenneth Schmitz, Elsevier
6. Advanced Physical Chemistry by Puri, Sharma and Pthania

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Physical Chemistry
M.Sc.Physical Chemistry, Semester III
PAPER-II

Course Code	[1903080203020001]	Title of the Course	Molecular Spectroscopy
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	- To understand the familiarize with the basic properties, theory & interpretation of IR, ^1H NMR, Mass and Luminescence Spectroscopy. - To impart knowledge in the theory & principals of spectroscopic techniques for characterization & differentiation of various molecules. - To impart knowledge on identification of compounds using spectroscopy

Course Content		
Unit	Description	Weightage* (%)
1.	IR and Raman Spectroscopy Theory of IR and Raman, selection rules, IR absorption, Raman scattering, Mutual exclusion rule, complimentary techniques, Instrumentation - FTIR and Raman, Cells and sampling techniques, Resonance Raman spectroscopy, Interpretation of IR spectra using correlation charts, Advantages of FTIR spectroscopy, Mid-IR Reflection – DRS, ATR, Data processing in Near IR, Applications in structure elucidation of inorganic and organic molecules.	25
2.	NMR Spectroscopy Theory of NMR, Relaxation, population of energy levels, Larmor precession, chemical shift and factors affecting it, references and solvents, Spin-spin splitting, Coupling constant, Magnetic Anisotropy, Instrumentation, Shift Reagents, Interpretation of simple NMR spectra, Signal averaging, FT-NMR, Pulse FT-NMR spectroscopy, ^{13}C NMR spectra, Calculation of chemical shift in ^{13}C NMR, NMR in medical diagnostics, Double resonance technique, Multi-dimensional NMR, Problems to elucidate structure from NMR spectra.	25

3.	Molecular Mass Spectroscopy Instrumentation, Methods of ion production (EI, CI, FI, FD, Electro Spray, MALDI), Ion separators, Ion collection and recording, Double focusing, Time of flight analyser, Quadruple-mass spectrometer, Sample handling techniques, Resolution, Parent peak, Base peak, Metastable ions isotope effect, Molecular formula from mass spectra, Nitrogen rule, Ring rule, Fragmentation rules, Behavior of classes of compounds, Interpretation of mass spectra, Additional applications, Problems to elucidate structure from mass spectral data.	25
4.	Molecular Luminescence Spectroscopy Introduction to molecular luminescence (fluorescence, phosphorescence and chemiluminescence); theory of luminescence, energy level diagram, Deactivation process,; instruments for measuring fluorescence (fluorometer and spectrofluorometer);, factor affecting, Emission and excitation spectra, wavelength selector, detector, application and problems.	25

Teaching-Learning Methodology	classroom teaching, use of e-resources, library, IT tools, encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand fundamental & basic terms involved in IR, ^1H NMR, Mass and Luminescence Spectroscopy, know effects of various factors on the spectra, interpretation from spectral data, identify structure of organic compounds by using combined spectral data, distinguish isomers and other closely related compounds by using spectral techniques.

2.	Identify drug testing contamination in food, isotope ratio determination and protein identification with the help of spectroscopy
3.	Identify the name of compounds using spectroscopy
4.	Understand the instrumental set up for all instruments.

Suggested References:

1. Instrumental Methods of Chemical Analysis: G. W. Ewing (McGraw-Hill, New York), 5th edition.
2. Instrumental Methods of Analysis: H. R. Willard, L. L. Merrit, J. A. Dean, F. A. Settle (Van Nostrand Reinhold Co., New York), 6th edition.
3. Modern Methods of Chemical Analysis: Pecsok, Shield & Cairns (John Wiley), 2nd edition.
4. Introduction to Instrumental Analysis (1987), R. D. Braun (McGraw-Hill Book Company), New Delhi.
5. Analytical Chemistry: Principles and Techniques: Larry G. Hargis (Prentice-Hall International edition).
6. Handbook of Analytical Chemistry: L. Meites (McGraw-Hill, New York).
7. Photometric and Fluorometric Methods of Analysis: F. D. Snell (John Wiley & Sons Inc., New York).
8. Instrumental Methods of Chemical Analysis: B. R. Sharma (Goel Publishing House, Meerut).

On-line resources to be used if available as reference material

On-line Resources

Master of Science, Physical Chemistry
M.Sc.Physical Chemistry, Semester III
PAPER-III

Course Code	[1903080203030001]	Title of the Course	Electro Analytical Techniques
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To understand process chemistry and research, basic knowledge of Polarography. • To learn about calculation of concentration of compound using Polarography. • To learn about types of electrodes and their selectivity for the ions in solution. • Concept of Chronopotentiometry.

Course Content		
Unit	Description	Weightage* (%)
1.	Potentiometric Titration and Chronopotentiometry (a) Fundamentals of potentiometry, Instrumentation, electrode system, accuracy of direct potentiometric measurements and its limitations, potentiometric titrations, neutralization titrations, end-point detection, oxidation- reduction, precipitation titrations, complexometry titrations with example, applications and advantages. (b) Chronopotentiometry Principle, Instrumentation and procedure, applications.	25
2.	DC-Polarography Theory and Applications of Polarography, Types of currents: Residual Current, Migration Current and Diffusion Current, Nature of the Limiting Current: 1) Kinetic currents, 2) Catalytic currents and 3) Adsorption currents, Electro capillary maxima,	25

	Maxima of first kind and second kind , Maxima suppressors, DME as electrode, Wave equation, Ilkovic equation (derivation), Reversible electrode reactions at DME half wave potential, Interference and removal of oxygen, Reversible Electrode Reactions of Metal Complexes at D.M.E (Ligane method) Determination of stability constants of complexes. Amperometric titrations: Principle, DME & RPE, curves, Biamperometric titration.	
3.	Morden Polarographic Methods A.C. Polarography: Principle of Sinusoidal alternating applied potential, AC peak polarogram, Peak current equation, Characteristic of AC polarographic peak, Importance of signal to noise ratio for the sensitivity, Comparison with DC polarography. Square-wave Polarography: Principle of alternating rectangular wave voltage applied, Frequency of square wave applied, Problems of large condenser currents in A.C., Peak polarogram, Peak current equation, Limitations of techniques. Pulse Polarography: Effect of capillary response with frequency of applied square wave potential , Principles and difference between Normal Pulse Polarography and Differential Pulse Polarography, Importance of charging and Faradaic currents.	25
4.	Ion selective electrodes Classification of ion selective electrodes, Solid state electrodes – Glass electrode effect of glass structure on selectivity function of the glass electrode. Acid error, Alkali error, Silver halide, Sulphide, Lanthanum fluoride ion selective electrodes. Liquid ion exchange electrode – Calcium selective ion electrodes. Gas electrodes, ammonia, sulphur dioxide, oxygen and CO₂ sensing electrode, Micro ion selective electrode, enzyme electrodes.	25

	Application and Numericals	

Teaching-Learning Methodology	classroom teaching, use of e-resources, library, IT tools, encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand concept of POLAROGRAPHY and its importance in analysis of electro active compounds
2.	Learn types of various electrodes their characteristics and their uses
3.	Understand the application of different Polarography in identification of compounds
4.	Understand the Potentiometric Titration and Chronopotentiometry

Suggested References:

Reference Books Recommended

1. "Polarography": Kolthoff I. M. and Lingane J. J. (Vol. I & II) (Interscience Publishers, New York).
2. "Polarographic Techniques": L. Meites (Interscience Publishers, New York).
3. Principles of Instrumental Analysis (5th ed.) by Skoog, Holler and Nieman (Saunders College Publications).

4. Modern Polarographic Methods in Analytical Chemistry by A M Bond CRC Press Inc
5. Undergraduate Instrumental Analysis (5th ed.), J. W. Robinson (Marcel Dekker Inc.).

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Physical Chemistry
M.Sc. Physical Chemistry, Semester III
PAPER-IV

Course Code	[1903080203040004]	Title of the Course	Physical Chemistry of Materials
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	● To understand kinetics of enzyme catalyst reaction. Enzymes inhibition immobilization, thermodynamics of biological reactions ● To understand phase diagrams for the mixtures. ● To learn about arrangements of molecules in solids. ● To understand concept of Electronic Behavior of Materials

Course Content		
Unit	Description	Weightage* (%)
1.	Biophysical Chemistry Bioenergetics: Standard free energy change in biochemical reactions (exergonic and endergonic). Coupled reaction, Energy rich compounds and energy coupling (Formation and hydrolysis	25

	of energy rich bonds in energy rich molecule), Enzyme Kinetics: MichaelisMenten, Michaelis-Menten for Inhibition and Activation, Lineweaver-Burke plots. Enzyme inhibition reversible and irreversible inhibition, Immobilized enzymes, Techniques and methods of immobilization of enzymes, Application of immobilized enzymes. Cell Membrane: Structure and Transport functions of cell membrane.	
2.	Phase Equilibria of Multi Component Systems Reduced Phase rule, Application of reduced phase rule to Two component systems: System with congruent and incongruent M.P., Phase rule for three component systems, Representation, methods of computing composition of ternary systems : methods of parallel and perpendicular lines, lever arm rule, Systems of three liquid component exhibiting partial miscibility (Formation of (a) one pair, (b) two pair and (c) three pairs of partially miscible liquids System composed of two solids and liquid components (a) crystallization of pure components (b) double salt formation (c) hydrate formation (d) formation of solid solution (Phase transitions in the ternary system	25
3.	Solid State Chemistry Ionic Crystals & Their structures, detailed explanation of types of packing and co ordination number, Radius ratio rule and prediction of packing of crystals, Polarization, Crystalline solids: Geometry of AB ₂ type: Fluorite (CdI ₂), antfluorites (CdCl ₂), Rutile structures (TiO ₂). AB ₂ type: ReO ₃ , BiI ₃ , A ₂ B ₃ type: Fe ₂ O ₃ , Corundum Al ₂ O ₃ , Ternary Compounds ABO ₃ type: Perovskite, AB ₂ O ₄ type : Spinelstructure Perfect & Imperfect crystals, Schottky defect, Frenkel defect, thermodynamics of Schottky& Frankel defects, Line defects: Dissociation, Extended defects:	25

	Lineage boundary, grain boundary, stacking fault	
4.	Electronic Behavior of Materials Metals, Insulators and Semiconductors, Electronic structure of solid, bond theory, band structure of metals, insulators and semiconductors, Intrinsic and extrinsic semiconductors, doping of semiconductors and conduction mechanism, the band gap. Temperature dependence of conductivity, carrier density and carrier mobility in semiconductors, synthesis and purification of semiconducting materials, single crystal growth, zone refining, fractional crystallization. Superconductivity: Introduction, theory of super conductivity, Meissner effect, Type I&II superconductors, crystal structure of high temperature semiconductors.	25

Teaching-Learning Methodology	classroom teaching, use of e-resources, library, IT tools, encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand biophysical chemistry of enzyme catalysed reaction. Immobilization of enzymes and role of cell membrane.
2.	Identify the separation of solid or liquid using phase diagram.
3.	Designing of new compounds using concept of solid state
4.	Different theories help to understand the behaviour of Electronic materials in depth

Suggested References:

Reference Books Recommended

1. Phase equilibria by Mats Hillert
2. Biochemistry by C.B.Powar and G.R. Chatwal
3. Physical chemistry by P.W.Atkins & dePaula 7Th Edition
4. Advanced physical chemistry by Gurtu & Gurtu
5. West A.R.,Solid State Chemistry and its Applications, Plenum
6. Solid state chemistry : introduction by Lesley E.Smart Elaine A.Moore, CRC press
7. West A.R.,Solid state Chemistry,John Wiley
8. Solid State Chemistry by D.K.Chakraburti, New Edge InternationPublication 1996.
9. West A.R.,Solid State Chemistry and its Applications,Plenum

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Physical Chemistry
M.Sc.Physical Chemistry, Practicals
Semester- III

Course Code	[1903080203050001]	Title of the Course	
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To impart basic knowledge for preparation of solution and instrumental set up for the experiments. • Understand theories of the experiments • To learn about the interpretation of results and graphical representation of results. • To understand the purpose of experiments to meet the objectives of the experiments.

Course Content				
		Full experiment (instrumental/ non instrumental)	4- Credit	
		Half experiment (instrumental)		
		Half experiment(non instrumental)	4- Credit	
		Viva-Voce		

FULL EXPERIMENT (Any Seven)

1. To Study the kinetics of reaction between $K_2S_2O_8$ and KI. Determine rate constant, order of reaction and influence of ionic strength on rate constant
2. Determination of CMC of surfactant by conductance method and calculate thermodynamic parameters for micellization
3. To study the kinetics of hydrolysis of ethyl acetate by NaOH at two different temperatures by conductance measurement and find out energy of activation of the reaction.
4. Determine the effect of salts on the cloud point of nonionic surfactant.
5. Determination of constants of Mark-Houwink equation for polymer by viscosity method
6. Determine ionic composition of synthetic sea water samples by flame photometer.

7. Determine parachor/density/refractive index of binary solutions.
8. To determine the Ca^{+2} , Mg^{+2} and Fe^{+2} content in a sample of dolomite ore.
9. Study influence of ionic strength on solubility of CaSO_4 and determine thermodynamic solubility product and mean ionic strength.

HALF EXPERIMENT (Any Seven)

1. Study the ratio of complex formation formed by titration of Zn^{2+} with potassium ferrocyanide potentiometrically.
2. Electrogravimetric determination of copper from solution
3. Equivalence conductance of solutions of strong electrolytes and weak electrolytes.
Application of Kohlrausch's law. Onsager constant.
5. K_a of weak organic acid [benzoic acid] conduct metrically.
6. Study stability constant of complex formation between Fe (III) and salicylic acid
7. Determine ionization constant of bromophenol blue using pH meter.
8. Preparation of simple colloids and determination flocculation value for different salts.
9. Study Hydrolysis constant of methyl acetate catalysed by HCl and equi-normal urea hydrochloride, determine degree of hydrolysis for the salt.
10. Determine basicity of organic acid by conductometer
11. Structure Identification and Elucidation by IR/NMR/MS spectroscopy

Teaching-Learning Methodology	Introduction, explanation of theory and procedure of the experiments and interpretation of results.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand preparation of solutions.
2.	Qualitative analysis of compound
3.	calculate the concentration of unknown solution by pH, potentiometer and colorimeter
4.	Understand behaviour of surfactant and polymer
5.	Separation of compounds using different solvent systems
6.	Theories of indicators

Suggested References:

Reference Books Recommended:

1. Advanced Practical Physical Chemistry by Yadav J. B., Krishna Prakashan Media
2. Practical Physical Chemistry, Dr. M. Satish Kumar Sankalp Publication
3. Gurtu, J. N., Kapoor, R., Advanced Experimental Chemistry S. Chand & Co. Ltd.
4. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Pearson

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Analytical Chemistry
M.Sc. Analytical Chemistry, Semester III
PAPER-I

Course Code	[1903080203010001]	Title of the Course	Analytical Methods of Analysis
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	● To understand advancement in thermal methods of analysis with various factors affects the results and their application in various field. ● To learn the basic concepts of electrical methods such as coulometry, electrogravimetry with their application in various titrations. ● To understand basic principles and theory of various voltammetry methods such Rapid scan, hydrodynamic, anodic stripping, cyclic with their application. ● To learn basic principles, theory of radio chemical methods, half-life and different uses of radioactive substance in various application.

Course Content		
Unit	Description	Weightage* (%)
1.	THERMAL METHODS OF ANALYSIS Differential thermal analysis (DTA), Differential scanning calorimetry (DSC), Instrument, Reference materials, Diluents, Factors affecting DTA results, Applications, Evolved gas detection and analysis, Instrumentation, application, hypernation with other techniques, Direct Injection Enthalpimetry, Applications, Numerical.	25
2.	ELECTRICAL METHODS OF ANALYSIS Liquid Junction Potential, Mass transfer, Electric Double layer, Faradic and Non-faradic Current, Polarization effect, Types of Polarization, Electrogravimetry, Constant Potential and current Electrolysis, Factors affecting the quality of deposits, Applications. Principle of Coulometry, Controlled current coulometry, Instrumentation and application of Controlled	25

	potential coulometry, Coulometric titrations (primary and secondary), endpoint detection in coulometry titration, applications and Problems	
3.	VOLTAMETRY METHODS OF ANALYSIS Rapid Scan Voltammetry: Principle, Rapid voltage scan at the end of the drop life, Peak current equation, Relation of peak current with the scanning rates, Summit potential equation, Comparison with DC polarography, Limitations. Hydrodynamic Voltammetry: Principle and similarity with dc polarography, Types of electrodes used, Applications of the technique in determination of rate constant of the reaction. Anodic Stripping Voltammetry: Concentration and stripping steps, Importance of Hanging mercury drop electrode and MTFE, Sensitivity of the technique, Adsorptive stripping, Applications, Cathodic stripping. Cyclic Voltammetry: Principle, Forward and reverse scan, cyclic voltamogram, Detection limits, Applications.	25
4.	RADIO-CHEMICAL METHODS OF ANALYSIS Interaction of radiation with matter, Units of radioactivity, Statistic of counting, Background corrections, Neutron activation analysis, Sources of neutrons, Theory of instrumental neutron activation analysis, Experimental considerations, Isotope dilution analysis (Direct and Inverse), Radioimmuno assay, Radiometric titrations, Radio release methods, Radiation safety, Numericals	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library books, IT tools, encouraging students to participate in seminars/workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to

1.	Learn the temperature-based methods and their advantages and application in various fields. Understand the basic instrument design their working and their application with the help of numerical.
2.	Understand the basic theory of liquid junction potential, coulometer and electrogravimetry and their working. Also learn in-depth of coulometry methods and their application in various titration.
3.	Learn different principles of rapid scan, hydrodynamic, Cyclic and hydrodynamic voltammetry and comparison as well their limitation and application.
4.	Understand the interaction of radioactive radiation with matter such as gamma, beta, alpha, X-ray and neutron. Also learn the application of various radioactive radiation in various titration with experimental consideration.

Suggested References:

17. Vogel's Text book Quantitative Chemical Analysis 5th edition by G.H.Jeffery, J. Bassett, J. Mendham, R.C. Denney.
18. Principles of Instrumental Analysis: D.A. Skoog, Holler and Crouch (Cengage learning, 7th edition)
19. Principle of Activation Analysis- P. Kruger, John Wiley and sons, (1971).
20. Nuclear Analytical Chemistry – J. Tolgyessy and S. Verga vol. 2, university Park press,(1972)
21. Radiochemistry and Nuclear methods – W.D. Ehmann and D.E. Vance, John Wiley and Sons.
22. Indian Pharmacopeia Volume I and II.
23. Extraction technique in analytical science, John R. Dean, Wiley (2009)
24. Standard methods of chemical analysis, Sixth Edition, F.J. Welcher.
25. Quantitative Inorganic Analysis including Elementary Instrumental analysis, By A. I. Vogel, 3ed, ELBS, 1964.
26. Instrumental Analysis: G. D. Caristian and J. E. O'Reilly (Allyn & Bacon Inc., New York, 2nd edition.
27. Instrumental Methods of Chemical Analysis: G. W. Ewing (McGraw-Hill, New York), 5th edition.
28. Instrumental Methods of Analysis: H. R. Willard, L. L. Merrit, J. A. Dean, F. A. Settle (Van Nostrand Reinhold Co., New York), 6 th edition.
29. Modern Methods of Chemical Analysis: Pecsok, Shield & Cairns (John Wiley), 2nd edition.

30. Introduction to Instrumental Analysis (1987), R. D. Braun (McGraw-Hill Book Company), New Delhi.
31. Analytical Chemistry: Principles and Techniques: Larry G. Hargis (Prentice-Hall International edition).
32. Introduction to Modern Liquid Chromatography: L. R. Snyder & J. J. Kirkland (John Wiley & Sons, New York).
33. Treatise on Analytical Chemistry: I. M. Kolthoff & P. J. Elving (John Wiley & Sons, New York).
34. Handbook of Analytical Chemistry: L. Meites (McGraw-Hill, New York).
35. Basic concepts of Analytical Chemistry by S.M. Khopker
36. Standard Methods of Chemical Analysis: Vol. I & II (6th edition), D. Van Nostrand Co. Inc. (London).
37. Official Methods of Analysis: Published by Association of Official Analytical Chemists, Washington.
38. Instrumental Methods of Chemical Analysis: B. K. Sharma (Goel Publishing House, Meerut).
39. Instrumental methods of Chemical Analysis by H. Kaur.
40. Environmental Chemistry: B. R. Sharma, H. Kaur (Goel Publishing House, Meerut).
41. Inorganic Quantitative Analysis: A. I. Vogel (Orient Longman).
42. "Polarography", J. D. Talati (In Gujarati), University Granth Nirman Board.
43. "Polarography": Kolthoff I. M. and Lingane J. J. (Vol. I & II) (Interscience Publishers, New York).
44. "Polarographic Techniques": L. Meites (Interscience Publishers, New York).
45. Principles of Instrumental Analysis (5th ed.) by Skoog, Holler and Nieman (Saunders College Publishings).
46. Undergraduate Instrumental Analysis (5th ed.), J. W. Robinson (Marcel Dekker Inc.).
47. Fundamentals of Molecular Spectroscopy, by Banwell.
48. Electronic Absorption Spectroscopy and related techniques, D.N. Sathyanarayan, (New Age International ND. 1996) Uni. Press, Hyderabad.
49. Introduction to Spectroscopy (3rd ed.) by Pavia Lampman Kriz, Cengage Learning Harcourt College Publishers

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Analytical Chemistry
M.Sc. Analytical Chemistry, Semester III
PAPER-II

Course Code	[1903080203020001]	Title of the Course	Molecular Spectroscopy
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To familiarize with the basic properties, theory & interpretation IR and Raman edge in the theory and principals of spectroscopic techniques for characterization and differentiation of various molecules. • To familiarize with the basic properties, theory and interpretation NMR edge in the theory and principals of spectroscopic techniques for characterization differentiation of various molecules. • To familiarize with the basic properties, theory and interpretation molecular Mass edge in the theory and principals of spectroscopic techniques for characterization and differentiation of various molecules. • To familiarize with the basic properties, theory and interpretation luminescence edge in the theory and principals of spectroscopic techniques for characterization and differentiation of various molecules.

Course Content		
Unit	Description	Weightage* (%)
1.	IR AND RAMAN SPECTROSCOPY Theory of IR and Raman, selection rules, IR absorption, Raman scattering, Mutual exclusion rule, complimentary techniques, Instrumentation - FTIR and Raman, Cells and sampling techniques, Resonance Raman spectroscopy, Interpretation of IR spectra using correlation charts, Advantages of FTIR spectroscopy, Mid-IR Reflection – DRS, ATR, Data processing in Near IR, Applications in structure	25

	elucidation of inorganic and organic molecules.	
2.	NMR SPECTROSCOPY Theory of NMR, Relaxation, population of energy levels, Larmor precession, chemical shift and factors affecting it, references and solvents, Spin-spin splitting, Coupling constant, Magnetic Anisotropy, Instrumentation, Shift Reagents, Interpretation of simple NMR spectra, Signal averaging, FT-NMR, Pulse FT-NMR spectroscopy, ^{13}C NMR spectra, Calculation of chemical shift in ^{13}C NMR, NMR in medical diagnostics, Double resonance technique, Multi-dimensional NMR, Problems to elucidate structure from NMR spectra	25
3.	MOLECULAR MASS SPECTROSCOPY (Instrumentation, Methods of ion production (EI, CI, FI, FD, Electro Spray, MALDI), Ion separators, Ion collection and recording, Double focusing, Time of flight analyser, Quadrupole-mass spectrometer, Sample handling techniques, Resolution, Parent peak, Base peak, Metastable ions isotope effect, Molecular formula from mass spectra, Nitrogen rule, Ring rule, Fragmentation rules, Behavior of classes of compounds, Interpretation of mass spectra, Additional applications, Problems to elucidate structure from mass spectral data.	25
4.	MOLECULAR LUMINESCENCE SPECTROSCOPY Introduction to molecular luminescence (fluorescence, phosphorescence and chemiluminescence); theory of luminescence, energy level diagram, Deactivation process,; instruments for measuring fluorescence (fluorometer and spectrofluorometer);, factor affecting, Emission and excitation spectra, wavelength selector, detector, application and problems	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library books, IT tools, encouraging students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand fundamental & basic terms involved in IR and Raman spectroscopy, know effects of various factors on the spectra, interpretation from spectral data, identify structure of organic compounds by using combined spectral data.
2.	Understand fundamental & basic terms involved in ^1H NMR, know effects of various factors on the spectra, interpretation from spectral data, identify structure of organic compounds by using combined spectral data, distinguish isomers and other closely related compounds by using spectral techniques.
3.	Understand fundamental & basic terms involved in Mass spectroscopy, know effects of various factors on the spectra, interpretation from spectral data, identify structure of organic compounds by using combined spectral data.
4.	Understand fundamental & basic terms involved in Molecular luminescence spectroscopy, know effects of various factors on the emission and excitation spectra.

Suggested References:

1. Vogel's Text book Quantitative Chemical Analysis 5th edition by G.H.Jeffery, J. Bassett, J. Mendham, R.C. Denney.
2. Principles of Instrumental Analysis: D.A. Skoog, Holler and Crouch (Cengage learning, 7th edition)
3. Principle of Activation Analysis- P. Kruger, John Wiley and sons, (1971).
4. Nuclear Analytical Chemistry – J. Tolgyessy and S. Verga vol. 2, university Park press,(1972)
5. Radiochemistry and Nuclear methods – W.D. Ehmann and D.E. Vance, John Wiley and Sons.
6. Indian Pharmacopeia Volume I and II.
7. Extraction technique in analytical science, John R. Dean, Wiley (2009)
8. Standard methods of chemical analysis, Sixth Edition, F.J. Welcher.
9. Quantitative Inorganic Analysis including Elementary Instrumental analysis, By A. I. Vogel, 3ed, ELBS, 1964.
10. Instrumental Analysis: G. D. Caristian and J. E. O'Reilly (Allyn & Bacon Inc., New York, 2nd edition.

11. Instrumental Methods of Chemical Analysis: G. W. Ewing (McGraw-Hill, New York), 5th edition.
12. Instrumental Methods of Analysis: H. R. Willard, L. L. Merrit, J. A. Dean, F. A. Settle (Van Nostrand Reinhold Co., New York), 6 th edition.
13. Modern Methods of Chemical Analysis: Pecsok, Shield & Cairns (John Wiley), 2nd edition.
14. Introduction to Instrumental Analysis (1987), R. D. Braun (McGraw-Hill Book Company), New Delhi.
15. Analytical Chemistry: Principles and Techniques: Larry G. Hargis (Prentice-Hall International edition).
16. Introduction to Modern Liquid Chromatography: L. R. Shyder & J. J. Kirkland (John Wiley & Sons, New York).
17. Treatise on Analytical Chemistry: I. M. Kolthoff & P. J. Elving (John Wiley & Sons, New York).
18. Handbook of Analytical Chemistry: L. Meites (McGraw-Hill, New York).
19. Basic concepts of Analytical Chemistry by S.M. Khopker
20. Standard Methods of Chemical Analysis: Vol. I & II (6th edition), D. Van Nostrand Co. Inc. (London).
21. Official Methods of Analysis: Published by Association of Official Analytical Chemists, Washington.
22. Instrumental Methods of Chemical Analysis: B. K. Sharma (Goel Publishing House, Meerut).
23. Instrumental methods of Chemical Analysis by H. Kaur.
24. Environmental Chemistry: B. R. Sharma, H. Kaur (Goel Publishing House, Meerut).
25. Inorganic Quantitative Analysis: A. I. Vogel (Orient Longman).
26. "Polarography", J. D. Talati (In Gujarati), University Granth Nirman Board.
27. "Polarography": Kolthoff I. M. and Lingane J. J. (Vol. I & II) (Interscience Publishers, New York).
28. "Polarographic Techniques": L. Meites (Interscience Publishers, New York).
29. Principles of Instrumental Analysis (5th ed.) by Skoog, Holler and Nieman (Saunders College Publishings).
30. Undergraduate Instrumental Analysis (5th ed.), J. W. Robinson (Marcel Dekker Inc.).
31. Fundamentals of Molecular Spectroscopy, by Banwell.
32. Electronic Absorption Spectroscopy and related techniques, D.N. Sathyanarayan, (New Age International ND. 1996) Uni. Press, Hyderabad.
33. Introduction to Spectroscopy (3rd ed.) by Pavia Lampman Kriz, Cengage Learning Harcourt College Publishers

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Analytical Chemistry
M.Sc. Analytical Chemistry, Semester III
PAPER-III

Course Code	[1903080203030001]	Title of the Course	Electroanalytical Techniques
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To familiarize with the basic principles, theory in potentiometry and chronopotentiometry techniques for various titration and applications. • To learn about basic theory and principles of DC-polarographic, amperometry, biamperometry methods, their instrumentation and applications. • To learn about basic principle and instrumentation as well as theory of modern polarographic technique such as A.C, Square wave and Pulse Polarography for application in determination of various metal ions in the solution. • To understand the basic principles and theory of ion selective electrodes and their application for the determination of various ions in the solution with their instrumentation.

Course Content		
Unit	Description	Weightage* (%)
1.	POTENTIOMETRIC TITRATION AND CHRONOPOTENTIOMETRY (a) Fundamentals of potentiometry, Instrumentation, electrode system, accuracy of direct potentiometric measurements and its limitations, potentiometric titrations, neutralization titrations, end-point detection, oxidation- reduction, precipitation titrations, complexometry titrations with example, applications and advantages. (b) Chronopotentiometry Principle, Instrumentation and procedure, applications	25
2.	DC-POLAROGRAPHY Theory and Applications of Polarography, Types of currents:	25

	Residual Current, Migration Current and Diffusion Current, Nature of the Limiting Current: 1) Kinetic currents, 2) Catalytic currents and 3) Adsorption currents, Electro capillary maxima, Maxima of first kind and second kind, Maxima suppressors, DME as electrode, Wave equation, Ilkovic equation (derivation), Reversible electrode reactions at DME half wave potential, Interference and removal of oxygen, Reversible Electrode Reactions of Metal Complexes at D.M.E (Ligane method) Determination of stability constants of complexes. Amperometric titrations: Principle, DME & RPE, curves, Biamperometric titration.	
3.	MODERN POLAROGRAPHIC METHODS A.C. Polarography: Principle of Sinusoidal alternating applied potential, AC peak polarogram, Peak current equation, Characteristic of AC polarographic peak, Importance of signal to noise ratio for the sensitivity, Comparison with DC polarography. Square-wave Polarography: Principle of alternating rectangular wave voltage applied, Frequency of square wave applied, Problems of large condenser currents in A.C., Peak polarogram, Peak current equation, Limitations of techniques. Pulse Polarography: Effect of capillary response with frequency of applied square wave potential, Principles and difference between Normal Pulse Polarography and Differential Pulse Polarography, Importance of charging and Faradaic currents.	25
4.	ION SELECTIVE ELECTRODES Classification of ion selective electrodes, Solid state electrodes – Glass electrode effect of glass structure on selectivity function of the glass electrode. Acid error, Alkali error, Silver halide, Sulphide, Lanthanum fluoride ion selective electrodes. Liquid ion exchange electrode – Calcium selective ion electrodes. Gas electrodes, ammonia, sulphur dioxide, oxygen and CO ₂ sensing electrode, Micro ion selective electrode, enzyme electrodes. Application and Numericals	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library books, IT tools, encouraging students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand fundamental & basic terms involved in potentiometry, know effects various factors on the methods, knows the limitation and application of potentiometric methods in various titrations.
2.	Understand fundamental & basic theory of polarography methods, learn the various current observed on DC polarography, know the various factors and electrode use in polarography and amperometry techniques.
3.	Understand fundamental & basic theory of different polarographic techniques, learn instrumentation, principles and understand the application, limitation and importance of the polarography techniques.
4.	Understand classification of ion selective electrode, construction and importance of that electrode for the determination of particular species in solutions.

Suggested References:

1. Vogel's Text book Quantitative Chemical Analysis 5th edition by G.H.Jeffery, J. Bassett, J. Mendham, R.C. Denney.
2. Principles of Instrumental Analysis: D.A. Skoog, Holler and Crouch (Cengage learning, 7th edition)
3. Principle of Activation Analysis- P. Kruger, John Wiley and sons, (1971).
4. Nuclear Analytical Chemistry – J. Tolgyessy and S. Verga vol. 2, university Park press,(1972)
5. Radiochemistry and Nuclear methods – W.D. Ehmann and D.E. Vance, John Wiley and Sons.

6. Indian Pharmacopeia Volume I and II.
7. Extraction technique in analytical science, John R. Dean, Wiley (2009)
8. Standard methods of chemical analysis, Sixth Edition, F.J. Welcher.
9. Quantitative Inorganic Analysis including Elementary Instrumental analysis, By A. I. Vogel, 3ed, ELBS, 1964.
10. Instrumental Analysis: G. D. Caristian and J. E. O'Reilly (Allyn & Bacon Inc., New York, 2nd edition.
11. Instrumental Methods of Chemical Analysis: G. W. Ewing (McGraw-Hill, New York), 5th edition.
12. Instrumental Methods of Analysis: H. R. Willard, L. L. Merrit, J. A. Dean, F. A. Settle (Van Nostrand Reinhold Co., New York), 6 th edition.
13. Modern Methods of Chemical Analysis: Pecsok, Shield & Cairns (John Wiley), 2nd edition.
14. Introduction to Instrumental Analysis (1987), R. D. Braun (McGraw-Hill Book Company), New Delhi.
15. Analytical Chemistry: Principles and Techniques: Larry G. Hargis (Prentice-Hall International edition).
16. Introduction to Modern Liquid Chromatography: L. R. Snyder & J. J. Kirkland (John Wiley & Sons, New York).
17. Treatise on Analytical Chemistry: I. M. Kolthoff & P. J. Elving (John Wiley & Sons, New York).
18. Handbook of Analytical Chemistry: L. Meites (McGraw-Hill, New York).
19. Basic concepts of Analytical Chemistry by S.M. Khopker
20. Standard Methods of Chemical Analysis: Vol. I & II (6th edition), D. Van Nostrand Co. Inc. (London).
21. Official Methods of Analysis: Published by Association of Official Analytical Chemists, Washington.
22. Instrumental Methods of Chemical Analysis: B. K. Sharma (Goel Publishing House, Meerut).
23. Instrumental methods of Chemical Analysis by H. Kaur.
24. Environmental Chemistry: B. R. Sharma, H. Kaur (Goel Publishing House, Meerut).
25. Inorganic Quantitative Analysis: A. I. Vogel (Orient Longman).
26. "Polarography", J. D. Talati (In Gujarati), University Granth Nirman Board.
27. "Polarography": Kolthoff I. M. and Lingane J. J. (Vol. I & II) (Interscience Publishers, New York).
28. "Polarographic Techniques": L. Meites (Interscience Publishers, New York).
29. Principles of Instrumental Analysis (5th ed.) by Skoog, Holler and Nieman (Saunders College Publishings).
30. Undergraduate Instrumental Analysis (5th ed.), J. W. Robinson (Marcel Dekker Inc.).
31. Fundamentals of Molecular Spectroscopy, by Banwell.
32. Electronic Absorption Spectroscopy and related techniques, D.N. Sathyanarayan, (New Age International ND. 1996) Uni. Press, Hyderabad.
33. Introduction to Spectroscopy (3rd ed.) by Pavia Lampman Kriz, Cengage Learning Harcourt College Publishers

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Analytical Chemistry
M.Sc. Analytical Chemistry, Semester III
PAPER-IV

Course Code	[1903080203040001]	Title of the Course	Applied Analysis
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To understand basic concepts of ores and cements, their properties and analysis of various elements present in ore and cements by various methods. • To understand basic concepts of air and soil, their properties and analysis of various pollutants and minerals present in air and soil by various methods. • To understand basic concepts of clinical and food, their properties and analysis of various adulteration present in food and molecules present in blood serum by various methods. • To understand basic concepts of paints and pigments, their properties and analysis of various elements present in paints and pigments by various methods.

Course Content		
Unit	Description	Weightage* (%)
1.	ANALYSIS OF ORES AND CEMENT Ores: Dolomite (For silicate, Mg and Ca content), Ilmenite (for silicate, Ti and Fe content), Monazite (Ce and Th metals), Hematite and Magnetite (silicate and Fe content), Pyrolusite (for	25

	silicate and Mn content) and bauxite (for Al and Silicate content). Cement: Composition of cement and characterization, setting and hardening of cement, Analysis of cement for silica, calcium, magnesium, iron, sodium and potassium using ISI method.	
2.	ANALYSIS OF AIR AND SOIL Air: Sampling, Analysis of air borne particulates using emission spectroscopy, Determination of CO, SO₂, CO₂, NO_x, H₂S, O₃ in air sample. Non-dispersive IR spectrophotometry to determine CO and CO₂. Analysis of Soil: Moisture, pH, Total nitrogen, phosphorous, silica, lime, magnesia, sulfur, manganese.	25
3.	CLINICAL CHEMISTRY AND FOOD PRODUCT ANALYSIS Clinical Chemistry: Determination of glucose, electrolytes, urea, cholesterol, uric acid in blood serum. Food Products: Analysis of (i) Oils and fats, Iodine value, Saponification value, RM value, (ii) reducing and non-reducing sugars (iii) butter, honey, fruit, juices, non-alcoholic beverages, (iv) adulteration in oil, ghee, butter	25
4.	ANALYSIS OF PAINTS AND PIGMENT Introduction, test of Volatile and Non-volatile content, separation of pigment binder, Analysis of pigments, Identification of inorganic pigments, Analysis of white and tinted pigments, HCL insoluble, Titanium dioxide, total lead, acid soluble Al and Fe, acid soluble calcium, total zinc, antimony oxide, total sulfate, total carbonate) analysis of ultramarine blue, Black pigments, Red Lead pigments.	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library books, IT tools, encouraging students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand fundamental & theory of the sources and available contents in ore and cements. Also learn the different approaches and classical as well as instrumental techniques used for the analysis.
2.	Understand fundamental & theory of the sources and available pollutants/minerals in air and soils. Also learn the different approaches and classical as well as instrumental techniques used for the analysis.
3.	Understand fundamental & theory of the adulteration in food. Also learn the different approaches and classical as well as instrumental techniques used for the analysis.
4.	Understand fundamental & theory of the sources and available contents in paints and pigments. Also learn the different approaches and classical as well as instrumental techniques used for the analysis.

Suggested References:

1. Vogel's Text book Quantitative Chemical Analysis 5th edition by G.H.Jeffery, J. Bassett, J. Mendham, R.C. Denney.
2. Principles of Instrumental Analysis: D.A. Skoog, Holler and Crouch (Cengage learning, 7th edition)
3. Principle of Activation Analysis- P. Kruger, John Wiley and sons, (1971).
4. Nuclear Analytical Chemistry – J. Tolgyessy and S. Verga vol. 2, university Park press,(1972)
5. Radiochemistry and Nuclear methods – W.D. Ehmann and D.E. Vance, John Wiley and Sons.
6. Indian Pharmacopeia Volume I and II.
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8. Standard methods of chemical analysis, Sixth Edition, F.J. Welcher.
9. Quantitative Inorganic Analysis including Elementary Instrumental analysis, By A. I. Vogel, 3ed, ELBS, 1964.
10. Instrumental Analysis: G. D. Caristian and J. E. O'Reilly (Allyn & Bacon Inc., New York, 2nd edition.

11. Instrumental Methods of Chemical Analysis: G. W. Ewing (McGraw-Hill, New York), 5th edition.
12. Instrumental Methods of Analysis: H. R. Willard, L. L. Merrit, J. A. Dean, F. A. Settle (Van Nostrand Reinhold Co., New York), 6 th edition.
13. Modern Methods of Chemical Analysis: Pecsok, Shield & Cairns (John Wiley), 2nd edition.
14. Introduction to Instrumental Analysis (1987), R. D. Braun (McGraw-Hill Book Company), New Delhi.
15. Analytical Chemistry: Principles and Techniques: Larry G. Hargis (Prentice-Hall International edition).
16. Introduction to Modern Liquid Chromatography: L. R. Shyder & J. J. Kirkland (John Wiley & Sons, New York).
17. Treatise on Analytical Chemistry: I. M. Kolthoff & P. J. Elving (John Wiley & Sons, New York).
18. Handbook of Analytical Chemistry: L. Meites (McGraw-Hill, New York).
19. Basic concepts of Analytical Chemistry by S.M. Khopker
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21. Official Methods of Analysis: Published by Association of Official Analytical Chemists, Washington.
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23. Instrumental methods of Chemical Analysis by H. Kaur.
24. Environmental Chemistry: B. R. Sharma, H. Kaur (Goel Publishing House, Meerut).
25. Inorganic Quantitative Analysis: A. I. Vogel (Orient Longman).
26. "Polarography", J. D. Talati (In Gujarati), University Granth Nirman Board.
27. "Polarography": Kolthoff I. M. and Lingane J. J. (Vol. I & II) (Interscience Publishers, New York).
28. "Polarographic Techniques": L. Meites (Interscience Publishers, New York).
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30. Undergraduate Instrumental Analysis (5th ed.), J. W. Robinson (Marcel Dekker Inc.).
31. Fundamentals of Molecular Spectroscopy, by Banwell.
32. Electronic Absorption Spectroscopy and related techniques, D.N. Sathyanarayan, (New Age International ND. 1996) Uni. Press, Hyderabad.
33. Introduction to Spectroscopy (3rd ed.) by Pavia Lampman Kriz, Cengage Learning Harcourt College Publishers

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Analytical Chemistry
M.Sc. Analytical Chemistry, Practicals
Semester- III

Course Code	[1903080203050001]	Title of the Course	
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To impart basic knowledge for carrying out analysis of some ore and cements • Understand the importance of various instrumental techniques in analysis. • To learn about the calculation in analysis. • To learn about the stoichiometry used in analysis of compounds. • Preparation of solution used in determination of various compounds.

Course Content				
		Major Exercise	4- Credit	
		Viva-Voce		
		Minor Exercise	4- Credit	
		Minor Exercise		

Major Exercise: (any Eight)

1. Analysis of Dolomite ore for the major constitute.
2. Analysis of Ultramarine sample for the major constitute.
3. Analysis of Portland cement for the major constitute.
4. Analysis of Zn-Chrome pigment for the major constitute.
5. Analysis of white pigment for the major constitute.
6. Potentiometric determination of Chloride, Bromide and Iodide in a mixture.
7. Analysis of Ilmenite ore for the major constitute.
8. Analysis of Haematite ore for the major constitute.
9. Analysis of Pyrolusite ore for the major constitute.
10. Separation and determination of total pigment in a paint sample.

Minor Exercise: (Any Eight)

1. Determination of fluoride in a given solution / tooth paste by Zirconyl-Alizarin red method colorimetrically
2. Analysis of organic materials: Glycerol, Glycine.
3. Determination of Pb^{+2} as $PbCrO_4$ after precipitation from homogeneous solution.
4. Analysis of Chloride in bleaching material.

5. Determination of COD of water sample.
6. Determination of DO of water sample.
7. Determination of K_{a1} and K_{a2} of phosphoric acid.
8. Simultaneous determination of Cr^{+3} + Co^{+2} in a mixture.
9. Determination of Nitrite spectrophotometrically.
10. Biuret in the sample of urea
11. Thin layer chromatographic separation.
12. Interpretation of IR, NMR, Mass Spectra (Dry lab)
13. Constant current Coulometric titration of (i) As_2O_3 (ii) Phenol (iii) $Na_2S_2O_3$
14. Analysis of dye intermediate containing $-NH_2$ by Potentiometric titration.
15. Electrogravimetric determination of Cu^{+2} in brass.

Teaching-Learning Methodology	Introduction, interaction with students in calculation of mole ratios, carrying out experiments at each step according to the respective practical.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the basics to carry out practical, calculation of mole and mole ratio.
2.	Done the titration or instrumental method for quantitative analysis.
3.	Done the stoichiometry of the reaction involved in titration.
4.	Draw the graph and find out the unknown concentration by comparison with known compound.
5.	Appreciate good laboratory practices.

Suggested References:

1. Vogel's Textbook of quantitative analysis fifth editions by Longman scientific and technical, UK.
2. Indian Pharmacopeia, Vol-I, II and III.
3. Standard methods of Chemical analysis sixth edition edited by Frank J. Welcher by D. Van Nostrand Company, Inc.

On-line resources to be used if available as reference material

On-line Resources

**Master of Science, Environment Chemistry
M.Sc. Environment Chemistry, Semester III**

PAPER-I

Course Code	[1903080203010005]	Title of the Course	Fundamentals of environment and ecology
Total Credits of the Course	4	Hours per Week	4 hrs

**Master of Science, Environment Chemistry
M.Sc. Environment Chemistry, Semester III**

PAPER-I

Course Code		Title of the Course	Fundamentals of environment and ecology
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	● To understand the fundamentals of environmental principles, the scope of environmental science and to learn their importance through studying various components of environment which will helpful to be aware of Global environmental problems. ● To study the natural resources and its associated problems, the

	renewable and non-renewable sources and to learn various resources of natural resources of ecosystem • To understand the concept, structure and function of ecosystem, the components of ecosystem that leads to grasp the knowledge of ecological succession and to understand the characteristic features and function of various type of ecosystem. • To learn the causes, effect, prevention, correction and protection of various natural hazards.

Course Content		
Unit	Description	Weightage* (%)
1.	ENVIRONMENTAL SCIENCE • Environmental Science: An Interdisciplinary Science *Fundamentals, Definition, principles, scope and importance □ • Environmental components: □ ▪ Atmosphere ▪ Lithosphere ▪ Hydrosphere ▪ Biosphere • Global Environmental Problems, Man and Environment	25
2.	NATURAL RESOURCE Natural Resources: Renewable and non renewable sources: Natural resources and associated problems both • Forest resources • Water Resources • Mineral resources • Land Resources • Energy Resources - Energy flow, Fossil Fuels, Geothermal energy, Nuclear, Wind, Solar and Biomass energy , Hydro power, Ocean Thermal Energy Conversion, Tidal power. • Food Resources - Agriculture-fertilizer and the green revolution, Environmental degradation, Nutrition energy and calories, protein, minerals and vitamins, antioxidants.	25
3.	ECOSYSTEMS • Concepts of an ecosystem	25

	● Structure and function of an ecosystem ● Producers, Consumer and decomposers ● Ecological succession ● Food chains, Food webs and ecological pyramid ● Types, Characteristic features, structure and function of the ecosystems: Forest ecosystem, Grassland ecosystem , Dessert ecosystem	
4.	NATURAL HAZARDS: ● River flooding: Causes, Nature and frequency of flooding, Nature and extent of flood hazard, urbanization and flooding, Environmental effects of flooding, Flood mitigation methods. ● Landslides: Causes, human use and landslides, Prevention and correction. ● Costal Hazards: Tropical cyclone and tsunamis, Costal erosion, Sea level changes and its impacts on costal areas. ● Earthquakes: Causes, Intensity and magnitude of earthquakes, Nature of destruction, Ground Subsidence, Protection from earthquake hazards. ● Volcanism: Nature, extent and causes of volcanism, Volcanism and climate.	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library, IT tools,, encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Thoroughly understand the principles, fundamental, definition, scope and importance of environmental science, obtains the knowledge of various environmental components and learns the global environmental problem.
2.	Establish the knowledge of various natural resources like renewable and non-renewable sources, develops the grip of various natural resources and its associated problems.
3.	Gain an understanding of Ecosystem, its concept, structure, components and functions, through which leads to understand the importance of ecological succession and learns the characteristic features and function of different ecosystem.
4.	Know about the various Natural hazards such as river flooding, landslides, Coastal hazard, earthquake, volcanism and their causes, protection and prevention.

Suggested References:

Reference Books Recommended:

1. Environmental Chemistry by Dr. A. K. De
2. Environmental Chemistry, Goel Publishing house Meerut, by B. K. Sharma and H. Kaur.
3. Basic Concept of environmental Chemistry by Des. W. Connell.
4. Chemistry for environmental engineering and science, 5th Ed., by Sawyer, McCarty and Parkin.
5. Environmental Chemistry, 7th Ed., By S. E. Manahan.
6. Chemistry for environmental Engineering 4th Ed., By Sawyer, McCarty and Parkin.
7. Instant note in ecology by Mackenzie, Ball and Virdee.
8. Marine biology: An Ecological approach, 2nd Ed., By James W. Nybakken.
9. Chemistry of Environment, 2nd Ed., By Thomas G. Spiro and William M. Stigliani.

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Environmental Chemistry
M.Sc. Environmental Chemistry, Semester III
PAPER-II

Course Code	[1903080203020005]	Title of the Course	ENVIRONMENTAL POLLUTION
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To understand and familiarize with classification, properties, sources of air pollution and learn chemistry of ozone and climate. • To learn about various pollution-water & air and effluent treatment. Contamination of water through heavy minerals, halogens, pathogens, air pollution, detection of various components and hydrocarbons, effluent treatment of sugar, paper & pulp and distilleries. • To understand basic concepts of air and soil, their properties and analysis of various pollutants and minerals present in soil by various methods. • To understand the properties of sound waves, nuclear concepts and Thermal pollution.

Course Content		
Unit	Description	Weightage* (%)
1.	AIR POLLUTION • Definition, Chemical composition and Air quality, Classification and Properties of air pollutants, Sources of air pollutants. • Ozone Chemistry formation and destruction, Ultraviolet Protection by Ozone, Catalytic Destruction of Ozone hydroxyl radical, chlorine and bromine, nitric oxide, Polar Ozone Destruction, Ozone Projections. • Climate- Radiation balance, Albedo- particles and clouds, Greenhouse Effect-IR absorption and molecular vibrations, greenhouse gas trends. • Global Warming, Acid Rain, Vehicular pollution, Photochemical smog, Radiation, Effects of Air pollution on health, Vegetation and Materials.	25

2.	WATER POLLUTION • Characteristics of bodies of water, Aquatic life- Eutrophication, Water pollution- Definition, Sources, Categories, Nature and Types and sources of water Pollution, Types of Water Pollutants - Inorganic pollutants, Elemental Pollutants, Heavy Metals, Metalloids, Organically Bound Metals and Metalloids, Inorganic Species, Organic Pollutants: Pesticides in Water, Polychlorinated Biphenyls, Radionuclides in the Aquatic Environment, • Effect of oil pollution in marine water • Adverse effects of water pollution.	25
3.	SOIL POLLUTION: • Nature and Composition of soil • Characterization of Soil • Soil Contaminants- Sources and Chemical Nature • Important environmental Properties of Soil Contaminants • Ecological and Health effects of soil Contaminants	25
4.	NOISE, RADIATION AND THERMAL POLLUTION: • Noise Pollution-Basic Properties of sound waves-Plane and spherical waves, Sound Pressure and intensity levels, Decibel, Effects of meteorological parameters on sound propagation, Measurement and analysis of sound. A weighted sound level, Noise pollution level, Sound exposure level, Traffic noise index, Day-Night level, Noise criteria curves, Noise sources, Noise control and abatement measures. • (B) Radiation Pollution- Introduction: Definition, Sources, Nuclear concepts and terminology and ecological importance, Maximum Permissible limit, Effects of radiation- Acute, Chronic and Genetic. • (C)Thermal Pollution- Introduction-Definition, Sources of thermal pollution, Biological and other effects of thermal pollution, hazardous effects, Thermal Stratification, Management of waste heat.	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library, IT tools, encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	To learn the about air pollution and its adverse effects. Learn about ozone layer and Global Warming.
2.	Learn water & air pollution, basic concepts of Eutrophication, water contamination with heavy materials, halogens, hydrocarbons and water purifying techniques and purification of water, sewage treatment, determination of air pollutants SOX, NOX, COX and hydrocarbons. Development of technologies to compart gaseous pollutants, effluent treatment of various paper pulp & distillation.
3.	To understand the basic concept about soil and to derive the different characteristics and composition of soil. Understand fundamental & theory of the sources and available minerals in soils. Also learn the different approaches and classical as well as instrumental techniques used for the analysis.
4.	Understand the chemistry involved in noise, radiation and thermal pollution and their hazardous effects.

Suggested References:

Reference Books Recommended:

1. Basic Concept of environmental Chemistry by Des. W. Connell.
2. Environmental Chemistry, 7th Ed., By S. E. Manahan.
3. Environmental Chemistry by Dr. A. K. De

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Environmental Chemistry
M.Sc. Environmental Chemistry, Semester III
PAPER-III

Course Code	[1903080203030005]	Title of the Course	Waste, Waste Management and Toxicology
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	● To understand different types of hazardous waste and recycling it by different methods. Basic concepts of the physical and chemical properties of hazardous waste. ● To learn about radioactive waste and new waste technologies for reduction of radioactive waste. Through study of properties of the nuclear waste ● To understand what e-waste is and various wastewater treatments. . To understand the environmental guidelines and standards for management. ● To study the different toxic effects of different metals and gases and to understand genotoxicity.

Course Content		
Unit	Description	Weightage* (%)
1.	SOLID AND HAZARDOUS WASTE - Sources of solid waste (Domestic, Industrial, Municipal, Hospital, Nuclear, Agriculture), - Characteristic of Solid waste- Physical, Chemical and Biological Properties - Processing - Physical, Chemical and Biological treatment of solid waste - Recycling of waste - Disposal of solid waste Methods, Site selection of disposals Solid waste management and handling rules. - Classification and sources of Hazardous Wastes - Flammable and Combustible Reactive and Corrosive Substances, Physical Forms and Segregation of Wastes, Hazard Ranking System, Physical and Chemical Properties of Hazardous Wastes, Transport, Effects, and Fates of Hazardous Wastes	25
2.	Radioactive Waste - Nuclear or Radioactive Waste- Principles of radioactivity, Sources of radioactivity in environment, Characteristics of nuclear waste, Radioactive materials and its decay, Half-life, Health effects of ionizing Radiation, Safety standards. Disposal and Analysis of radioactive waste - Detection and Analysis of radioactive materials, Mining and Recovery, Low-level Radioactive waste, High-level radioactive waste, transport of Radioactive Materials, Storage and Disposal of radio active waste, New waste reduction technologies	25

3.	[A] Biomedical and e-waste Introduction, characterization of biomedical waste, handling and disposal of biomedical waste, medical waste treatment techniques, Biomedical waste: Environment standards and guidelines for management, Management and disposal of electronics waste, Basel convention. [B] Waste treatment Technologies Waste destruction technologies, waste concentration technologies, TSDF, cradle to grave concepts, solidification and stabilization technologies, biological treatment, bio treatment by sequencing batch reactors, thermal processes, storage and leak detection-underground storage tanks, leak detection and remediation.	25
4.	TOXICITY [A] Chemical Toxicology- Introduction, Principles of toxicology, Types of Toxicpollutants, TLV (Threshold limiting Value), Common toxic effects, Dosage-potency VS Toxicity, Lethal dosage (LD),Toxic chemicals in the environment, Biochemical Effects of Metals and gases(Pb, Cd, Hg, As, Cr, CO, NO_x and SO₂, Cyanide, Pesticides, Carcinogens, Bio-Warfare Agents, [B] Genotoxicity- Teratogens and Teratogenesis, Teratogens (Alcohol, Methylmercury, Rubella, Thalidomide), Mutagens and Mutagenesis, Carcinogens.	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library, IT tools, encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the source, classification, characteristics and disposal of hazardous waste.
2.	Learn radioactive waste and principle of radioactivity, its decay, health effects of ionization, to storage , transport and disposal of radioactive waste.
3.	Understand introductory part of biomedical waste and its disposal by different methods
4.	Understand about chemical toxicity and genotoxicity in detail.

Suggested References:

Reference Books Recommended

1. Environmental Chemistry, 7th Ed., By S. E. Manahan.
2. Chemistry for environmental Engineering 4th Ed.,By Sawyer, McCarty and Parkin.
3. The Chemistry of Industrial Toxicology; By Hervey B. Elkins, John Wiley & Sons, New York. (2nd Edit.)

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Environmental Chemistry
M.Sc. Environmental Chemistry, Semester III
PAPER-IV

Course Code	[1903080203040005]	Title of the Course	Environmental Studies and Instrumental Techniques
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To learn spectroscopic determination of compounds by ^{13}C NMR, ^1H NMR, and ^2D NMR and important concepts like chemical shift, coupling constants for different types of compounds. • To understand different types of spectroscopic techniques for water analysis. • To separate the various substances that make up a mixture. The applications range from a simple verification of the purity of a given compound to the quantitative determination of the components of a mixture. • To learn principles of different electrical techniques like coulometry, voltammetry etc. and Supercritical Fluid Chromatography.

Course Content		
Unit	Description	Weightage* (%)
1.	NMR Spectroscopy (i) ^1H NMR Spectroscopy Proton resonance condition, Aspects of PMR spectra – number of signals, chemical shift, factors influencing chemical shift, deshielding, chemical shift values and correlation for protons bonded to carbons (aliphatic, olefinic, aldehydic, aromatic) and other nuclei (alcohols, phenols, enols, acids, amides and mercaptans), effect of deuteration, spin- spincoupling, (n+1) rule, factors effecting coupling constant “J” (ii) ^{13}C NMR spectroscopy Types of ^{13}C NMR Spectra: proton coupled and decoupled ^{13}C spectra, chemical shift, calculations of chemical shifts of aliphatic, olefinic, alkyne, aromatic, hetero aromatic and carbonyl carbons, factors affecting chemical shifts	25

2.	2 INSTRUMENTAL TECHNIQUES FOR AIR AND WATER ANALYSIS (A) Spectroscopic Technique for Water Analysis – U.V. – Visible spectroscopy FT-IR, Mass Spectroscopy, Flame Photometry, X-ray Fluorescence, ICP-OES, Chemiluminescence methods. (B) Atomic Absorption and Atomic Fluorescence Spectrometry Sample Atomization and Atomic Absorption Instrumentation, Interference AAS, Atomic Fluorescence Spectroscopy. Applications (C) Atomic Emission Spectrometry- Emission Spectroscopy base on plasma sources, Emission Spectroscopy Based Arc and Spark Sources	25
3.	CHROMATOGRAPHIC TECHNIQUES: (A) GC, HPLC, Headspace GC, GC-MS, LC-MS Ion Exchange Chromatography- Resins used – Principle of exchange Factors affecting the exchange – Capacity of resin and its determination, Techniques – IEC with eluent suppressor columns – Applications. (B) Capillary Electrophoresis Types of electrophoresis, The basis of electrophoresis Separations, Capillary zone and gel electrophoresis, Application.	25
4.	(A) Supercritical Fluid Chromatography - Introduction, Supercritical Fluid Chromatography- Instrumentation and Operating Variables, Comparison of Supercritical to other types of Chromatography, Advantages, Applications of Supercritical Fluid Chromatography. (B) Electrical Techniques Coulometry, Anodic Stripping Voltammetry, Ion Selective Electrodes Principle and Applications.	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library, IT tools, encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand fundamental & basic terms involved in ^1H NMR, ^{13}C NMR, know effects of various factors on the spectra, interpretation from spectral data, identify structure of organic compounds by using combined spectral data, distinguish isomers and other closely related compounds by using spectral techniques.
2.	Able to understand spectroscopic techniques, Atomic Absorption and Atomic Fluorescence Spectrometry, Atomic Emission Spectrometry for water analysis.
3.	Recognize the use of different stationary and mobile phase for the separation of organic molecule and identify the problems and their solution during the analysis and learn the use of the chromatography for those whose don't identified by the techniques.
4.	Understand the basic theory of coulometer, voltammetry electrogravimetry and their working. Also learn in-depth of coulometry methods and their application in various titration, Supercritical Fluid Chromatography and ion selective electrodes

Suggested References:

Reference Books Recommended

1. Instrumental Analysis by R. D. Braun, McGraw-Hill.
2. Modern Methods of Chemical Analysis (2nd ed.), Pecsok, Shields, Cairns & McWilliam, John Wiley & Sons.
3. Principles of Instrumental Analysis (5th ed.) by Skoog, Holler and Nieman (Saunders College Publishings).
4. High Performance Liquid Chromatography, Dr. P.D. Sethi.
5. Practical NMR Spectroscopy, M.L. Martin, J.J. Delpeuch and G.J. Martin, Heyden.
6. Spectrometric identification of Organic compounds, R.M. Silverstein, G.C. Bassler and T.C. Morrill, John Wiley.
7. Introduction to NMR Spectroscopy, R.J. Abraham, J. Fisher and P. Loftus, Wiley.
8. Application of Spectroscopy of Organic compounds, J.R. Dyer, Prentice Hall.
9. Spectroscopy Methods in Organic Chemistry, D.H. Williams, I. Fleming, Tata McGraw-Hill.
10. Spectroscopy of Organic compounds, P.S. Kalsi, New Age International Ltd.
11. Environmental Chemistry, De A.K.
12. Spectroscopy by Jagmohan
13. Analytical Chemistry by Gary D. Christian, Sixth Edition, Wiley Sons.
14. D. A. Skoog, D.M. West, F.J. Holler, S.R. Crouch, Analytical Chemistry – An Introduction, 7th ed(2000), S. C. Publishing, Philadelphia, London.

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Environmental Chemistry
M.Sc. Environmental Chemistry, Practical
Semester- III

Course Code	[1903080203050001]	Title of the Course	
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To impart basic knowledge for carrying out analysis of some environmental water sample. • Understand the importance of various instrumental techniques in analysis. • To learn about the calculation in analysis. • To learn about the stoichiometry used in analysis of compounds. • Preparation of solution used in determination of various compounds.

Course Content				
		Major Exercise	4- Credit	
		Viva-Voce		
		Minor Exercise	4- Credit	
		Minor Exercise		

Major Experiments

1. Removal of hazardous dyes/metals by Cloud Point Extraction using non-ionic surfactant.[TX-100]
2. Determination of the Chemical Oxygen Demand (COD) value of KHP sample using conventional method.
3. Determination of the Dissolved Oxygen (DO) in given water sample.
4. Analysis of water sample.
5. Determination of K_{sp} of AgI and AgCl and find out amount of KCl and KI in a given (KI + KCl) using potentiometric titration.
6. Determination of total salt content by ion exchange chromatography.
7. Determination of pK_{in} of Methyl red indicator.
8. Determination of pK_{in} of Bromo Phenol Blue Indicator.
9. Ion-Exchange separation of Fe⁺³ and Co⁺² and determination Fe⁺³ by Spectrophotometer.

Minor Experiments

10. Precipitation Titration: Determination of Chloride by the Mohr's Method.
11. Determination of Aniline.
12. Determination of % purity of Aspirin in given tablet.
13. Determination of sulphate using complexometric titration.
14. Determination of the R_f value of amino acids in a given mixture by the technique of ascending out descending Paper chromatography.
15. Spectroscopic determination of Ni⁺² with D.M.G.
16. Conductometric determination of vanillin in Vanilla.
17. Analysis of Insecticides: Analysis of BHC.
18. Colorimetric estimation of titanium in the given solution by hydrogen peroxide.
19. Estimation of amino acids by colorimetry.
20. Electro gravimetric determination of Cu⁺² in given unknown/Brass solution.
21. Determination of the amount of As₂O₃ in the given solution by coulometric titration.
22. Determination of the amount of PO₄⁻³ in given sample of soil by spectrophotometrically.
23. Determination of the Iodine value of given fat sample.
24. Determination of saponification value of given oil fat sample.

Note:

- Practical examination will be for **2 days in each semester**.
- **6** hours duration on each day.

Teaching-Learning Methodology	Introduction, interaction with students in calculation of mole ratios, carrying out experiments at each step according to the respective practical.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the basics to carry out practical.
2.	Done the titration or instrumental method for quantitative analysis.
3.	Done the stoichiometry of the reaction involved in titration.
4.	Draw the graph and find out the unknown concentration by comparison with known compound.
5.	Appreciate good laboratory practices.

Suggested References:

Reference Books Recommended

1. Quantitative Inorganic Analysis including Elementary Instrumental analysis, By A. I. Vogel, 3ed, ELBS, 1964.
2. Vogel's Quantitative Chemical Analysis; J. Mendham, R. C. Denney, J. D. Barnes, M. Thomas, B. Sivasankar; Pearson Publication.
3. Analytical Chemistry; Gary D. Christian; Wiley India Pvt. Ltd.
4. Environmental Pollution, A.K. De
5. Environmental Pollution, B.K. Sharma & H.Kaur
6. Quantitative Analysis by R.A. Day and A. L. Underwood, (Sixth Edition)
7. Standard methods of chemical analysis, Sixth Edition, F.J. Welcher.
8. Standard Methods of Chemical Analysis: Vol. I & II (6th edition), D. Van Nostrand Co. Inc. (London).
9. Official Methods of Analysis: Published by Association of Official Analytical Chemists, Washington.
10. Advance practical physical chemistry by J. B. Yadav
11. Advanced University Practical chemistry by P.C. Kamboj (Part-1)
12. Advance Practical Chemistry by R. Mukhopadhyay and P. Chatterjee
13. Official Methods of Analysis: Published by Association of Official Analytical Chemists, Washington.
14. APHA Standard methods 21st Edition.

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Inorganic Chemistry
M.Sc.Inorganic Chemistry, Semester IV
Paper 1

Course Code	[2003080204010002]	Title of the Course	Selected Topics in Inorganic Chemistry
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• Photochemistry laws and photo physical processes. • Types, sources and control of various types of pollution. • Types of homogeneous catalysis • Transition metal hydrides, dihydrogen complexes.

Course Content		
Unit	Description	Weightage* (%)
1.	PHOTOCHEMISTRY OF INORGANIC COMPOUNDS AND CO-ORDINATION COMPOUNDS Introduction: Photochemistry laws and photochemical kinetics, Absorption of light, quantum yield and reactivity, life time, kinetic aspects of photochemical process, temperature dependence of photochemical process and photochemical equipment. Photo physical process: Introduction , theory and relative process stimulated absorption, spontaneous emission, selection rules, oscillator strength and radiative life time, Frank Condon principle, theory of non-radiative processes, radiationless transitions and biomolecular	25

2.	ENVIRONMENTAL CHEMISTRY Various types of pollution: Introduction, definition and classification a) Air Pollution: Sources and sinks of gases pollutants on living and non-living things, Green House Effect, Acid rain, Ozone layer Depletion and their consequences on environment. Effect of air pollution, photochemical smog and major air pollution. b) Method of control of air pollution: Different methods of control air pollution, precipitation wet and dry scrubber, filters, gravity and cyclonic separation, adsorption, absorption and condensation of gaseous effluent. c) Water pollution: types, sources and classification of water pollution, constituent and oxygen control of water and aquatic life, oxygen electrode and its use. Effect of water pollutants on life and environment. d) Method of control of water pollution: principle of coagulation, flocculation, softening, disinfection, demineralization, and fluoridation. Objective analysis: color, turbidity, total solids, conductivity, acidity, alkalinity, hardness, chlorine, sulphate, fluoride, silica, phosphate and different form. DO, BOD, COD and significance.	25
3.	HOMOGENEOUS CATALYSIS Introduction, types of catalysts, Catalytic steps, Hydrogenation of alkene, Ziegler-Natta polymerization of olefins, Hydrocarbonylation of olefins, The wacker process, Monsanto Acetic Acid Synthesis, Water-gas Shift Reaction, Hydrosilation, Activation of C-H bond.	25
4.	TRANSITION METAL COMPOUNDS WITH BOND TO HYDROGEN AND REACTIONS OF HOMOGENEOUS CATALYSIS a) Transition metal compounds with Bond to Hydrogen: Introduction, characterization of transition metal hydride complexes, methods of preparation, properties, Mononuclear polyhydrides, Homoleptic polyhydrido anions, Metal carbonyl hydrides, Dihydrogen complexes. b) Reaction of homogeneous catalysis: Oxidative-Addition Reaction : Energetics and Mechanism, Reductive-Elimination Reaction, Insertion Reaction:	25

	classification and some examples, Deinsertion Reaction, Nucleophilic and Electrophilic Attack on Coordinated ligands	

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library, IT tools, encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Learn about Photochemistry laws and photochemical kinetics, photochemical process and photochemical equipment, Photo physical process theory and relative process stimulated absorption, spontaneous emission, selection rules, theory of non-radiative processes, radiationless transitions and bimolecular
2.	Learnt and understand about various types of water pollution, sources, sinks and methods of control.
3.	Understand the types of catalysts, different methods of homogeneous catalysis, Hydrogenation of alkene, Ziegler-Natta polymerization of olefins, Hydrocarbonylation of olefins, The Wacker process, Monsanto Acetic Acid Synthesis, Water-gas Shift Reaction, Hydrosilation, Activation of C-H bond.
4.	Learn the characterization of transition metal hydride complexes, methods of preparation, properties, Mononuclear polyhydrides, Homoleptic polyhydrido anions, Metal carbonyl hydrides, Dihydrogen complexes,

Suggested References:

Reference Books Recommended:

1. Fundamentals of photochemistry, K. K. Rohatgi, Mukerjee. Wiley Eastern Limited, New Delhi, (1978).
2. Photochemistry, J. G. Calvents and J. N. Pitts. John-Wiley & Sons.
3. Introduction to photochemistry. Wells
4. Photochemistry of solutions. C. A. Parker, Elsevier.
5. Photochemistry of coordination compounds, V. Balzani and V. Carassitti, Academic Press, London (1970).
6. Concept of Inorganic photochemistry, A. W. Adamson and Paul D. Fleischauer, Wiley Interscience Publication, New Delhi, 1975
7. Water pollution. J. E. Jajic, Marcel-Dekker,
8. Air pollution. H. W. Parker, Prentice-Hall
9. Environmental chemistry. A. K. De, Wiley Eastern Ltd, New Delhi.
10. Environmental pollution control in process industries. S. P. Mahajan.
11. Introduction to air pollution. P. K. Trivedi.
12. Environmental pollution Analysis, S. M. Khopkar
13. A text book of Environmental pollution. D.D. Tyagi and M. Mehre.
14. Environmental pollution Engineering and control. C. S. Rao.
15. Environmental Chemistry, B. K. Sharma, Goel Publishing house,
16. Environmental Chemistry, S.C Bhatia, CBS Publisher and Distributer
17. Elements of Magnetochemistry, R.L. Datta & A. Syamal, Affiliated East- West Press Pvt. Ltd., New Delhi (1993).

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Inorganic Chemistry
M.Sc.Inorganic Chemistry, Semester IV
Paper II

Course Code	[2003080204020002]	Title of the Course	General Topics of Inorganic Chemistry
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To understand and familiarize the development of supra molecular chemistry, Host-guest compounds and its concepts and design. • To understand regarding isomerism among Inorganic compounds. • To understand the various solids, closed packing, lattice energy and its calculation. • Learn different cells, oxidation-reduction reaction and related diagram.

Course Content		
Unit	Description	Weightage* (%)
1.	BASICS OF SUPRAMOLECULAR CHEMISTRY Definition and development of Supramolecular chemistry, classification of Supramolecular Host-Guest compounds, Receptors, coordination and lock and key analogy, binding constant, cooperativity and the chelate effect, preorganization and complementarity, Thermodynamic and kinetic selectivity and discrimination, nature of supramolecular interactions, solvation and hydrophobic effects, supramolecular concepts and design.	25
2.	ISOMERISM AMONG INORGANIC COMPLEXES Structural isomerism, stereoisomerism or space isomerism, geometrical isomerism in 4 - and 6 - coordinates compound, distinguish between cis and trans- isomers, optical or mirror image isomerism. Condition for a molecule to show optical isomerism. Optical isomerism in 4 - and 6 - coordinates compounds. Resolution of racemic mixtures.	25

3.	CHEMISTRY OF SOLID STATE Crystalline and amorphous solids, size and shape of crystals, symmetry in crystals, space lattice and unit cell, Bravais lattices, Miller indices, types of crystals, close packing of identical solid spheres, interstitial sites in close packing of spheres, limiting radius ratio, radius ratio rule and the shape of an ionic crystal, structure of metallic crystals and ionic crystals, lattice energy of an ionic crystal and calculation, Born equation and its application, experimental determination of lattice energy, defect structures of crystals, semiconductors, fabrication of transistors.	25
4.	OXIDATION AND REDUCTION Oxidation number, Galvanic cell, single electrode potential, sign of electrode potential, standard electrode potentials, electrochemical series, Nernst equation, application of electrochemical series, source of electrical energy in a galvanic cell, hydrogen over voltage, oxygen over voltage, redox stability in water, oxidation by atmospheric Oxygen, Latimer diagram, Frost diagram, pourbaix diagram	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library, IT tools, encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Learn about development of Supramolecular chemistry, classification of Supramolecular Host-Guest compounds, Receptors, coordination and lock and key analogy, nature of supramolecular interactions, solvation and hydrophobic effects, supramolecular concepts and design
2.	Understand regarding the structural isomerism, stereoisomerism geometrical isomerism in 4 - and 6 - coordinates compound, cis and trans- isomers, mirror image isomerism, Optical isomerism in 4 - and 6 - coordinates compounds. Resolution of racemic mixtures
3.	Learn about the crystalline and amorphous solids, types of crystals, close packing of identical solid spheres, interstitial sites in close packing of spheres, limiting radius ratio, radius ratio rule and the shape of an ionic crystal, structure of metallic crystals and ionic crystals, lattice energy of an ionic crystal and calculation, Born equation, experimental determination of lattice energy, defect structures of crystals.
4.	Knowledge of Oxidation number, Galvanic cell, single electrode potential, sign of electrode potential, standard electrode potentials, electrochemical series, Nernst equation, application of electrochemical series, galvanic cell, hydrogen over voltage, oxygen over voltage, redox stability in water, oxidation by atmospheric Oxygen, Latimer diagram, Frost diagram, pourbaix diagram
Suggested References:	

Reference Books Recommended:

1. Supramolecular chemistry by Jonathan W. Steed, Jerry L. Atwood, John Wiley & sons Ltd.
2. A. F. Wells, Structural Inorganic chemistry, 3rd Edn, Oxford Fair Lawn, N. J. 1962.
3. Principles of inorganic chemistry: Puri, Sharma, Kalia, Thirty third Edn. (Vishal publishing co.)
4. Advanced in inorganic chemistry: S. K. Agrawal, Keemti Lal, Fifteenth Edn. (Pragati Edition)
5. A. I. Vogel's text book of quantitative inorganic analysis, ELBS III Edn. 1987.
6. Advanced in inorganic chemistry vol. 1 & 2, Gurdeep Raj, Krishna Publication Meerut.
7. Selected topics in inorganic chemistry: Malik, Tuli, Madan

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Inorganic Chemistry
M.Sc.Inorganic Chemistry, Semester IV
Paper III

Course Code	[2003080204030002]	Title of the Course	Spectroscopy & Agricultural Pollutants
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• General aspects and classification, structural features of some common insecticides. • Learn the Principle and presentation of the ESR spectrum, Hyperfine splitting, Anisotropy and interpretation of g values • Principle, working and application of FT-NMR, its applications. chemistry of lanthanides and actinides • Basic principle, Spectral parameters and spectrum Display. Interpretation of Isomer shift. Application of Moa

Course Content		
Unit	Description	Weightage* (%)
1.	POLLUTION FROM AGRICULTURE PESTICIDES AND FERTILIZERS Pesticides: general aspects and classification, structural features of some common insecticides, mode of action-general aspects, fate of insecticides in environment and environment hazards, characteristics features of some commonly used insecticides,	25

	some important fungicides herbicides and their characteristics features, major disasters with the pesticides and herbicides, alternative to chemical pesticides, fertilizers and environmental hazards from the fertilizers, eutrophication.	
2.	ELECTRON SPIN RESONANCE Principle and presentation of the spectrum. Hyperfine splitting. Anisotropy and interpretation of g values. Hyperfine coupling and zero field splitting. Survey of EPR spectra of first row transition metal ion complexes. Double Resonance and Fourier transform EPR techniques.	25
3.	A. NMR SPECTROSCOPY Principle and application of FT-NMR, Chemical shift, contact shift and pseudo contact shift lanthanide complexes as shift reagents. Double resonance technique, Proton, Boron, Carbon, Nitrogen, Phosphorous NMR of inorganic compounds. B. CHEMISTRY OF LANTHANIDES AND ACTINIDES Separations, spectral and magnetic properties, organometallic chemistry of lanthanides and actinides, transuranium elements.	25
4.	MOSSBAUER SPECTROSCOPY Basic principle, Spectral parameters and spectrum Display. Interpretation of Isomer shift. Application of technique to the studies of bonding and structure of Fe^{+2} and Fe^{+3} compounds, Sn^{+2} and Sn^{+4} compounds and detection of oxidation states. FAB and electron spray, mass spectrometry of metal complexes.	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library, IT tools encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Learn about general aspects and classification of pesticides, structural features of some common insecticides, mode of action-general aspects, fate of insecticides in environment and environment hazards, characteristics, fungicides herbicides, major disasters with the pesticides and herbicides, alternative to chemical pesticides, fertilizers and environmental hazards from the fertilizers, eutrophication
2.	Understand the principle and presentation of the spectrum of ESR, Hyperfine splitting, Anisotropy and interpretation of g values, hyperfine coupling and zero field splitting, Double Resonance and Fourier transform EPR techniques.
3.	Learn the principle and application of FT-NMR, Chemical shift, contact shift and pseudo contact shift lanthanide complexes as shift reagents. Double resonance technique, Proton, Boron, Carbon, Nitrogen, Phosphorous NMR of inorganic compounds
4.	To learn the basic principle, Spectral parameters and spectrum Display. Interpretation of Isomer shift. Application of technique to the studies of bonding and structure of Fe^{+2} and Fe^{+3} compounds, Sn^{+2} and Sn^{+4} compounds and detection of oxidation states. FAB and electron spray, mass spectrometry of metal complexes.

Suggested References:

Reference Books Recommended:

1. Structural methods in inorganic chemistry. E. A. V. Ebsworth, D. W. H. Rankin and S. Cardock.
2. Spectroscopic identification of organic compounds -R. M. Silverstein, G. C. Bassler and Morrill.
3. Physical methods in Inorganic chemistry- R. S. Drago.

4. Application of absorption spectroscopy of organic compounds- J. Dyers.
5. Electron Spin Resonance-Elementary theory and Practical Applications- Wertz and olton.
6. Principles of inorganic chemistry: Puri, Sharma, Kalia, Thirty third Edn. (Vishal publishing co.)
7. Advanced in inorganic chemistry: S. K. Agrawal, Keemti Lal, Fifteenth Edn. (Pragati Edition)
8. Advanced in inorganic chemistry vol. 1 & 2, Gurdeep Raj, Krishna Publication Meerut.
9. Environmental chemistry with green chemistry: Asim K.Das, Books and allied (p) ltd.

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Inorganic Chemistry
M.Sc.Inorganic Chemistry, Semester IV
Paper IV

Course Code	[2003080204040002]	Title of the Course	Co-ordination Chemistry(Special Paper)
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	● Reactivity of metal complexes, ligand replacement reaction, classification of mechanism. ● Spectrophotometric methods, Potentiometric method ● Anomalous magnetic behavior

Course Content		
Unit	Description	Weightage* (%)
1.	KINETICS AND REACTION MECHANISM OF TRANSITION METAL COMPLEXES: Reactivity of metal complexes, ligand replacement reaction, classification of mechanism. KINETICS OF OCTAHEDRAL SUBSTITUTION REACTION: Complementary reaction, Non-complementary reaction, Anation reaction, reactions without metal-ligand bond cleavage. STEREOCHEMICAL CHANGES IN OCTAHEDRAL COMPLEXES: Molecular rearrangement in complexes, reaction of geometrical and optical isomers. Isomerization and racemization of octahedral complexes, Ligand stereo specificity. REDOX REACTION: Electron transfer reactions, mechanism of one electron transfer reactions, outer sphere electron transfer reactions, tunneling effect, cross reaction, Marker-Hush theory, inner sphere electron transfer reactions, bridged activated mechanism, experimental Techniques.	25
2.	METAL-LIGAND COMPLEX EQUILIBRIA IN SOLUTION: Stability of complex ions in solution, Basic principles, mathematical function and interrelationship. DETERMINATION OF STABILITY CONSTANTS OF BINARY COMPLEX BY EXPERIMENTAL METHODS: Spectrophotometric methods, Potentiometric method (pH-metric titration technique. i.e. Irving-Rossotti methods), Polarographic method. Factors affecting the stability of metal complexes with reference to the nature of metal ion and ligand. Statistical, electronic, chelate effect and its thermodynamics(ΔG, ΔH and ΔS)	25

3.	MAGNETIC PROPERTIES OF TRANSITION METAL COMPLEXES Anomalous magnetic behavior: Solute-Solvent interaction, Solute-Solute interaction, configurationl equilibrium, Equilibrium between two spin states, magnetically non-equivalent sites in the unit -cell, Quenching of Orbital moments, Spin cross-over, Magnetic exchange coupling, stereochemical applications of magnetic properties.	25
4.	SELECTED TOPIC IN INORGANIC CHEMISTRY Stereochemistry of unusual co-ordination number 2 to 9. Metal sequestration and its industrial applications. Catalysis and Green Chemistry: Biocatalysts - Enzyme, Synthesis, Advantages and Disadvantages, Uses. Photocatalysts: Synthesis, Photochemical Reactions, Advantages and Challenges.	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library, IT tools, encourages students to participate in seminars/ workshops, presentations by students, assignment etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand kinetics of octahedral substitution reaction, stereochemical changes in octahedral complexes, redox reaction:
2.	Learn the metal-ligand complex equilibria in solution, Stability of complex ions in solution, Basic principles, mathematical function and interrelationship, determination of stability constants of binary complex by experimental methods, Spectrophotometric methods, Potentiometric methods
3.	Understand the Solute-Solvent interaction, Solute-Solute interaction, configurational equilibrium, Magnetic exchange coupling, stereochemical applications of magnetic properties
4.	Understand the Stereochemistry of unusual co-ordination number 2 to 9, Metal sequestration and its industrial applications, Catalysis and Green Chemistry

Suggested References:

Reference Books Recommended

1. Inorganic reaction mechanism, Basello and Pearson, Wiley Eastern Ltd. New Delhi-1977.
2. Kinetic and Mechanism of Inorganic reactions: A study of metal complexes in solution, A. A. Frost and R. G. Pearson, Wiley, New York-(1953, 1961).
3. Inorganic reaction mechanism, S.k. Skyes.
4. Electron Transfer reaction of metal complex ions in solution, H. Taube, Academic press, London-1970.
5. Modern Inorganic Chemistry, J. Lewis and R. G. Wilkinson, Interscience, New York.
6. Inorganic Reaction Mechanism, M. L. Obe, Nelson, London-1972.
7. Mechanism of Inorganic Reactions in solutions: An Introduction, D. Benson, Mc GrowHill, Chapter-15, P-455, 1968.
8. "Comprehensive coordination Chemistry" G. Wilkinson, R. D. Gillard and J. A. Mcclevertypergamon, London, Vol-1. P-281-322, 331-374,385-411, 415- 458 (Chapter-7-4) and P-463-471-1987.
9. Coordination Chemistry, Rajbir Singh, Mittal Publication, New Delhi.

10. Coordination Chemistry, G with more
11. Instability constants of complex compounds, K.B. Yatsimirskil and V.P.A. Vasilis (Translated from Russian), D. Van Nostrand Co. Inc. Princeton, New Jersey.
12. Chemistry of complex Equilibria, M.T. Beck (Hungary), translated by R.A., van Nostrand Co., London, 1970.
13. Rossotti F.J.C. and Rossotti H.S., The determination of stability constants, McGraw Hill, New York, P-108, 1961.
14. Irving H. and Rossotti H. S. J. Chem. Soc, 3397, 1953.
15. Elements of Magnetochemistry, R.L. Datta & A. Syamal, Affiliated East- West press Ltd., New Delhi (1993).
16. Magnetochemistry, R. L. Karlin, Springer-Verlag, New York (1993).
17. Introduction to Magnetochemistry, A. Earnshaw, Academic Press, New York (1968).
18. Magnetism and Transition metal Complexes, F. E. Mabbs & D. J. Machin, Chapman and Hall, London (1973).
19. Stereo chemistry and bonding in Inorganic chemistry, J. E. Ferguson. Prentice Hall, Inc. Eryleword Cliffs, N. J. 1974.
20. Inorganic chemistry (Principles of structure and coordination compounds), J. E. HuheHarper and Row Intermediated series, N.Y. 1963.
21. Organic sequestering agents, Chaberck S. and Martell, John Wiley and Sons, Inc, New York (1959).
22. Green Chemistry, K. R. Desai, Tarulata Chhowala, Bhavanaben Mistry, Himalaya Publication, Mumbai

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Inorganic Chemistry
M.Sc.Inorganic Chemistry, Practicals
Semester - IV

Course Code	[2003080204050001]	Title of the Course	
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To impart basic knowledge of complexes • Understand and synthesize different inorganic complexes • Learn and perform practicals of analysis of water. • To understand the Irving-Rossotti method and perform experiments

Course Content

1	Water Analysis	4- Credit
2	Preparation of Inorganic complexes	
3	Irving-Rossotti Method	4- Credit
4	Viva-Voce	

INORGANIC PRACTICALS:

1. Preparation and Estimation of chloro-penta ammine Cobalt-II chloride
 $[\text{CoCl}(\text{NH}_3)_5] \text{Cl}_2$
2. Preparation and Estimation of Reineck's salt [Ammonium tetrathiocyanato diammine chromate] $[\text{NH}_4(\text{NH}_3)_2\text{Cr}(\text{CNS})_4]$
3. Preparation and Estimation of Bis[Ethylene diammine]copper sulphate
4. Preparation and Estimation of potassium trioxalato ferrate
 $[\text{K}_3(\text{Fe}(\text{C}_2\text{O}_4)_3 \cdot 3\text{H}_2\text{O})]$

5. Preparation and Estimation of Potassium trioxalato aluminate
 $K_3[Al(C_2O_4)_3 \cdot 3H_2O]$
6. Preparation and Estimation of $Cu[Resacetophenone]_2$ [$Cu(C_8H_7O_3)_2$]
7. Preparation and Estimation of $Cu[Salicylaldehyde]_2$ [$Cu(C_7H_5O_2)_2$]
8. Preparation and Estimation of $Cu[Salicylaldehyde]_2$ Schiff base
[$Cu(C_7H_6ON)_2$]
9. Preparation and Estimation of $Ni[Salicylaldehyde]_2$ [$Ni(C_7H_5O_2)_2$]
10. Preparation and Estimation of $Ni[Salicylaldehyde]_2$ Schiff base
[$Ni(C_7H_6ON)_2$]
11. Preparation and Estimation of Potash alum [$K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$]
12. Preparation and Estimation of $Co[Salicylaldehyde]_2$ [$Co(C_7H_5O_2)_2$]
13. Preparation and Estimation of $Co[Salicylaldehyde]_2$ Schiff base
[$Co(C_7H_6ON)_2$]
14. Analysis of water sample
15. Determine the stability constant of Ni-glycine complex by using
Irving - Rossoti method
16. Determine the stability constant of Co-glycine complex by using
Irving- Rossoti method
17. Determine the stability constant of Cu-glycine complex by using
Irving- Rossoti method

Teaching-Learning Methodology	Introduction, interaction with students in calculation of mole ratios, carry out experiments at each step according to the respective practical, interpretation of spectra and deduce the structure.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the basics to carry out reactions, nature of reaction and calculation of mole ratio.
2.	Establish mechanism and monitoring reaction at specified reaction condition.

3.	Learn to work-up after the complexation of metal and ligands
4.	Learn Irving-Rossotti methods through the references.
5.	Perform the practicals at different pH and draw the different graphs.
6.	Understand the calculation with reference to respective factors.
7.	Appreciate good laboratory practices.

Suggested References:

Reference Books Recommended:

1. Vogel's Textbook of practical organic chemistry, 5th edition, B. S. Furniss, A. J. , P. W. G. Smith, A. R. Tatchell (Pearson Education).
2. Comprehensive practical organic chemistry: Preparation and Quantitative analysis, V. K. Ahluwalia, Renu Agarwal (Universities Press).
3. Monograph on Green Chemistry Laboratory Experiments by Green Chemistry Task Force Committee, DST
4. L. D. Field, S. Sternhell, J. R. Kalman - Organic Structures from Spectra-Wiley (2013)
5. Inorganic Vogel by Mendhan

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Organic Chemistry
M.Sc.Organic Chemistry, Semester IV
Paper 1

Course Code	[2003080204010003]	Title of the Course	Advance Organic Chemistry)
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To learn multicomponent reaction, alkene formation, asymmetric synthesis, amide formation, role of intermediate in synthesis, transformation and study their mechanism. • Role of various oxidizing agents in organic synthesis, chemoselectivity, factors affecting oxidation reaction, study their working mechanism and various applications. • Role of various reducing agents in organic synthesis, chemoselectivity, factors affecting reduction reaction, study their working mechanism and various application. • Study of cationotropic, anionotropic migration, involvement of reactive intermediate in various rearrangement, migrating aptitude of various groups.

Course Content		
Unit	Description	Weightage* (%)
1.	NAME REACTIONS General nature, method, mechanism and synthetic applications of the following reactions; (1)Ugi reaction (2)Noyori reaction (3)Wittig reaction (4)Peterson olefination reaction (5)Mannich reaction (6)Stille reaction (7)Ene reaction (8)Staudinger reaction (9)Corey-Fuchs reaction (10)Ritter reaction (11)Mcmurry reaction	25

	(12)Michael addition	
2.	OXIDATION Introduction, Oxidation with Cr(VI), Mn(VII), Mn(IV), OsO ₄ , Periodic acid. Peroxy acid. Oxidation of hydrocarbons-alkenes, aromatic rings, saturated C-H group (activated and unactivated), aldehyde and ketones	25
3.	REDUCTION Introduction, different reductive processes, hydrocarbons-alkenes, alkynes and aromatic rings, Carbonyl compounds-aldehydes, ketones, (LiAlH ₄ , NaBH ₄ only for aldehyde and ketone) acids and their derivatives, epoxides, nitro, nitroso, azo and oxime groups, Birch reduction, Shapiro reduction.	25
4.	MOLECULAR REARRANGEMENTS Rearrangement involving migration to electron deficient carbon: (i) Expansion and contraction of rings/Demajnov rearrangement (ii) Benzil-benzilic acid rearrangement Rearrangement involving migration to electron rich carbon: (i) Favorskii rearrangement (ii) Sommelet-Hauser rearrangement (iii) Neber rearrangement Rearrangement involving migration to electron deficient nitrogen: (i) Schmidt rearrangement (ii) Curtius rearrangement Aromatic rearrangements: (i) Migration around the aromatic nucleus: Jacobsen rearrangement (ii) Migration of group from the side chain to the nucleus: Orton rearrangement, Hoffmann-Martius rearrangement, Rearrangement of N-nitrosoanilines (Fischer- Hepp rearrangement). Rearrangement involving migration from oxygen to ring: (i) Fries rearrangement (ii) Claisen rearrangement	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library, IT tools, encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	To learn type of transformation, intermediate step. Types of multicomponent reaction, insitu reaction, role of reactive intermediate in transformation, types of asymmetric synthesis, alkene formation reaction, base catalyzed reaction, mechanism of reaction and their synthetic applications.
2.	To learn the role of various oxidizing agents, study chemoselectivity, mechanism of reaction, transformation of group, name reactions based on various oxidizing agents and their synthetic applications.
3.	To learn about role of various reducing agents, chemoselectivity, mechanism of reaction, transformation of group, name reactions based on various reducing agents and their synthetic applications.
4.	To learn about type of rearrangement, migrating aptitude, ring expansion, contraction, strain theory, isotopic effect, effect of other groups with reference to functional group and their application.

Suggested References:

Reference Books Recommended:

1. Organic synthesis using transition metals-Roderick Bates (Wiley)
2. Organic chemistry – J. Clayden, N. Greeves, S. Warren and P. Wothers (Oxford Press)
3. Some modern methods of organic synthesis – W. Carruthers (Cambridge)
4. Organic synthesis – Michael B. Smith
5. Advanced organic chemistry, Part B – F. A Carey and R. J. Sundberg, 5th edition (2007)
6. Guidebook to organic synthesis-R K Meckie, D M Smith and R A Atken
7. Organic synthesis- Robert E Ireland
8. Strategic Applications of named reactions in organic synthesis-Laszlo Kurti and Barbara Czako
9. Organic Synthesis, Jagdamba Singh & L.D.S. Yadav, 6th edition, Pragati Prakashan (2010).
10. Reaction Mechanism in Organic Chemistry by S. M. Mukherji and S. P. Singh (McMillan India Ltd., 1976)
11. Advance Organic Chemistry, Reaction Mechanism and Structure by Jerry March, 4th ed. John Wiley & Sons, 1992

On-line resources to be used if available as reference material

On-line Resources

Master of Science, Organic Chemistry
M.Sc.Organic Chemistry, Semester IV
Paper I1

Course Code	[2003080204020003]	Title of the Course	Selected Topics in Organic Chemistry-II
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To understand and familiarize the basic principles, theory and instrumentation of mass spectroscopy, low and high resolution mass spectra, to impart knowledge in theory and principles of spectroscopy, spectroscopic technique for characterization and differentiation of various nucleus.

	• To understand kinetically and thermodynamically controlled reactions, effect of substituent on structure on reactivity, terms involved in linear free energy relationship. • To provide basic theoretical understanding of heterocyclic chemistry, improving general methodology for different kind of ring synthesis which implies the new heterocyclic systems by changing the functionality with respective positions in skeleton. • To understand natural and synthetic polymers, structural variations, classification properties and applications.

Course Content		
Unit	Description	Weightage* (%)
1.	MASS SPECTROMETRY Theory and principles of mass spectroscopy; Instrumentation; low and high resolution mass spectra; Ionization techniques – Electron Impact (EI) ionization, Chemical Ionization (CI), Field Desorption (FD), Fast Atom Bombardment (FAB), Electrospray Ionization (ESI); Determination of molecular weight and molecular formula, nitrogen rule, detection of molecular ion peak, metastable ion peak; Fragmentations – rules governing the fragmentations, McLafferty rearrangement; Interpretation of mass spectra of different class of compounds – saturated and unsaturated hydrocarbons, aromatic hydrocarbons, alcohols, ethers, ketones, aldehydes, carboxylic acids, amines, amides, compounds containing halogens; To write possible fragmentation for given compound; To identify structure from mass spectral data; To identify structure from combined spectral data. <i>Structure elucidation by using UV, IR, NMR and Mass Spectroscopic techniques</i>	25
2.	STRUCTURE-REACTIVITY PRINCIPLES Types of mechanisms, thermodynamic and kinetic requirements, kinetic and thermodynamic control, Hammonds postulate, Curtian-Hammet principle, potential energy diagrams, transition state and intermediates, methods of determining mechanisms-isotope effect. Effect of structure on reactivity- resonance and field effect, steric effect, quantitative treatment. The Hammet equation and	25

	linear free energy relationships, substituent and reaction constants, positive and negative deviation from Hammett equation, Taft equation, Solvent effect	
3.	HETEROCYCLIC CHEMISTRY-II (A) Five and six membered heterocycles with more than two hetero atoms: Synthesis, reactivity, aromatic character and importance of following heterocycles: 1,2,3- triazole, 1,2,4- triazole, 1,2,4-oxadiazole, 1,3,4-oxadiazole, 1,2,5-oxadiazole (B) Condensed six membered heterocycles: Synthesis, reactivity, aromatic character and importance of following heterocyclic Rings: Quinoline, Isoquinoline, Cinnoline, Quinoxaline, Phthalazine, Naphthyridine, Phenoxazine	25
4.	SYNTHETIC AND BIO-POLYMERS Bio-polymers: General introduction, types, properties and uses of polysaccharides – starch and cellulose Synthetic polymers: General introduction, method of preparation, properties and uses of Polyester, poly-tetrafluoroethylene, polyamino acids, polycyanoacrylates, polyurethanes, silicone rubbers, polyphosphazenes, divinylether - maleic anhydride cyclopolymer (DVEMA) polymeric antioxidants	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library, IT tools, encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the theory, instrumentation and important terms of mass spectrometry, fragmentation pattern, to set valuable insight into the types of molecular interaction and interpreting from obtained data.
2.	To learn about basic concept, synthesis and application of heterocyclic chemistry, aware about heterocyclic systems, types of heterocyclic rings, application of heterocycles in medicinal chemistry.
3.	To learn about type of reactions in context to kinetically and thermodynamically control concept, derivatization of various equation and their significance, different terminology and their application in designing various bioactive scaffolds.
4.	To learn about natural and synthetic polymers, their classification, properties and synthetic applications.
Suggested References:	

Reference Books Recommended:

1. Spectroscopic Identification of Organic Compounds, R. M. Silverstein and F. X. Webster, 6th edition (John Wiley & Sons)
2. Introduction to Spectroscopy, D. L. Pavia, G. M. Lampman and G. S. Kriz, 3rd edition (Thomson Brooks/Cole)
3. Spectroscopic Methods in Organic Chemistry, D. H. Williams and I. Fleming, 4th edition (McGraw – Hill Book Company)
4. Organic Spectroscopy, William Kemp, 3rd edition (Palgrave)
5. Organic Spectroscopy – Principles and Applications, Jag Mohan, 2nd edition (Narosa Publishing House)
6. Spectroscopy of Organic Compounds, P. S. Kalsi, 5th edition (New Age International Publishers)
7. Elementary Organic Spectroscopy: Principles and Chemical applications (revised edition), Y. R. Sharma (S. Chand Publishing)
8. Organic Chemistry by Francis A. Carey (McGraw-Hill Book Co., 1987).
9. Structure and Mechanism in Organic Chemistry, C. K. Ingold, Cornell Uni. Press.
10. Principles of Organic Synthesis, R.O.C. Norman and J. M. Coxon, Blackie Academic and Professional.
11. Reaction Mechanism in Organic Chemistry, S. M. Mukherji and S. P. Singh, Macmillan.
12. Organic Chemistry – J. Clayden, N. Greeves, S. Warren and P. Wothers
13. An introduction to the chemistry of heterocyclic compounds-R M Acheso
Heterocyclic Chemistry- J A Joule and Smith
14. Heterocyclic Chemistry-II- R R Gupta, M Kumar, V Gupta, Springer (India) pvt
15. Heterocyclic Chemistry, 4th Edition by J. A. Joule & K. Mills, Published by Chapman & Hall (1995)

16. Principles of modern heterocyclic chemistry, Edited by Leo A. Paquette, Published by Pearson Benjamin Cummings (1968)
17. Heterocyclic Chemistry, 3rd Edition by Thomas L. Gilchrist, Published by Prentice Hall (1997)
18. The Structure & Reactions of Heterocyclic Compounds, Edited by Michael Henry Palmer, Published by Edward Arnold (1967)
20. Heterocyclic chemistry by V. K. Ahluwalia, Narosa publishing house.
21. Harry R. Allcock, Frederick W. Lampe and James E. Mark, Contemporary Polymer Chemistry, 3rd edition, Pearson Prentice Hall, 2005.
22. Organic Polymer Chemistry by K. J. Saunders.

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Organic Chemistry
M.Sc.Organic Chemistry, Semester IV
Paper 1II

Course Code	[2003080204030003]	Title of the Course	Advance Organic Synthesis
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	● To understand the reaction mechanism of a chemical reaction, the path and the feasibility of a reaction, reactivity of a group and need to understand preferential group, suitable reagent and appropriate condition. ● To understand the synthetic pathway, breaking and assembling molecules, suitable reagent, to suggest synthetic route for complex organic compounds with stereochemistry. ● To learn ring synthesis based on retrosynthetic pathway, application of various name reactions, generation of intermediates and their involvement in the construction of ring and generation of aromatic compounds from heterocycles. ● To learn about organometallic chemistry, synthesis of

	hydrocarbon, olefin, transformation of various functional group, name reactions based on organometallic compound, their mechanism and synthetic applications.

Course Content		
Unit	Description	Weightage* (%)
1.	PROTECTING GROUPS Need of protecting groups – Protection of alcohols, Carbonyl, Carboxylic acid and amino groups, Synthetic equivalent groups and examples on transformations	25
2.	DISCONNECTION APPROACH Introduction to disconnection, Concept of synthon, Synthetic equivalent, Functional group interconversion (i) One group disconnection: Disconnection and synthesis of alcohols, olefins, simple ketones, acids and its derivatives (ii) Two groups disconnection: Disconnections in 1,3-dioxygenated skeletons, preparation of β -hydroxy carbonyl compounds, α,β -unsaturated carbonyl compounds, 1,3-dicarbonyls, 1,5- dicarbonyls and use of Mannich reaction (iii) Pericyclic reactions: Disconnections based on Diels-Alder reaction and electrocyclic reaction: Its use in organic synthesis	25
3.	RING SYNTHESIS Introduction to ring synthesis (i) Synthesis of saturated heterocycles: Synthesis of 3 and 4 membered rings (ii) heterocycles in organic synthesis: Synthesis of alkanes and cycloalkanes from thiophene, Synthesis of alkenes and cycloalkenes from pyridines, Synthesis of Aromatic compounds from pyrilium salts, pyridazine, thiophenes and furan	25
4.	ORGANOMETALLIC COMPOUNDS AND THEIR APPLICATIONS (i) Carbon-metal bonds in organometallic compounds, Synthesis and applications of Organolithium, Organozinc and Lithium diorganocuprate.	25

	(ii) Basic concept of organoboranes, Preparation of organoboranes, Stereochemistry of hydroboration, Mechanism of hydroboration – oxidation, Synthetic applications.	

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library, IT tools encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	eightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Focus on the protecting and deprotecting groups with various organic scaffolds, choose of reagents, solvents and synthetic pathway, the reactions of group and their synthetic applications.
2.	Understand deep aspects of retrosynthesis and oxidation-reduction reaction, assumption of synthetic equipment and design the novel route for the synthesis target.
3.	Understand synthesis of various rings based on retrosynthetic pathway, application of reactive intermediate in the synthesis of ring, can be able to design new molecules of interest and generation of aromatic hydrocarbons from various heterocycles.
4.	Learn the Role of organometallic compounds in organic synthesis, reduction, oxidation, transformation of a group, application in pharmaceutical industries for the synthesis of pharmaceutically active agents.

Suggested References:

Reference Books Recommended:

1. Organic synthesis using transition metals-Roderick Bates (Wiley).
2. Organic chemistry – J. Clayden, N. Greeves, S. Warren and P. Wothers (Oxford Press).
3. Some modern methods of organic synthesis – W. Carruthers (Cambridge)
4. Organic synthesis – Michael B. Smith.
5. Advanced organic chemistry, Part B – F. A Carey and R. J. Sundberg, 5th edition (2007).
6. Guidebook to organic synthesis-R K Meckie, D M Smith and R A Atken.
7. Organic synthesis- Robert E Ireland.
8. Strategic Applications of named reactions in organic synthesis-Laszlo Kurti and Barbara Czako.
9. Organic Synthesis, Jagdamba Singh & L.D.S. Yadav, 6th edition, Pragati Prakashan (2010).
10. Reaction Mechanism in Organic Chemistry by S. M. Mukherji and S. P. Singh (McMillan India Ltd., 1976).
11. Advance Organic Chemistry, Reaction Mechanism and Structure by Jerry March, 4th ed. John Wiley & Sons, 1992.
12. Designing Organic Synthesis – A Programmed Introduction to the Synthon Approach, Stuart Warren, John Wiley & Sons (1994).
13. Organic Synthesis: The disconnection approach, Stuart Warren, John Wiley & Sons (1994).
14. Selected Organic Synthesis, Ian Fleming, John Wiley & Sons (1977).
15. Principles of Organic Chemistry by R.O.C. Norman (Chapman and Hall, 1986).
16. Organometallic Chemistry by P. L. Pauson (Edward Arnold, 1968).
17. Principles of Organometallic Chemistry by Coats, Green, Powell & Wade (Chapman and Hall, 1977).

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Organic Chemistry
M.Sc.Organic Chemistry, Semester IV
Paper IV

Course Code	[2003080204040003]	Title of the Course	Medicinal Chemistry-II
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To understand antibiotics, classification and drug belong to that class, structural variation, synthesis and uses of antibiotics. • To learn about types of anti allergic and anti infective drugs, their classification, general structures, effect of substituent, SAR, synthesis and uses. • To understand anti malarial drug, life cycle of plasmodium, general classification, their structural variation, synthesis and uses. • To understand life cycle of virus. Various classes of enzymes, general structure of anti viral and anti-HIV agents, structural variation, synthesis and uses.

Course Content		
Unit	Description	Weightage* (%)
1.	ANTIBIOTICS General introduction and classification of antibiotics Broad spectrum antibiotics, Macrolide antibiotics, Amino glycoside antibiotics and Non-classifiable antibiotics (i) β-lactam antibiotics: Penicillins (Structural variations and SAR), Cephalosporins (Structural variations) (ii) Non-lactam antibiotics: Tetracyclin (Structural variations and SAR) Structures and medicinal importance/ clinical uses/ pharmacological applications of the following: Bacitracin, Vancomycin, Erythromycin, Lincomycin, Chloramphenicol, Nalidixic acid, Norfloxacin, Ciprofloxacin	25

	Synthesis and therapeutic uses of only the following: Methicillin, Ampicillin, Cephalexin, Chloramphenicol, Ciprofloxacin	
2.	ANTIALLERGIC AND LOCAL ANTI INFECTIVE DRUGS (A) Antihistamines and related Antiallergic Drugs: General introduction and mode of action, Structure variation in Aminoalkylethers, Ethylenediamines and Piperazine derivatives. Synthesis and therapeutic uses of only the following: Diphenhydramine (Benadryl), Antazoline, Chlorpheniramine, Primethazine (B) Anti – mycobacterial agents: General Introduction of Tuberculosis & Leprosy-disease, Treatment, Mode of action, adverse effect of Anti TB agents & Anti-leprotic agents Synthesis and therapeutic uses of only the following: Ethionamide, Ethambutol, DDS (Dapsone), Pyrazinamide. (C) Sulfonamides: General classification, mode of action and SAR Synthesis and therapeutic uses of only the following: Sulfamethoxine (Sufadoxine), Sulfamethoxy-Pyrazine (Sulfalene), Succinyl sulfathiazole (Sulfasuxidine)	25
3.	Antimalerials and Antineoplastic agents (A) Antimalarials: Introduction, Types, Life cycle of plasmodium, drug resistance, General classification, SAR of 4- and 8-aminoquinolines and Structure variation in Sesquiterpene Lactones, mode of action Synthesis and therapeutic uses of only the following: Mefloquine, Chloroquine, Primaquine, Pyrimethamine (Daraprim), Quinacrine (B) Antineoplastic Agents (Cancer Chemotherapy): Introduction to cancer, types, Causes & Treatment of cancer, Metastasis, Drug Resistance, Targets of anticancer agents, adverse effects of cancer therapy (in brief) General classification of	25

	antineoplastic agents, Cell Cycle-Specific (CCS) and Non Cell Cycle-Specific (CCS) Agents, Mode of action, Synthesis and therapeutic uses of only the following: Mechlorethamine, Cyclophosphamide, Melphalan, 6-Mercaptopurine, Trimetrexate, Cytarabine	
4.	Anti-Viral and Anti-HIV agents (A) Antiviral agents: Introduction, Types & classes of viruses, Classification of antiviral agents, mechanism of action, Antiviral Compounds for DNA Viruses & Selected RNA Virus Infections other than HIV (Influenza A and B Viruses, Hepatitis C Virus) (B) Anti-HIV Drugs: Introduction, HIV Infection and its Pathological Effects, HIV Structure and life cycle, Targets for Drug Design of Anti-HIV Agents, HIV drugs in clinical use, Development of Drug Resistance, the need for new Anti-HIV Drugs, Introduction of AIDS Synthesis and therapeutic uses of only the following: Amantadine, Acyclovir, Zidovudine, Indinavir, Ritonavir	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library, IT tools, encourages students to participate in seminars/ workshops, presentations by students, assignment etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand antibiotics, their classification, general structure, lactum and non-lactum antibiotics, next generation antibiotics, SAR, synthesis and uses of selected drug molecules.
2.	Learn general classification of anti histamines, anti-mycobacterial and sulphonamides, their structural variations, mode of action and synthesis of selected drug molecules.
3.	Learn life cycle of malaria, types of plasmodia, general structure of anti malarial agents, structural variation among them, mode of action, synthesis and uses of selected drug molecules.
4.	Understand life cycle of virus. Identification of enzymes responsible for replication of virus, mechanism of drug action. Synthesis and uses of selected drug molecules.

Suggested References:

Reference Books Recommended

1. Burger's Medicinal Chemistry and Drug Discovery (5/e), 1997, Vol. 1, 2, 3, 4,5, Edited by ManFred E. Wolff (John Wiley & Sons, inc., New York).
2. Principles of Medicinal Chemistry, Vol. I & II (5/e), by S. S. Kadam, K. R. Mahadik, K. G. Bothra (Nirali Prakashan).
3. Principles of Medicinal Chemistry by William O. Foye (ed.), Lea and Febiyer, Philadelphia.
4. Wilson and Gisvold's Text-book of Organic Medicinal and Pharmaceutical Chemistry (5/e, 1982) by Robert F. Doerge (J. B. Lippincott Company, Philadelphia/Toppan Co. Ltd., Tokyo).
5. Essential of Medicinal Chemistry (2/e) by Andrejus Korolkovas (A Wiley Interscience Publication, 1988, John Wiley & Sons, Canada).
6. Medicinal Chemistry by Ashutoshkar (Wiley Eastern Ltd., 1993).
7. The Pharmaceutical Basis of Therapeutics by Goodman and Gilman (The Macmillan Co.).
8. The Organic Chemistry of Drug Synthesis, Vol. I, II & III (1980), Ed. By D. Lednicer and L.A. Mitscher (John Wiley and Sons, New York).
9. Topics in Medicinal Chemistry, Vol. I & II by Rabinowitz and Myerson (Editor) (Interscience, 1968).
10. Adhunik Sanshleshit Aushodhonu Rasayanvighyan, Dr. Anamik Shah, University Granth Nirman Board, Ahmedabad.
11. Medicinal Chemistry, D. Sriram and P. Yogeeswari, 1st edi, Pearson Education, 2007.

12. Handbook of pharmaceutical chemicals by Dr. A. R. Shenoy and Dr. V. R. Shenoy
Multitech Publishing Co., 15-Yogesh, Hingwala Lane, Ghatkopar (East) Mumbai.
13. Fundamentals of Medicinal Chemistry by G Thomas.

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Organic Chemistry
M.Sc.Organic Chemistry, Semester IV
Paper IV

Course Code	[2003081004040001]	Title of the Course	DYES AND INTERMEDIATES
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To understand vat dyes, their classification, various methods, various processes, synthesis and uses. • To learn about reactive, acid and TPM dyes, classification, method of application, synthesis and uses. • To learn about various disperse, indigo and cationic dyes, classification, methods of application, synthesis and uses. • To understand nature of fibres, application of various dyes on various fibres, application of dyes as medicine, LCD, laser, photo-sensitizer etc.

Course Content		
Unit	Description	Weightage* (%)
1.	ANTHRAQUINONE DYES Vat Dyes and Solubilized Vat dyes, Acid dyes, Mordant dyes	25

	and dyes for cellulose acetate. Synthesis of only the following: Indanthrene Orange 7RK, Indanthrene Yellow FFRK, Indanthrene Khakhi 2G, Indanthrene Orange FFRK, Indanthrene Yellow 4GK, Indanthrene Scarlet B, Caledon Jade Green XBN, Anthracene Blue SWX, Indanthrene Brilliant Orange GR, Celliton Fast Blue FFG.	
2.	General nature, classification, structural variation, synthesis and application of fibres of the following classes of dyes: (i) Reactive dyes (ii) Triphenylmethane dyes (TPM) (iii) Acid dyes Synthesis of only the following: Procion Brilliant Blue MR, Procion Brilliant Red H-3B, Remazol Brilliant Blue R, Malachite Green, Crystal Violet, Acid Yellow 73, Acid Red 1, Acid Black 24	25
3.	General nature, classification, structural variation, synthesis and application of fibres of the following classes of dyes: (i) Disperse dyes (ii) Indigoid and Thio-indigoid dyes (iii) Cationic dyes Synthesis of the following: Disperse Yellow 16, Disperse Blue 14, Celliton Fast Yellow 7G, Ciba Blue 2B, Indanthrene Brilliant Pink R, Bismarck Brown, Chrysoidine Y, Methylene Blue, Acridine Yellow G, Disperse Orange 29	25
4.	General nature, classification, structural variation, synthesis and application of fibres of the following classes of dyes: (A) Sulphur dyes (B) Ecology and toxicity of dyes with reference to textile dyes, food colours, benzidine etc. (C) Medicinal dyes and biological staining agents (D) High tech application of dyes: Liquid crystal display (LCD), Laser dyes, Photochromic dyes, Thermochromic dyes, dye sensitizer solar cells.	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library, IT tools, encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand vatting process, mechanism, classes of dyes, synthesis and uses of selected dyes.
2.	Learn application of dyes on various fibres for reactive, TPM and acid dyes and synthesis of selected dyes.
3.	Understand disperse, indigo and cationic dyes, their application on various fibres, mechanism of application, structure and uses of selected dyes.
4.	To learn about medicinal, ecology and toxicity of dyes, LCD, photochemical dyes, laser dyes, their application and synthesis of selected dyes.

Suggested References:

Reference Books Recommended

1. The chemistry of synthetic Dyes, Vol. I to VII by Venkataraman, Academic Press, New York.
2. Chemistry of Synthetic Dyes & Pigments by Lubs.
3. Dyes and their intermediates by E. N. Abraham.
4. Handbook of synthetic dyes and pigments, Vol. I & II by K. M. Shah.
5. Industrial Dyes by Klaus Hunger, Germany by Wiley-VCH.
6. Development in the Chemistry and technology of Organic Dyes by J. Griffiths, Blackwell Sci. Pub., Oxford, London.

7. Principles of colour Technology by Fred W. Billmeyer and Max Saltzman, John Wiley & Sons.
8. Advance in colour chemistry, series vol.-3, Modern colourants: Synthesis and structure, edited by A.T.Peters and H.S. Freeman, Blackie Academic and Professional (1995).
9. Colour chemistry: Synthesis, properties and applications of organic dyes and pigments, Heinrich Zollinger VCH, Germany (1987).
10. Organic Chemnistry in Colour V., P.F.Gordan, P. Gregory, Spinger-Verlag (1983).
11. Textile Auxiliaries, J.W. Batty
12. The production and applications fluorescent brightening agents, Milos Zahradnik, John Wiley & Sons (1982).
13. Chemistry of Dyes and Principles of dyeing-V.A. Shenai
14. Synthetic dyes- G.R. Chatwal
15. Critical reports on Applied chemistry, Vol-7, Developments in chemistry and Technology of organic dyes, Edited by : J. Griffths, Blackwell

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Organic Chemistry
M.Sc.Organic Chemistry, Practicals
Semester - IV

Course Code	[2003080204050001]	Title of the Course	
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	● Able to interpret structure of organic compounds from spectra like UV, IR, NMR and Mass. ● To impart basic knowledge for carrying out multistep synthesis based on some name reactions. ● Understand nature of reaction and establishment of reaction condition with mechanism ● To learn about the calculation of mole ratio for each reaction. ● Isolation of product from individual step, purification and

	confirmation of the product. • To understand the purpose of green synthesis.

Course Content

1	Spectral Exercise	4- Credit
2	Preparation of organic compounds	
3	Green Synthesis	4- Credit
4	Viva-Voce	

1 Spectral Exercise (Minimum 10 from syllabus)

Structure interpretation of organic compounds from spectra (UV, IR, NMR and Mass)

2 Preparation of industrially important compounds (Minimum 8)

1. Sulfanilamide from via p-acetamido benzene sulphonyl chloride and acetamido benzene-sulfonamide.
2. Acridone from anthranilic acid via o-chloro benzoic acid and N-phenylanthranilic acid
3. Benzocaine from p-nitro toluene via p-nitro benzoic acid and p-amino benzoic acid.
4. Eosin from phthalic acid via phthalic anhydride and fluorescein.
5. Benzanilide from benzene via Benzophenone and Benzophenonoxime.
6. p-Nitro chloro benzene from acetanilide via p-nitro acetanilide and p-nitroaniline.
7. p-Chloro bromo benzene from acetanilide via p-bromo acetanilide and p-bromoaniline.
8. Anthrone from phthalic anhydride via o-benzoyl benzoic acid and anthraquinone.
9. 4-Methyl-7-hydroxy-8-acetyl coumarin from resorcinol via 4-methyl-7-hydroxycoumarin and 4-methyl-7-acetyl coumarin.
10. Preparation of Congo red dye from naphthionic acid via hydrozobenzene.
11. Preparation of o & p-hydroxyacetophenone from Aniline via phenol and phenylacetate.

3. Green Synthesis (Any Four)

1. Green approach for preparation of benzopinacolone from bezopinacol using iodine catalyst
2. Preparation of 1, 1-bis-2-naphthol under grinding at room temperature
3. Three component coupling reaction by green approach. (Synthesis of dihydropyrimidinone)
4. Green approach to Transesterification reaction (Synthesis of biodiesel)
5. Ecofriendly nitration of phenols and its derivatives using Calcium nitrate

Teaching-Learning Methodology	Introduction, interaction with students in calculation of mole ratios, carry out experiments at each step according to the respective practical, interpretation of spectra and deduce the structure.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the basics to carry out reactions, nature of reaction and calculation of mole ratio.
2.	Establish mechanism and monitoring reaction at specified reaction condition.
3.	Learn to work-up after the completion of reaction, purification.
4.	Confirmation of product through the references.
5.	Learn to interpret structure of organic compounds from given spectra.
6.	Understand the calculation with reference to respective factors.
7.	Appreciate good laboratory practices.

Suggested References:

Reference Books Recommended:

1. Vogel's Textbook of practical organic chemistry, 5th edition, B. S. Furniss, A. J. , P. W. G. Smith, A. R. Tatchell (Pearson Education).
2. Comprehensive practical organic chemistry: Preparation and Quantitative analysis, V. K. Ahluwalia, Renu Agarwal (Universities Press).
3. Monograph on Green Chemistry Laboratory Experiments by Green Chemistry Task Force Committee, DST

4. L. D. Field, S. Sternhell, J. R. Kalman - Organic Structures from Spectra-Wiley (2013)

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Physical Chemistry
M.Sc. Physical Chemistry, Semester IV
Paper 1

Course Code	[2003080204010004]	Title of the Course	Advanced chemical kinetics
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To learn theories of kinetics, statistical thermodynamic approach to theories of rate of reaction. • To learn kinetics of various complex reaction. • factors affecting kinetics of solution and gas phase reactions. • Study of concept of catalytic mechanism in terms of kinetics.

Course Content		
Unit	Description	Weightage* (%)
1.	Theories of Reaction Rates Arrhenius theory of reaction rates, collision theory of bimolecular gaseous reaction, limitations and extension of collision theory, Rate theories based on thermodynamics, rate theories based on statistical mechanics, conventional transition-state theory (CTST), statistical mechanics and chemical equilibrium, Derivation of the rate equation, Thermodynamic formulation of CTST, few Applications of CTST, Assumptions and limitation of CTST, Extension of CTST: Vibration CTST	25

2.	Reactions in Solution Phase and Gas Phase Solution Phase Reaction: Solvent effects on reaction rates, factors determining reaction rates in solution, reaction between ions, ion dipole and dipole-dipole reactions. Effect of ionic strength. Substituent and correlation effects – Hammett equation. Linear free energy relationship. Gas Phase Reaction: Theories of unimolecular gaseous reaction: Lindmann-Christiansen hypothesis, Hinshelwood treatment, Rice Ramsperger Kassel (RRK) theory, RRKM theory	25
3.	Kinetics of Catalysis and Adsorption Catalysis Characteristic and types of catalyst, Homogeneous and heterogeneous catalysis and their commercial processes, General catalytic mechanisms: Equilibrium treatment (Arrhenius Intermediates), Steady state treatment (Van't Hoff intermediates), Activation energies for catalysed reaction. Acid-base catalysis, General acid base catalysis, Mechanism of acid base catalysis, Bronsted catalysis law and acidity functions. Kinetics of Adsorption: Isotherm for simple, Dissociation, competitive adsorption, statistical thermodynamics of Adsorption, mechanism for unimolecular and bimolecular surface reaction.	25
4.	Kinetics of Complex Reactions Kinetics of (I) Reversible reaction: when first order reaction opposed by second order reaction, when second order reaction opposed by first order reaction, Second order reaction opposed by one of the same order (II) Parallel reaction (III) Feedback, non-linearity and Oscillation reactions: (i) The Lotka - Volterra mechanism (iii) The Brusselator mechanism (V) Explosion (VI) Photochemistry: Photo physical Processes, Fluorescence and Fluorescence Quenching, Measurement of, Fluorescence Resonance Energy Transfer (V) Electron transfer, Kinetic Model of Electron Transfer	25

Teaching-Learning Methodology	classroom teaching, use of e-resources, library, IT tools, encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	To learn statistical thermodynamic approach to chemical kinetics. The factors responsible for rate of reaction. Thermodynamic concept to understand the rate constant of the reaction
2.	Gives guidelines to understand control of reaction condition, increase reaction rate to increase production, effect of catalysis, slow down side reaction and improve separation process
3.	To learn about mechanism of various catalytic reactions Arrhenius and Vant Hoff concept of catalytic mechanism
4.	To learn about kinetics of control of solution and gas phase reaction.

Suggested References:

Reference Books Recommended:

1. Chemical Kinetics, Laidler K.J. TATAMcGRAW-HILL PUBLISHING COMPANY LTD
2. Principles of Chemical Kinetics, James E. House, Elsevier Publication
3. Kinetics and Mechanism of Chemical Transformations, Rajaraman, J. and Kuriacose, J., McMillan (2008)
4. Kinetics of chemical reactions, S.K. Jain, Vishal Publications
5. Engel, T. & Reid, P. Physical Chemistry, Pearson
6. Maron, S. & Prutton Physical Chemistry

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Physical Chemistry
M.Sc.Physical Chemistry, Semester IV
Paper I1

Course Code	[2003080204020004]	Title of the Course	Atomic Spectroscopy
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	● To understand the basic principles, theory and instrumentation of X ray Diffraction. ● To understand the concept of atomic absorption spectroscopy and Flame emission spectroscopy. ● To understand basic concept of Electron Spin Resonance Spectroscopy ● To provide basic theoretical understanding of Atomic Emission and Fluorescence Spectroscopy

Course Content		
Unit	Description	Weightage* (%)
1.	Atomic X-RAY Spectroscopy Emission of X-ray, continuum and line spectra, X-ray absorption, absorption spectra, Apparatus, Source (monochromatic X-ray), Sample handling, Wavelength and energy dispersive device, Detector, Chemical analysis by X-ray absorption, X-ray fluorescence: Theory, instrumentation and applications, X-ray diffraction: Theory, instrumentation and applications.	25

2.	Atomic Absorption and Flame Emission Spectroscopy (a) Atomic Absorption Spectroscopy (AAS) Principle of AAS, Instrument, Continuous sources and line sources, Flames, Flame atomizers, Non flame atomizers (furnaces), Monochromator and Detector, Interference with AAS Quantitative Analysis with AAS, Applications, Numerical. (b) Flame Emission Spectroscopy (FES) Flame as a source of atomic vapour, Flame atomization, Flame photometer, Applications and limitations comparison with AAS	25
3.	Electron Spin Resonance Spectroscopy Introduction, Factors affecting the g-value, Limitations of ESR, Difference between ESR and NMR, Instrumentation, Electron nucleus coupling, Hyperfine interactions-isotropic and anisotropic coupling constants, The spin Hamiltonian, Quantitative analysis, Sensitivity, Choice of solvent, applications of ESR, Study of free radicals, Electronic and Hyperfine splitting, Triplet states- zero field splitting and Krammer's degeneracy, Analytical applications of ESR, Structural determination by ESR, Study of inorganic compounds by ESR, Transition elements, Biological systems	25
4.	Atomic Emission and Fluorescence Spectroscopy Atomic Emission Spectroscopy: Emission spectroscopy with plasma sources, Instrument, AES with electrical discharge, Electrodes of AES, DC- arc, spark, Laser microprobe, Salient features of the emission spectrograph, Qualitative and Quantitative analysis applications, Fluorescence Spectroscopy: Atomic fluorescence, apparatus for AFS, EMR source for AFS, LASERS, Cells for AFS, Plasmas, Wavelength selection for AFS, Detectors for AFS, Theory of AFS, Analysis with AFS, Interference with AFS	25

Teaching-Learning Methodology	classroom teaching, use of e-resources, library, IT tools, encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the theory, instrumentation and important terms of Atomic X-RAY Spectroscopy. Identification of compound from X ray pattern
2.	learn instrumentation and important terms of AAS and FES in identification of metal ions in industrial effluents.
3.	To learn concept of Electron Spin Resonance Spectroscopy and Qualitative and quantitative applications of EPRS.
4.	To learn instrumentation, application of Atomic Emission and Fluorescence Spectroscopy
Suggested References:	

Reference Books Recommended:

1. Photometric and Fluorometric Methods of Analysis: F. D. Snell (John Wiley & Sons Inc., New York).
2. Instrumental Methods of Chemical Analysis: B. R. Sharma (Goel Publishing House, Meerut).
3. Electronic Absorption Spectroscopy and related techniques, D.N. Sathyanarayan, (New Age International ND. 1996) Uni. Press, Hyderabad.
4. Introduction to Spectroscopy (3rd ed.) by Pavia Lampman Kriz, Cengage Learning, Harcourt College Publishers.
5. Spectroscopy of Organic Compounds, P.S. Kalsi, 5th edition (New Age International Publishers)
6. Flame Emission and Atomic Absorption Spectrometry by Theodore C. Rains, John A. Dean
7. Atomic Absorption Spectrometry, Third Edition, Dr. Bernhard Welz, Dr. Michael Sperling

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Physical Chemistry
M.Sc. Physical Chemistry, Semester IV
Paper III

Course Code	[2003080204030001]	Title of the Course	Separation Techniques
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To understand the distribution law for separation of compound from solution. • To understand the types of chromatographic techniques. • To learn types and applications of liquid chromatography. • To learn about basics of solid phase extraction.

Course Content		
Unit	Description	Weightage* (%)
1.	Solvent Extraction Principal of solvent extraction, Nernst distribution law, Distribution coefficient, Equations for the solute dissociating or associating in one phase, limitations of distribution law, Application : partition chromatography, Distribution ratio, selectivity ratio, Successive extractions, Extraction of metal ion	25

	with chelating agent with necessary equation, Extraction involving association of ion pairs, extraction by solvation, types of Multiple extractions, multiple extraction with successive portion, basic concept, Apparatus and bi nominal distribution for Craig pseudo/ continuous counter current extractions. True counter current extraction: Fractional distillation, Use of crown ethers and Cryptans for extraction, extraction equilibria with crown ethers, factors affecting extraction with crown ether, numerical of distribution coefficient and multiple extraction.	
2.	Theory of Chromatography Methods of elution, Ideal and non-ideal chromatography, Plate theory, Rate theory, Reasons for broadening of bands, Van Deemter equation and significance of terms involved, Optimum velocity, Resolution, Methods to improve resolution, GLC, Supports for liquid stationary phases, Selection of columns, FID, Selective Detectors- FID, TID, Temperature programming in GC, Derivatisation in GC, Qualitative analysis from retention parameters, Quantitative analysis, Headspace Analysis, Thermal Desorption.	25
3.	Liquid Chromatography (a) Ion-exchange Chromatography: Resins used, Principle of exchange, Factors affecting the exchange, Capacity of resin and its determination, Techniques, IEC with eluent suppressor columns, Applications. (b) Gel-permeation Chromatography: Principle, Types of gels, Theoretical principles, Techniques and applications. (c) Adsorption Chromatography: Principle, column packings, adsorbents, mobile phase, technique of separation,	25

	detectors, identification of compounds, applications, Chiral Chromatography. (d) Affinity Chromatography: Introduction, classification, column matrices, affinity ligands, elution methods, applications.	
4.	Solid Phase Extraction and Micro Extraction (a) Solid Phase extraction (SPE): Introduction, Types of SPE media, SPE formats and apparatus, method for SPE operation, solvent selection, factors affecting SPE, selected methods of analysis for SPE, Automation and On-Line SPE (b) Solid phase micro-extraction (SPME): Introduction, theoretical considerations, experimental, Methods of analysis: PMEGC, Methods of analysis: SPME-HPLC-MS, Automation of SPME, New development in micro extraction (liquid micro extraction, membrane micro extraction). Development in micro extraction (liquid micro extraction, membrane micro extraction)	25

Teaching-Learning Methodology	Classroom teaching, use of e-resources, library, IT tools encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	The concept of separation of compounds from solution using the partition law. Application of extracting agents and use of various solvents for the same
2.	Understand the basics of chromatography, factors affecting chromatography and its application in separation and purification of compounds
3.	Learn the principle and application of liquid chromatography for separation of proteins, small organic compounds. Choice of mobile and stationary phases
4.	Learn the concept of micro extraction for the separation of compounds

Suggested References:

Reference Books Recommended:

1. Introduction to instrumental analysis –R.D.Brown, McGraw Hill (1987)
2. D. A. Skoog, D.M. West, F.J. Holler and S.R. Crouch, Fundamentals of Analytical Chemistry, 8th Edition, Brooks/Cole, Thomson Learning, Inc., USA, 2004
3. Vogel's Textbook of Quantitative Chemical Analysis, 6th Edn. Pearson Education Ltd.
4. Beginners Guide to Liquid Chromatography by Waters Corporation
5. Instrumental methods of chemical analysis – H.Willard, L.Merrit, J.A. Dean and F.A. Settle. Sixth edition CBS (1986)
6. Introduction to Modern Liquid Chromatography, Lloyd R. Snyder, Joseph J. Kirkland, John W. Dolan
7. Chemical Separations: Principles, Techniques and Experiments, by Clifton E. Meloon

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Physical Chemistry
M.Sc.Physical Chemistry, Semester IV
Paper IV

Course Code	[2003080204040004]	Title of the Course	Polymer Chemistry
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	● To understand thermodynamics of polymer dissolution, theories of dissolution, factor affecting dissolution of polymer. ● To learn about crystallinity and structure of polymer in solution. ● To understand fractionalization and synthesis of polymers ● To understand degradation of polymer.

Course Content		
Unit	Description	Weightage* (%)
1.	Solution Behaviour of Polymer Solution Criteria for polymer dissolution, Factors affecting swelling and dissolution: Effect of molecular weight and degree of crystallinity on dissolution, Size and shape of polymer molecules in solution, Thermodynamics aspects of polymer dissolution, cohesive energy density, Solubility parameter and its uses and determination, Flory-Huggins theory, Enthalpy of mixing, ΔS , ΔH and ΔG of mixing, Thermodynamics of dilute polymer solution, vapour pressure, Phase equilibria and phase separations in polymer solutions, Flory interaction parameter and determination. Unperturbed dimensions of polymer coil, Good/poor/theta and non-solvents, Viscosity of polymer solutions and the size of polymer coil, Effect of molecular weight on viscosity, determination of intrinsic viscosity in theta conditions.	25

	Concentrated polymer solutions and physical gelation, Newtonian & Non-Newtonian solutions.	
2.	Characterisation of Amorphous and Crystalline Polymers Thermal stability and thermal transitions in polymers, Melting versus glass transition, Glass transition temperature, its cause and importance, Relation between T_g and T_m, Factors affecting glass transition temperature: Chain flexibility, effect of plasticizers, blending and copolymerization of T_g, Determination of glass transition method by dilatometry, Crystalline polymers, Fringe micelle model, Factors affecting polymer crystallinity, Degree of crystallinity in polymers, Polymer crystallization, Spherulites and crystallites, Polymer single crystals, Chain folding during crystal formation, Crystallizability and crystallinity, Effect of crystallinity on properties of polymer.	25
3.	Copolymerization and Fractionation Kinetics of free radical copolymerization, reactivity ratios and their determination, Mayo-Lewis method, Fineman-Ross method, Disadvantages of F-R method, Kelen-Tudos (K-1) method, Reactivity in copolymerization: Alfrey & Price method, Prediction of copolymer composition, Ionic copolymerization, copolycondensation, Ideal, alternate & azeotropic copolymerization, Graft and block copolymers, Polymer mixtures: IPNs, Composites, Blends and Alloys, Polymer Fractionation: fractional precipitation techniques, partial dissolution technique, gradient elution technique, GPC technique	25
4.	Polymer Degradation and Reactions Polymer degradation: Definition, Types: thermal, mechanical, degradation by ultrasonic waves, photo degradation, degradation	25

	by high-energy radiations, oxidative and hydrolytic degradation Polymer reactions: Hydrolysis, acetolysis, aminolysis, hydrogenation, addition and substitution reaction, reaction of various specific groups, cyclization reaction and cross linked reactions, reaction leading to graft and block copolymers, miscellaneous reactions	

Teaching-Learning Methodology	Classroom teaching, use of e-resources, library, IT tools, encourages students to participate in seminars/ workshops, presentations by students, assignment etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand various thermodynamic function responsible for dissolution of polymer. Flory parameter for solubility and Flory Huggins theory of dissolution.
2.	Learn the techniques for polymer fractionation. Understand the kinetics of copolymerization for their synthesis.
3.	Learn life cycle of various polymers, types of polymer degradation and factors affecting polymer degradation.
4.	Synthesis of different polymers.

Suggested References:

1. Principles of Polymer Science: P. Bahadur & N. V. Sastry, Narosa.
2. Polymer Science – Gowarikar et al New Ages International
3. Seymour/Carraher's Polymer Chemistry Charles E. Carraher Jr Marcel Dekker
4. Textbook of Polymer Science, J. W. Billmeyer, John Wiley & Sons.
5. Physical Chemistry of Macromolecules, C. Tanford, John Wiley & Sons.
6. Macromolecules in Solution, H. Morowitz, Interscience Publ.
7. Introduction to Polymer, R. J. Young, Chapman & Hall.

On-line resources to be used if available as reference material

On-line Resources

Master of Science, Physical Chemistry
M.Sc. Physical Chemistry, Practicals
Semester - IV

Course Code	[2003080204050001]	Title of the Course	
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To impart basic knowledge for preparation of solution and instrumental set up for the experiments. • Understand theories of the experiments • To learn about the interpretation of results and graphical representation of results. • To understand the purpose of experiments to meet the objectives of the experiments.

Course Content

1	Full Experiment (instrumental/ non instrumental)	4- Credit
2	Half experiment (instrumental)	
3	Half experiment (non instrumental)	4- Credit
4	Viva-Voce	

FULL EXPERIMENT (Any Seven)

1. Determination of the primary salt effect on the kinetics of ionic reactions (Persulphate-iodide reaction) by isolation method.
2. To calculate the surface area of adsorbed molecule in a monolayer, CMC, effectiveness from surface tension measurements of aqueous solutions of surfactant.
3. Determinations of pKa value of acid-base Methyl red indicator by spectrophotometry.
4. To carryout fractionation of a polydispersed polymer by viscosity method
5. Ion exchange separation of Fe^{+3} and Co^{+2} and determination of Fe^{+3} spectrophotometrically.
6. Determine partition function of two organic compounds in ether – water system and find out molecular condition of organic compound in ether.
7. Determine equilibrium constant of reversible reaction between Ag^{+2} and CaSO_4
8. Determine relative strength of two acids (HCl and H_2SO_4) and study hydrolysis of ester.
9. Potentiometric titration of halide mixture of KCl , KBr , KI against std. AgNO_3 solution

HALF EXPERIMENT (Any Seven)

1. Determination of rate constant, order of reaction and energy of activation for saponification of ethyl acetate by sodium hydroxide conductometrically.
2. Spectrophotometric determination of - Cobalt and Chromium.
3. Photometric titration of iron-EDTA.
4. Investigate the formation of complex between nickel and o-phenantroline using spectrophotometer.
5. Determination of dissociation constant of a buffer pH-metrically

6. To determine the degree of hydrolysis and hydrolysis constant for the hydrolysis of aniline hydrochloride by conductance method.
7. Determination of Ca^{+2} and Cu^{+2} in a mixture using EDTA titration spectrophotometrically.
8. To determine the % purity of aspirin sample tablet
9. Estimate concentration of H_2SO_4 , CH_3COOH and $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ by conductometric titration with NaOH Solution

Teaching-Learning Methodology	Introduction, explanation of theory and procedure of the experiments and interpretation of results

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand preparation of solutions.
2.	Qualitative analysis of compound
3.	calculate the concentration of unknown solution by pH, potentiometer and colorimeter
4.	Understand behaviour of surfactant and polymer
5.	Separation of compounds using different solvent systems
6.	Theories of indicators

Suggested References:

Reference Books Recommended:

1. Advanced Practical Physical Chemistry by Yadav J. B., Krishna Prakashan Media
2. Practical Physical Chemistry, Dr. M. Satish Kumar Sankalp Publication
3. Gurtu, J. N., Kapoor, R., Advanced Experimental Chemistry S. Chand & Co. Ltd.
4. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Pearson

On-line resources to be used if available as reference material

On-line Resources

Master of Science, Analytical Chemistry
M.Sc. Analytical Chemistry, Semester IV
Paper 1

Course Code	[2003080204010001]	Title of the Course	Advance analytical techniques
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	● To learn the basic concept, theory, principles and instrumentation of electron spectroscopy and microscopic techniques which applied for characterization of alloys and surface morphology of compounds. ● To understand the principles, instrumentation of advanced chromatography and extraction techniques and also learn the comparison and application in the various fields. ● Role of various electrophoresis techniques in the separation of ions in analytical chemistry, importance of micellar electrokinetic chromatography and application in separation of protein and amino acids. ● Study of combination of two techniques and their advantages over single techniques and their application in various fields.

Course Content		
Unit	Description	Weightage* (%)
1.	ELECTRON SPECTROSCOPY AND MICROSCOPY Introduction, Types of surface measurements, General techniques in surface spectroscopy, Sampling surfaces, Surface contamination, X-ray Photo electron spectroscopy- Principle instrumentation and Application. Auger electron Spectroscopy- Principles, Instrumentation, application. Ion, laser and electron microprobe spectrometry, Application, Electron Microscope, SEM, STM and AFM, Numerical	25
2.	ADVANCED CHROMATOGRAPHY AND EXTRACTION Supercritical Fluid Chromatography (SFC): Properties of supercritical fluid, Instrumentation and operating variables like effect of pressure, stationary phase, mobile phase, detectors, comparison with other chromatography, application. Super Critical fluid extraction: Introduction, Advantages, Instrumentation, Choice of SFC, Offline and Online Extraction, Application, Numerical	25
3.	ELECTROPHORESIS AND ELECTRO CHROMATOGRAPHY Definition, types, Free solution electrophoresis, Moving boundar electrophoresis, Zone electrophoresis, paper electrophoresis, types of stabilizing medium, location of components, electrode, source of current, requirement of electrophoretic chamber, Immuno electrophoresis Continuous (Curtain) flow electrophoresis, Gel electrophoresis. Capillary Electrophoresis, Column, Electro Chromatography, Field Flow Fraction (FFF), Micellar electrokinetic capillary Chromatography, Application.	25
4.	HYPHENATED TECHNIQUES AND AUTO ANALYSER MS-FTIR, ICP-MS, GC- MS, LC-MS, MS-MS, Tandem Mass Spectra, GC-FTIR. TG- FTIR, TG-MS. Auto analyser: Need for auto analyser, Instrument used in clinical laboratory, Flow Injection Analysis, Micro Fluid Disk, Discreet Automatic System, Oxygen Analyser	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library books, IT tools, encouraging students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand fundamental & theory electron spectroscopy and microscopy. Learn the interaction of electron with matter, with different surfaces and its contaminations. Understand the working of microscope to find out the morphology of surfaces.
2.	Learn the advancement in chromatography with use of supercritical fluid CO ₂ , learn selection of stationary phase as well condition in operating, understand the online and offline extraction with super critical fluid.
3.	Understand fundamental concepts of the separation of charged particles, amino acids, ions with different electrophoresis techniques, learn the separation of molecules with the help of field Flow Fraction.
4.	Understand limitation of single technique and advantages of hyphenated techniques over it, learn the need of auto analyser for clinical analysis, types of analysis.

Suggested References:

1. Vogel's Text book Quantitative Chemical Analysis 5th edition by G.H.Jeffery, J. Bassett, J. Mendham, R.C. Denney.
2. Principles of Instrumental Analysis: D.A. Skoog, Holler and Crouch (Cengage learning, 7th edition)
3. Principle of Activation Analysis- P. Kruger, John Wiley and sons, (1971).
4. Nuclear Analytical Chemistry – J. Tolgyessy and S. Verga vol. 2, university Park press,(1972)

5. Radiochemistry and Nuclear methods – W.D. Ehmann and D.E. Vance, John Wiley and Sons.
6. Indian Pharmacopeia Volume I and II.
7. Extraction technique in analytical science, John R. Dean, Wiley (2009)
8. Standard methods of chemical analysis, Sixth Edition, F.J. Welcher.
9. Quantitative Inorganic Analysis including Elementary Instrumental analysis, By A. I. Vogel, 3ed, ELBS, 1964.
10. Instrumental Analysis: G. D. Caristian and J. E. O'Reilly (Allyn & Bacon Inc., New York, 2nd edition.
11. Instrumental Methods of Chemical Analysis: G. W. Ewing (McGraw-Hill, New York), 5th edition.
12. Instrumental Methods of Analysis: H. R. Willard, L. L. Merrit, J. A. Dean, F. A. Settle (Van Nostrand Reinhold Co., New York), 6 th edition.
13. Modern Methods of Chemical Analysis: Pecsok, Shield & Cairns (John Wiley), 2nd edition.
14. Introduction to Instrumental Analysis (1987), R. D. Braun (McGraw-Hill Book Company), New Delhi.
15. Analytical Chemistry: Principles and Techniques: Larry G. Hargis (Prentice-Hall International edition).
16. Introduction to Modern Liquid Chromatography: L. R. Snyder & J. J. Kirkland (John Wiley & Sons, New York).
17. Treatise on Analytical Chemistry: I. M. Kolthoff & P. J. Elving (John Wiley & Sons, New York).
18. Handbook of Analytical Chemistry: L. Meites (McGraw-Hill, New York).
19. Basic concepts of Analytical Chemistry by S.M. Khopker
20. Standard Methods of Chemical Analysis: Vol. I & II (6th edition), D. Van Nostrand Co. Inc. (London).
21. Official Methods of Analysis: Published by Association of Official Analytical Chemists, Washington.
22. Instrumental Methods of Chemical Analysis: B. K. Sharma (Goel Publishing House, Meerut).
23. Instrumental methods of Chemical Analysis by H. Kaur.
24. Environmental Chemistry: B. R. Sharma, H. Kaur (Goel Publishing House, Meerut).
25. Inorganic Quantitative Analysis: A. I. Vogel (Orient Longman).
26. "Polarography", J. D. Talati (In Gujarati), University Granth Nirman Board.
27. "Polarography": Kolthoff I. M. and Lingane J. J. (Vol. I & II) (Interscience Publishers, New York).
28. "Polarographic Techniques": L. Meites (Interscience Publishers, New York).
29. Principles of Instrumental Analysis (5th ed.) by Skoog, Holler and Nieman (Saunders College Publishings).
30. Undergraduate Instrumental Analysis (5th ed.), J. W. Robinson (Marcel Dekker Inc.).
31. Fundamentals of Molecular Spectroscopy, by Banwell.
32. Electronic Absorption Spectroscopy and related techniques, D.N. Sathyanarayan, (New Age International ND. 1996) Uni. Press, Hyderabad.
33. Introduction to Spectroscopy (3rd ed.) by Pavia Lampman Kriz, Cengage Learning Harcourt College Publishers

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Analytical Chemistry
M.Sc. Analytical Chemistry, Semester IV
Paper II

Course Code	[2003080204020004]	Title of the Course	Atomic Spectroscopy
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To understand and familiarize the basic principles, theory and instrumentation of atomic X-ray spectroscopy, to impart knowledge in theory and principles of spectroscopy, spectroscopic technique for characterization and differentiation of various elements/ions. • To understand and familiarize the basic principles, theory and instrumentation of absorption and emission spectroscopy, to impart knowledge in theory and principles of spectroscopy, spectroscopic technique for characterization and differentiation of various elements/ions. • To understand and familiarize the basic principles, theory and instrumentation of ESR spectroscopy, to impart knowledge in theory and principles of spectroscopy, spectroscopic technique for characterization and differentiation of various elements/ions. • To understand and familiarize the basic principles, theory and instrumentation of emission and fluorescence, to impart knowledge in theory and principles of spectroscopy, spectroscopic technique for characterization and differentiation of various elements/ions.

Course Content		
Unit	Description	Weightage* (%)
1.	ATOMIC X-RAY SPECTROSCOPY Emission of X-ray, continuum and line spectra, X-ray absorption, absorption spectra, Apparatus, Source (monochromatic X-ray), Sample handling, Wavelength and energy dispersive device, Detector, Chemical analysis by X-ray absorption, X-ray fluorescence: Theory, instrumentation and applications, X-ray diffraction: Theory, instrumentation and applications.	25
2.	ATOMIC ABSORPTION AND FLAME EMISSION SPECTROSCOPY a) Atomic Absorption Spectroscopy (AAS) Principle of AAS, Instrument, Continuous sources and line sources, Flames, Flame atomizers, Non flame atomizers (furnaces), Monochromator and Detector, Interference with AAS Quantitative Analysis with AAS, Applications, Numerical. (b) Flame Emission Spectroscopy (FES) Flame as a source of atomic vapour, Flame atomization, Flame photometer, Applications and limitations comparison with AAS	25
3.	ELECTRON SPIN RESONANCE SPECTROSCOPY Introduction, Factors affecting the g-value, Limitations of ESR, Difference between ESR and NMR, Instrumentation, Electron nucleus coupling, Hyperfine interactions-isotropic and anisotropic coupling constants, The spin Hamiltonian, Quantitative analysis, Sensitivity, Choice of solvent, applications of ESR, Study of free radicals, Electronic and Hyperfine splitting, Triplet states- zero field splitting and Krammer's degeneracy, Analytical applications of ESR, Structural determination by ESR, Study of inorganic compounds by ESR, Transition elements, Biological systems	25

4.	ATOMIC EMISSION AND FLUORESCENCE SPECTROSCOPY Atomic Emission Spectroscopy: Emission spectroscopy with plasma sources, Instrument, AES with electrical discharge, Electrodes of AES, DC- arc, spark, Laser microprobe, Salient features of the emission spectrograph, Qualitative and Quantitative analysis applications, Fluorescence Spectroscopy: Atomic fluorescence, apparatus for AFS, EMR source for AFS, LASERS, Cells for AFS, Plasmas, Wavelength selection for AFS, Detectors for AFS, Theory of AFS, Analysis with AFS, Interference with AFS.	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library books, IT tools, encouraging students to participate in seminars/ workshops, presentations by students, assignments etc.

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand fundamental & theory of atomic x-ray spectroscopy, learn the interaction of x-ray with matter, understand the difference between two techniques. Understand the use of x-ray spectroscopy for qualitative and quantitative analysis.
2.	Understand fundamental & theory of atomic absorption and emission spectroscopy, learn the phenomenon involved in absorption and emission, understand the use of absorption and emission spectroscopy for qualitative and quantitative analysis.
3.	Understand fundamental & theory of ESR spectroscopy, learn the difference between ESR and NMR, coupling constant and spin of signal, application in inorganic chemistry.
4.	Understand fundamental & theory of atomic fluorescence and emission spectroscopy, learn the phenomenon involved in fluorescence and emission, understand the use of fluorescence and emission spectroscopy for qualitative and quantitative analysis.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written Examination (As per CBCS R.6.8.3)	30%
3.	University Examination	70%

Reference Books:

1. Vogel's Text book Quantitative Chemical Analysis 5th edition by G.H.Jeffery, J. Bassett, J. Mendham, R.C. Denney.
2. Principles of Instrumental Analysis: D.A. Skoog, Holler and Crouch (Cengage learning, 7th edition)
3. Principle of Activation Analysis- P. Kruger, John Wiley and sons, (1971).
4. Nuclear Analytical Chemistry – J. Tolgyessy and S. Verga vol. 2, university Park press,(1972)
5. Radiochemistry and Nuclear methods – W.D. Ehmann and D.E. Vance, John Wiley and Sons.
6. Indian Pharmacopeia Volume I and II.
7. Extraction technique in analytical science, John R. Dean, Wiley (2009)
8. Standard methods of chemical analysis, Sixth Edition, F.J. Welcher.
9. Quantitative Inorganic Analysis including Elementary Instrumental analysis, By A. I. Vogel, 3ed, ELBS, 1964.
10. Instrumental Analysis: G. D. Caristian and J. E. O'Reilly (Allyn & Bacon Inc., New York, 2nd edition.
11. Instrumental Methods of Chemical Analysis: G. W. Ewing (McGraw-Hill, New York), 5th edition.
12. Instrumental Methods of Analysis: H. R. Willard, L. L. Merrit, J. A. Dean, F. A. Settle (Van Nostrand Reinhold Co., New York), 6 th edition.
13. Modern Methods of Chemical Analysis: Pecsok, Shield & Cairns (John Wiley), 2nd edition.
14. Introduction to Instrumental Analysis (1987), R. D. Braun (McGraw-Hill Book Company), New Delhi.
15. Analytical Chemistry: Principles and Techniques: Larry G. Hargis (Prentice-Hall International edition).
16. Introduction to Modern Liquid Chromatography: L. R. Shyder & J. J. Kirkland (John Wiley & Sons, New York).
17. Treatise on Analytical Chemistry: I. M. Kohthoff & P. J. Elving (John Wiley & Sons, New York).
18. Handbook of Analytical Chemistry: L. Meites (McGraw-Hill, New York).
19. Basic concepts of Analytical Chemistry by S.M. Khopker
20. Standard Methods of Chemical Analysis: Vol. I & II (6th edition), D. Van Nostrand Co. Inc. (London).
21. Official Methods of Analysis: Published by Association of Official Analytical Chemists, Washington.

22. Instrumental Methods of Chemical Analysis: B. K. Sharma (Goel Publishing House, Meerut).
23. Instrumental methods of Chemical Analysis by H. Kaur.
24. Environmental Chemistry: B. R. Sharma, H. Kaur (Goel Publishing House, Meerut).
25. Inorganic Quantitative Analysis: A. I. Vogel (Orient Longman).
26. "Polarography", J. D. Talati (In Gujarati), University Granth Nirman Board.
27. "Polarography": Kolthoff I. M. and Lingane J. J. (Vol. I & II) (Interscience Publishers, New York).
28. "Polarographic Techniques": L. Meites (Interscience Publishers, New York).
29. Principles of Instrumental Analysis (5th ed.) by Skoog, Holler and Nieman (Saunders College Publishings).
30. Undergraduate Instrumental Analysis (5th ed.), J. W. Robinson (Marcel Dekker Inc.).
31. Fundamentals of Molecular Spectroscopy, by Banwell.
32. Electronic Absorption Spectroscopy and related techniques, D.N. Sathyanarayan, (New Age International ND. 1996) Uni. Press, Hyderabad.
33. Introduction to Spectroscopy (3rd ed.) by Pavia Lampman Kriz, Cengage Learning Harcourt College Publishers

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Analytical Chemistry
M.Sc. Analytical Chemistry, Semester IV
Paper 1II

Course Code	[2003080204030001]	Title of the Course	Separation Techniques
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	- To understand the distribution of liquid in two immiscible liquid, to impart the knowledge of doing extraction of different compounds and their application. - To understand the theory behind the separation of molecules by chromatography, various factors affecting separation and their solution, application the theory in validation of the results obtained.

	• To learn principles, theory and instrumentation of various liquid chromatography techniques such as gel and ion exchange, adsorption and affinity, their application in identification/separation of compounds. • To learn theory and concepts of the extraction of molecules from solid surfaces as well as their application and limitation.

Course Content		
Unit	Description	Weightage* (%)
1.	SOLVENT EXTRACTION Principal of solvent extraction, Nernst distribution law, Distribution coefficient, Equations for the solute dissociating or associating in one phase, limitations of distribution law, Application : partition chromatography, Distribution ratio, selectivity ratio, Successive extractions, Extraction of metal ion with chelating agent with necessary equation, Extraction involving association of ion pairs, extraction by solvation, types of Multiple extractions, multiple extraction with successive portion, basic concept, Apparatus and bi nominal distribution for Craig pseudo/ continuous counter current extractions. True counter current extraction: Fractional distillation, Use of crown ethers and Cryptans for extraction, extraction equilibria with crown ethers, factors affection extraction with crown ether, numerical of distribution coefficient and multiple extraction	25
2.	THEORY OF CHROMATOGRAPHY Methods of elution, Ideal and non-ideal chromatography, Plate theory, Rate theory, Reasons for broadening of lands, Van Deemter equation and significance of terms involved, Optimum velocity, Resolution, Methods to improve resolution, GLC, Supports for liquid stationary phases, Selection of columns, FSOT, Selective Detectors- FPB, TID, Temperature programming in GC, Derivatisation in GC, Qualitative analysis from retention parameters, Quantitative analysis, Headspace Analysis, Thermal Desorption.	25

3.	LIQUID CHROMATOGRAPHY (a) Ion-exchange Chromatography: Resins used, Principle of exchange, Factors affecting the exchange, Capacity of resin and its determination, Techniques, IEC with eluent suppressor columns, Applications. (b) Gel-permeation Chromatography: Principle, Types of gels, Theoretical principles, Techniques and applications. (c) Adsorption Chromatography: Principle, column packings, adsorbents, mobile phase, technique of separation, detectors, identification of compounds, applications, Chiral Chromatography. (d) Affinity Chromatography: Introduction, classification, column matrices, affinity ligands, elution methods, applications.	25
4.	SOLID PHASE EXTRACTION AND MICRO EXTRACTION (a) Solid Phase extraction (SPE): Introduction, Types of SPE media, SPE formats and apparatus, method for SPE operation, solvent selection, factors affecting SPE, selected methods of analysis for SPE, Automation and On-Line SPE (b) Solid phase micro-extraction (SPME): Introduction, theoretical considerations, experimental, Methods of analysis: PMEGC, Methods of analysis: SPME-HPLC-MS, Automation of SPME, New development in micro extraction (liquid micro extraction, membrane micro extraction).	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library books, IT tools, encouraging students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand fundamental and principles of solvent extraction, basic theory of distribution law, use of the extraction techniques for cryptons and crown ethers, working of Craig vessels extractions.
2.	Understand fundamental & theory involved in the separation of compound by chromatographic techniques, reason behind the band broadening and their resolution, use of chromatography for qualitative and quantitative analysis.
3.	Understand the separation of different types of molecules with the help of different chromatographic techniques, choice of different stationary phase and mobile phase and application of chromatography.
4.	Understand fundamental & theory of solid phase extraction, factors affecting the extraction, techniques involved in extraction and their application.

Suggested References:

1. Vogel's Text book Quantitative Chemical Analysis 5th edition by G.H.Jeffery, J. Bassett, J. Mendham, R.C. Denney.
2. Principles of Instrumental Analysis: D.A. Skoog, Holler and Crouch (Cengage lerning, 7th edition)
3. Principle of Activation Analysis- P. Kruger, John Wiley and sons, (1971).
4. Nuclear Analytical Chemistry – J. Tolgyessy and S. Verga vol. 2, university Park press,(1972)
5. Radiochemistry and Nuclear methods – W.D. Ehmann and D.E. Vance, John Wiley and Sons.
6. Indian Pharmacopeia Volume I and II.
7. Extraction technique in analytical science, John R. Dean, Wiley (2009)
8. Standard methods of chemical analysis, Sixth Edition, F.J. Welcher.
9. Quantitative Inorganic Analysis including Elementary Instrumnetal analysis, By A. I. Vogel, 3ed, ELBS, 1964.

10. Instrumental Analysis: G. D. Caristian and J. E. O'Reilly (Allyn & Bacon Inc., New York, 2nd edition.
11. Instrumental Methods of Chemical Analysis: G. W. Ewing (McGraw-Hill, New York), 5th edition.
12. Instrumental Methods of Analysis: H. R. Willard, L. L. Merrit, J. A. Dean, F. A. Settle (Van Nostrand Reinhold Co., New York), 6 th edition.
13. Modern Methods of Chemical Analysis: Pecsok, Shield & Cairns (John Wiley), 2nd edition.
14. Introduction to Instrumental Analysis (1987), R. D. Braun (McGraw-Hill Book Company), New Delhi.
15. Analytical Chemistry: Principles and Techniques: Larry G. Hargis (Prentice-Hall International edition).
16. Introduction to Modern Liquid Chromatography: L. R. Shyder & J. J. Kirkland (John Wiley & Sons, New York).
17. Treatise on Analytical Chemistry: I. M. Kolthoff & P. J. Elving (John Wiley & Sons, New York).
18. Handbook of Analytical Chemistry: L. Meites (McGraw-Hill, New York).
19. Basic concepts of Analytical Chemistry by S.M. Khopker
20. Standard Methods of Chemical Analysis: Vol. I & II (6th edition), D. Van Nostrand Co. Inc. (London).
21. Official Methods of Analysis: Published by Association of Official Analytical Chemists, Washington.
22. Instrumental Methods of Chemical Analysis: B. K. Sharma (Goel Publishing House, Meerut).
23. Instrumental methods of Chemical Analysis by H. Kaur.
24. Environmental Chemistry: B. R. Sharma, H. Kaur (Goel Publishing House, Meerut).
25. Inorganic Quantitative Analysis: A. I. Vogel (Orient Longman).
26. "Polarography", J. D. Talati (In Gujarati), University Granth Nirman Board.
27. "Polarography": Kolthoff I. M. and Lingane J. J. (Vol. I & II) (Interscience Publishers, New York).
28. "Polarographic Techniques": L. Meites (Interscience Publishers, New York).
29. Principles of Instrumental Analysis (5th ed.) by Skoog, Holler and Nieman (Saunders College Publishings).
30. Undergraduate Instrumental Analysis (5th ed.), J. W. Robinson (Marcel Dekker Inc.).
31. Fundamentals of Molecular Spectroscopy, by Banwell.
32. Electronic Absorption Spectroscopy and related techniques, D.N. Sathyanarayan, (New Age International ND. 1996) Uni. Press, Hyderabad.
33. Introduction to Spectroscopy (3rd ed.) by Pavia Lampman Kriz, Cengage Learning Harcourt College Publishers

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Analytical Chemistry
M.Sc. Analytical Chemistry, Semester IV
Paper IV

Course Code	[2003080204040001]	Title of the Course	Applied Analysis
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To understand basic concepts of soaps, detergents and alloys, their properties and analysis of various elements present in them by various methods. • To understand basic concepts of pesticides and fertilizer, their properties and analysis of various compounds and elements present in pesticides and fertilizer by various methods. • To understand basic concepts of drug products, types of drugs and capsules, their properties and analysis of various drug present in markets by various methods. • To understand basic concepts of vitamins, their properties and analysis of various vitamins by different methods.

Course Content		
Unit	Description	Weightage* (%)
1.	ANALYSIS OF SOAPS, DETERGENTS AND ALLOYS Soaps and Detergents: Classification of detergents, Action of detergents, Determination of alcohol soluble materials, moisture, active constituents, silicates, phosphates, borates etc. Alloys: Analysis of brass, German silver, stainless steel. Bronze, Ferromanganese, Alloys of Al, Mg and Ti (Emphasis should be given on major constituent and instrumental methods such as AAS, molecular spectrophotometry, fluorescence, emission, spectroscopy for analysis of trace elements).	25
2.	ANALYSIS OF PESTICIDE AND FERTILIZER Pesticides: Analysis of Benzene hexachloride, Analysis of DDT in mixture by colorimetric methods, Determination of Dieldrin in formulation by partition chromatography, Total phosphorous in	25

	phosphorous containing pesticides, Determination of traces of pesticides using GC and HPLC, Determination of Aldrin using IR spectrophotometry. Fertilizer: Sampling and sample preparation, water, total nitrogen by Kjeldahl method, total nitrogen by reduced iron method, Urea nitrogen by urease methods, Total phosphorous by differential spectroscopic methods, water soluble phosphorous, Potassium: potassium by flame photometric methods, Acid –base forming quantity of Fertilizer.	
3.	ANALYSIS OF DRUG PRODUCT Analytical methods for the following- Tablets, different types of tablets, uniformity in weight (aspirin) additives used in tablet manufacture, capsules, types of capsules, Identification, assay and Test: Rifampicin capsule, Sodium benzoate Powders, Sodium Chloride Injection, barium sulphate Suspensions, Mouthwashes (Ointments (salicylic acid) and creams Dimethicone by IR) Mannitol Injections, Sulphacetamide Eye Drops, Salbutamol Inhalation, Penicillin, Problems based on assay of these materials.	25
4.	ANALYSIS OF VITAMINS Carr-price method of Vitamin A, Spectroscopic method for Vitamin D, Determination of total assay Vitamin E, Stability study of Vitamin K₃, Determination of Vitamin B₁, Determination of Assay of Vitamin B₂ by fluorometric method, Determination of Nicotinic Acid by cyanogen bromide method, Determination of Nicotinamide by cyanogen bromide method, Determination of Pyridoxine by Non-aqueous titration method, Spectroscopic determination of Vitamin B₁₂, Folic Acid by colorimetric method, Ascorbic Acid by iodate titration method	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library books, IT tools, encouraging students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand fundamental & theory of the sources and available contents in alloys and surfactants. Also learn the different approaches and classical as well as instrumental techniques used for the analysis.
2.	Understand fundamental & theory of the sources and available contents in fertilizer and pesticides. Also learn the different approaches and classical as well as instrumental techniques used for the analysis.
3.	Understand fundamental & theory of the drugs and capsules. Also learn the different approaches and classical as well as instrumental techniques used for the analysis.
4.	Understand fundamental & theory of the sources of vitamins. Also learn the different approaches and classical as well as instrumental techniques used for the analysis.

Suggested References:

1. Vogel's Text book Quantitative Chemical Analysis 5th edition by G.H.Jeffery, J. Bassett, J. Mendham, R.C. Denney.
2. Principles of Instrumental Analysis: D.A. Skoog, Holler and Crouch (Cengage learning, 7th edition)
3. Principle of Activation Analysis- P. Kruger, John Wiley and sons, (1971).
4. Nuclear Analytical Chemistry – J. Tolgyessy and S. Verga vol. 2, university Park press,(1972)
5. Radiochemistry and Nuclear methods – W.D. Ehmann and D.E. Vance, John Wiley and Sons.
6. Indian Pharmacopeia Volume I and II.
7. Extraction technique in analytical science, John R. Dean, Wiley (2009)
8. Standard methods of chemical analysis, Sixth Edition, F.J. Welcher.
9. Quantitative Inorganic Analysis including Elementary Instrumental analysis, By A. I. Vogel, 3ed, ELBS, 1964.
10. Instrumental Analysis: G. D. Caristian and J. E. O'Reilly (Allyn & Bacon Inc., New

- York, 2nd edition.
11. Instrumental Methods of Chemical Analysis: G. W. Ewing (McGraw-Hill, New York), 5th edition.
 12. Instrumental Methods of Analysis: H. R. Willard, L. L. Merrit, J. A. Dean, F. A. Settle (Van Nostrand Reinhold Co., New York), 6 th edition.
 13. Modern Methods of Chemical Analysis: Pecsok, Shield & Cairns (John Wiley), 2nd edition.
 14. Introduction to Instrumental Analysis (1987), R. D. Braun (McGraw-Hill Book Company), New Delhi.
 15. Analytical Chemistry: Principles and Techniques: Larry G. Hargis (Prentice-Hall International edition).
 16. Introduction to Modern Liquid Chromatography: L. R. Shyder & J. J. Kirkland (John Wiley & Sons, New York).
 17. Treatise on Analytical Chemistry: I. M. Kolthoff & P. J. Elving (John Wiley & Sons, New York).
 18. Handbook of Analytical Chemistry: L. Meites (McGraw-Hill, New York).
 19. Basic concepts of Analytical Chemistry by S.M. Khopker
 20. Standard Methods of Chemical Analysis: Vol. I & II (6th edition), D. Van Nostrand Co. Inc. (London).
 21. Official Methods of Analysis: Published by Association of Official Analytical Chemists, Washington.
 22. Instrumental Methods of Chemical Analysis: B. K. Sharma (Goel Publishing House, Meerut).
 23. Instrumental methods of Chemical Analysis by H. Kaur.
 24. Environmental Chemistry: B. R. Sharma, H. Kaur (Goel Publishing House, Meerut).
 25. Inorganic Quantitative Analysis: A. I. Vogel (Orient Longman).
 26. "Polarography", J. D. Talati (In Gujarati), University Granth Nirman Board.
 27. "Polarography": Kolthoff I. M. and Lingane J. J. (Vol. I & II) (Interscience Publishers, New York).
 28. "Polarographic Techniques": L. Meites (Interscience Publishers, New York).
 29. Principles of Instrumental Analysis (5th ed.) by Skoog, Holler and Nieman (Saunders College Publishings).
 30. Undergraduate Instrumental Analysis (5th ed.), J. W. Robinson (Marcel Dekker Inc.).
 31. Fundamentals of Molecular Spectroscopy, by Banwell.
 32. Electronic Absorption Spectroscopy and related techniques, D.N. Sathyanarayan, (New Age International ND. 1996) Uni. Press, Hyderabad.
 33. Introduction to Spectroscopy (3rd ed.) by Pavia Lampman Kriz, Cengage Learning Harcourt College Publishers

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Analytical Chemistry
M.Sc. Analytical Chemistry, Practicals
Semester - IV

Course Code	[2003080204050001]	Title of the Course	
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• Able to identify the elements presents in various alloys, soap and detergents. • Understand the importance of various instrumental techniques in analysis. • To learn about the calculation in analysis. • To learn about the stoichiometry used in analysis of compounds. • Preparation of solution used in determination of various compounds.

Course Content

1	Major Exercise	4- Credit
2	Viva-Voce	
3	Minor Exercise	4- Credit
4	Minor Excercise	

Major Exercise:

1. Analysis of brass alloys for Copper, Zinc and Iron Content.
2. Analysis of German silver for Copper, Nickel and Zinc Content.
3. Analysis of stainless steel for simultaneously determination of Chromium and manganese.
4. Ion exchange separation of ($\text{Fe}^{+3} + \text{Co}^{+2}$) and determination of Fe^{+3} colorimetric.
5. Determination of total salt content by ion exchange chromatography.
6. Ion exchange separation of (Zn^{+2} and Mg^{+2}) and determination of Zn^{+2} by EDTA titration.
7. Determination of pK_{In} of Methyl red indicator.
8. Determination of pK_{In} of Bromo Phenol Blue Indicator.

Minor Exercise (Any eight):

- Analysis of Drugs (any three):
 - Sulpha drugs by non-aqueous titration and argentometric titration.
 - Analysis of Penicillin
 - Iron formulation for iron content.
 - Aspirin tablet
 - Analysis of APC tablets for its aspirin and phenacetin content using UV spectrophotometry.
- Analysis of Insecticides: Analysis of BHC.
- Determination of Protein content of wheat flour by Kjeldahl Method.
- Analysis of Detergent sample for PO_4 and other constituents.
- Analysis of fertilizers by determination of nitrogen content.
- Analysis of fruit juice for Vitamin-C.
- Determination of saponification value of Oil and fat.
- Spectroscopic determination of Ni^{+2} with D.M.G.
- Conductometric determination of vanillin in Vanilla.
- Photometric titration of ($\text{Cu}^{+2} + \text{Ca}^{+2}$) in a mixture
- Determination of Metal: Ligand ratio in complex.
- Flame photometric determination of Na^+ and K^+ .
- Colorimetric estimation of titanium in the given solution by hydrogen peroxide.
- Estimation of amino acids by colorimetry.
- TLC separation.

Teaching-Learning Methodology	Introduction, interaction with students in calculation of solution preparations, carry out experiments at each step according to the respective practical, stoichiometry calculation.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
3.	University Examination	70%

<u>Course Outcomes: Having completed this course, the learner will be able to</u>	
1.	Understand the basics to carry out practical, calculation of mole and mole ratio.
2.	Done the titration or instrumental method for quantitative analysis.
3.	Done the stoichiometry of the reaction involved in titration.
4.	Draw the graph and find out the unknown concentration by comparison with known compound.
5.	Appreciate good laboratory practices.

<u>Suggested References:</u>

1. Vogel's Textbook of quantitative analysis fifth editions by Longman scientific and technical, UK.
2. Indian Pharmacopeia, Vol-I, II and III.
3. Standard methods of Chemical analysis sixth edition edited by Frank J. Welcher by D. Van Nostrand Company, Inc.

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Environmental chemistry
M.Sc. Environmental Chemistry, Semester IV
Paper 1

Course Code	[2003080204010005]	Title of the Course	ANALYSIS OF WATER POLLUTANTS
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	- To understand the detailed analysis of water on the basis of Color, pH, Test, Odour, Hardness, TDS, Alkalinity, Chloride, Fluoride, Sulphate, Ammoniac Nitrogen, Nitrite, Nitrate, Phosphate, Iron, Fluoride Heavy Metals, Silica. - To understand different treatments methods for wastewater classified in primary, secondary and tertiary wastewater treatment. - To learn which problems arise with industrial wastewater and remedies. - To Understand fundamental & theory of the sources and available minerals in soils. Also learn the different approaches and classical as well as instrumental techniques used for the analysis.

Course Content		
Unit	Description	Weightage* (%)
1.	SAMPLING METHODS AND PRESERVATION DO, BOD and COD- Signification, Analytical Methods, Interferences and their elimination, Modifications Color, pH, Test, Odour, Hardness, TDS, Alkalinity, Chloride, Fluoride, Sulphate, Ammonical Nitrogen, Nitrite, Nitrate, Phosphate, Iron, Fluoride Heavy Metals, Silica	25
2.	WATER TREATMENT (A)Water purification; Natural Water Purification Processes- Treatment for Potable Water, Preliminary treatment, Primary treatment: Sedimentation, Flocculation Secondary treatment: Trickling filters, Activated	25

	Sludge, Tertiary treatment: Chlorination, Wet Oxidation, adsorption, Reverse Osmosis, Electro dialysis Ion exchange and water disinfection. A. Sewage treatment- Removal of Solids, metals (Ca, Fe, Mn), Removals of dissolved organic and inorganic compounds, Sludge dewatering and disposal. (C) Water management- Water Reuse and Recycling, Rainwater harvesting	
3.	INDUSTRIAL WATER POLLUTION PROBLEMS AND REMEDIES ☐ Industrial water pollution- Site of pollution and remedies with flowcharts in ☐ Pharmaceutical Industry ☐ Fertilizers Industry ☐ Pulp and Paper Industry ☐ Sugar Industry ☐ Distillery Industry ☐ Textile Industry.	25
4.	SOIL ANALYSIS ☐ pH ☐ Lime requirement of soil ☐ Nitrogen analysis ☐ Phosphorous analysis ☐ Exchangeable Cation Analysis ☐ Micro nutrient analysis ☐ Trace element in soil analysis ☐ Analysis of pesticides- Standard and polarographic analysis	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library, IT tools, encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand Sampling methods and preservation DO, BOD and COD- Signification, Analytical Methods, Interferences and their elimination, Modifications
2.	To learn various water purification methods, sewage treatment, and water management
3.	Water pollution occurs in different industries like Pharmaceutical Industry, Fertilizers Industry, Pulp and Paper Industry, Sugar Industry, Distillery Industry, Textile Industry and its remedies with flowchart diagram.
4.	Understand the analysis of soil on the basis of pH, Lime requirement of soil, Nitrogen analysis, Phosphorous analysis, Exchangeable Cation Analysis, Micro nutrient analysis.

Suggested References:

Reference Books Recommended:

1. Environmental Chemistry by Manhanan.
2. Environmental Pollution Monitoring and control by S. M. Khopkar
3. Introduction to Environmental Analysis by Roger N. Reere. John Wiley & Sons.
4. Industrial Safety and Pollution control handbook. Published by National Safety Council and Associate (Data) Publishers Pvt. Ltd.
5. Environmental Chemistry, Goel Publishing house Meerut, by B. K. Sharma and H. Kaur
6. APHA Standard Methods 21st Edition
- 7.

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Environmental Chemistry
M.Sc. Environmental Chemistry, Semester IV
Paper I1

Course Code	[2003080204020005]	Title of the Course	AIR ANALYSIS AND POLLUTION CONTROL METHODS
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To study the analysis of gaseous air pollutants, air sampling methods, preservation of samples. • To learn Air pollution Control Methods and Equipments: Source, Collection methods, cleaning of gaseous effluent, particulate emission, absorption, adsorption, Odour control units • To study the Removal, Recovery and Destruction of SO₂, NO₂, H₂S, Organic Vapours and Particulates matters from production houses • To detailed study about bioremediation process.

Course Content		
Unit	Description	Weightage* (%)
1.	Analysis of Air pollutants Sampling of Particulate matter and Gaseous air pollutants- Sedimentation, HVS, Tape Sampler Impingement, Electrostatic precipitation, Adsorption in Liquid and solids, Thermal precipitation, Stack sampling system (Train), Preservation of samples. Analysis of Oxides of Sulphur, Nitrogen Oxygen and Carbon, H ₂ S, Mercaptans, Hydrocarbons	25

	and Organics, Elemental Analyser Analysis of Particulate Matter, Direct Spectrophotometric Analysis of Gaseous Air Pollutants Atmospheric Monitoring	
2.	AIR POLLUTION CONTROL METHODS AND EQUIPMENTS Air pollution Control Methods and Equipments: Source, Collection methods, cleaning of gaseous effluent, particulate emission, absorption, adsorption, Odour control units, Limestone injection and fluidized bed combustion, Desulfurization, Gravity settling chamber, Centrifugal collectors- cyclone collector and dynamic precipitators; Electrostatic precipitators; wet and dry Scrubbers, filters, Fabric filters. Combustion, Absorption and Adsorption Devices, Catalytic converter and control of vehicular emission	25
3.	INDUSTRIAL AIR POLLUTION PROBLEMS AND REMEDIES Removal, Recovery and Destruction of SO ₂ , NO ₂ , H ₂ S, Organic Vapours and Particulates matters from production houses. Microbial cleaning. Petroleum refinery, Cement industries, Fertilizers Industry, Thermal power plants Iron and Steel industries, Chemical Process industries-Mineral Acid manufacturing and Chloralkali Plants, Microbial cleaning of gases (Bio-filtration and bio-scrubbing)	25
4.	BIOREMEDIATION ● Microbial systems of bioremediation; factors influencing bioremediation (Environmental, Physical and chemical actors) ● Application of genetically engineered microorganisms for waste management ● Microbial aerobic and anaerobic biotransformations ● Bioremediation systems and processes (Solid, Liquid and Slurry phase) ● Microbial detoxification of specialty chemicals (Insecticides, Herbicides, Fungicides, Polychlorinated biphenyls, Heavy metals)	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library, IT tools, encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the Analysis of Oxides of Sulphur, Nitrogen Oxygen and Carbon, H ₂ S, Mercaptans, Hydrocarbons and Organics in different air sampling and compare the samples of different polluted areas.
2.	Learn about the different equipments like cyclone collector and dynamic precipitators; Electrostatic precipitators; wet and dry Scrubbers, filters, Fabric filters.
3.	Learn the different air pollutants from Petroleum refinery, Cement industries, Fertilizers Industry, Thermal power plants Iron and Steel industries, Chemical Process industries-Mineral Acid manufacturing and Chloralkali Plants.
4.	Study about bioremediation process, systems, applications and Microbial detoxification of specialty chemicals (Insecticides, Herbicides, Fungicides,
Suggested References:	

Reference Books Recommended:

1. Basic Concept of environmental Chemistry by Des. W. Connell.
2. Chemistry for environmental Engineering 4th Ed., By Sawyer, McCarty and Parkin.
3. Environmental Pollution Monitoring and control by S. M. Khopkar.
4. C.S. Rao, Environmental Pollution Control Engineering. Wiley Eastern Ltd. 1991.
5. John H. Seinfeld Air pollution: Physical and Chemical Fundamental McGraw Hill, 998.
6. M.N. Rao and H.V. Rao Air Pollution, Tata McGraw Hill Book Co. 1989.

7. Hand book of Air Pollution, Prevention and control: Nicholas P. Cheremisinoff
Elesvier 2nd edition.
8. C.S. Rao, Environmental Pollution Control Engineering. Wiley Eastern Ltd. 1991.
9. John H. Seinfeld Air pollution: Physical and Chemical Fundamental McGraw
Hill 1998.
10. M.N. Rao and H.V. Rao Air Pollution, Tata Mcgraw Hill Book Co. 1989.
11. Hand book of Air Pollution , Prevention and control: Nicholas P. Cheremisinoff
Elesvier 2nd edition

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Environmental Chemistry
M.Sc. Environmental Chemistry, Semester IV
Paper III

Course Code	[2003080204030005]	Title of the Course	GREEN TECHNOLOGY
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	● The goal of green tech is to protect the environment, repair damage done to the environment in the past, and conserve the Earth's natural resources ● Its foremost objective is to protect and preserve the environment. Examples include technologies that recycle waste, purify water, or reduce pollution in water sources and air. But these aren't limited to industrial use and may apply to household items as well ● Green nanotechnology has two goals: producing nanomaterials and

	products without harming the environment or human health, and producing nano-products that provide solutions to environmental problems. • To use biocatalysis, to produce green buildings and use less hazardous substances in technology.

Course Content		
Unit	Description	Weightage* (%)
1.	Green technology Overview of green chemistry, principles of sustainable and green chemistry. Basic principles of green technology, concepts of atom economy and carbon trading, tools of green technology. Waste minimization and climate change, Zero waste technology, concept of environmentally balanced industrial complexing and industrial ecology	25
2.	Green synthetic methods and designs Catalytic methods in green synthesis, safer chemicals – different basic approaches; selection of auxiliary substances (solvents, separation agents), green solvents, solventless processes, immobilized solvents and ionic liquids; energy requirements-use of microwaves, ultrasonic energy; selection of starting materials; use of blocking/protecting groups, catalytic reagents; designing of biodegradable products.	25
3.	Green Nanotechnology Introduction to Nanomaterials and green nanotechnology, Fullerene, carbon nanotubes, Nanoparticles; Green nanoparticle production and characterization; Biocompatibility; Nanomedical applications of green nanotechnologies; use of nanotechnologies and materials impact on biodiversity, resource conservation, ecosystems and human.	25
4.	Green Technology Applications Biocatalysis, green chemistry in industries, fuel cell and	25

	electric vehicles, solar energy and hydrogen production, energy from alternate sources; Solar photovoltaic technology, Biofuel production (bio-ethanol and biodiesel), Biomass, prevention/minimization of hazardous/ toxic products. Agricultural related practices and food processing, Production of biodegradable materials, concept of green building and Pollution free engineering processes.	

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library, IT tools encourages students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Study Overview of green chemistry, principles of sustainable and green chemistry. Basic principles of green technology, concepts of atom economy and carbon trading, tools of green technology
2.	Understand the Catalytic methods in green synthesis, use of green solvents and solvent less processes,
3.	Underst and Nanomaterials and green nanotechnology, Fullerene, carbon nanotubes, Nanoparticles and its characterization.
4.	Understand how green technology is applicable in industries and other production methods, fuel cell and electric vehicles, solar energy and hydrogen production

Suggested References:

Reference Books Recommended:

1. Lynn Goldman, Christine Coussens, Implications of nanotechnology for environmental health research, National Academic Press, Washington, 2007
2. Matlack, A. S. Introduction to Green Chemistry. Marcel Dekker: New York, 2001
3. Anastas, P. T.; Warner, J. C. Green Chemistry: Theory and Practice. Oxford Univ. Press: Oxford,
4. Caye Drapcho, Nhuan Phú Nghiêm, Terry Walker (2008). Biofuels Engineering Process Technology. [McGraw-Hill].

On-line resources to be used if available as reference material

On-line Resources

Master of Science, Environmental chemistry
M.Sc. Environmental Chemistry, Semester IV
Paper IV

Course Code	[2003080204040005]	Title of the Course	AUDIT, LAWS AND CASE STUDIES
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• To learn definition and terminologies of Environmental Impact Assessment • To understand Pollution control boards, EPA-US, The Environment (Protection) Acts enacted by CPCB-India for water, air, noise and waste management • To study the rules and acts for hazardous waste management. • To study the Environmental Movements and Case Studies

Course Content		
Unit	Description	Weightage* (%)
1.	ENVIRONMENTAL IMPACT ASSESSMENT Definition and terminologies, Basic Description of EIA processes. Biosolid management practices and regularity requirements. Environmental facility and assessment and Audit	25
2.	ENVIRONMENTAL PROTECTION LEGISLATIONS Pollution control boards, EPA-US, The Environment (Protection) Acts enacted by CPCB-India for water, air, noise and waste management. GPCB, Legislation and legal aspects: Water (Prevention and control of Pollution) Act 1974, Air (Prevention and control of Pollution) Act 1981, Wild Life protection act, 1972, The India Forest Act, 1927, The Environment protection Act, 1986	25
3.	HAZARDOUS WASTE MANAGEMENT : Description of the Environmental settling, Prediction and Assessment of impact on air, water, Noise and Biological environment. Laws and regulations, E- waste management and Handling Rule 2011, Plastic Manufacture, Sale, Usage sale Rule 2011, 2016 and issues involved in enforcement of environmental legislation.	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library, IT tools, encourages students to participate in seminars/ workshops, presentations by students, assignment etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Study detailed description about ENVIRONMENTAL IMPACT ASSESSMENT
2.	To study the various acts for ENVIRONMENTAL PROTECTION LEGISLATIONS
3.	To understand Description of the Environmental settling, Prediction and Assessment of impact on air, water, Noise and Biological environment
4.	To understand the case studies of Movements related to Environment Sacred groves, Bishnoi tradition, Chipko movement, Tehridam, Sardar Sarovar, Narmada dam, Almatti dam, Silent Valley.

Suggested References:

Reference Books Recommended

1. Environment impact assessment: David P Lawrence, Wiley inter science 2003.
2. Environment impact assessment handbook: Barbara Carroll, Trevor Turpin, Thomas Telford 2003.
3. Case Studies in the Environment Editor-in-Chief: Wil Burns, Vol 3, 2019,ISSN: 2473-9510

On-line resources to be used if available as reference material
On-line Resources

Master of Science, Environmental Chemistry
M.Sc. Environmental Chemistry, Practicals
Semester - IV

Course Code	[2003080204050001]	Title of the Course	
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	• Understand the importance of various instrumental techniques in analysis. • To learn about the calculation in analysis. • To learn about the stoichiometry used in analysis of compounds. • Preparation of solution used in determination of various compounds.

Course Content

1	Major Exercise	4- Credit
2	Viva-Voce	
3	Minor Exercise	4- Credit
4	Minor Exercise	

Major Experiments

1. Analysis of dolomite ore by gravimetry.
2. Determination of the amount of Fe in Cement by optical method.
3. Analysis of Portland cement for the major constitute.
4. Separation of Zn^{+2} & Mg^{+2} ion by an anion exchange resin.
5. Potentiometric determination of Chloride, Bromide and Iodide in a mixture.
6. Analysis of Pyrolusite ore for the major constitute.
7. Separation and determination of total pigment in a paint sample.
8. Determination of volatile thinner in a paints sample.
9. Determination of Cr and Mn in a steel sample photospectrometry.
10. Determination of the total salt amount content in given Water using Ion Exchange Chromatography (IEC). (Dowex cation).

Minor Experiments

11. Determination of the thiosulphate in a given solution.

12. Analysis of dye intermediate containing -NH_2 by Potentiometric titration.
13. Determination of Nitrite spectrophotometrically.
14. Biuret in the sample of urea
15. Determination of fluoride in a given solution / tooth paste by Zirconyl-Alizarin red method colorimetrically
16. Analysis of organic materials: Glycerol, Glycine, phenol.
17. Determination of the % of Ca & Mg both combined volumetrically.
18. Estimation of Fe by colorimetry.
19. Determination of the concentration of Cr^{+3} and Co^{+2} in a given mixture using spectrophotometer.
20. Titrimetric determination of L-ascorbic acid. (Vitamin C)
21. Determination of the individual concentration of Cu^{+2} and Ca^{+2} in a mixture using by EDTA solution and complexometric titration.
22. Determination of K_{a1} and K_{a2} of phosphoric acid.
23. Determination of Ca present in CaCO_3 with Vitamin D_3 tablet using EDTA by volumetrically.
24. Paper Chromatography.

Note:

8. Practical examination will be for **2 days in each semester.**
9. **6** hours duration on each day.

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology comprise classroom teaching, use of e-resources, library books, IT tools, encouraging students to participate in seminars/ workshops, presentations by students, assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the basics of practical.
2.	Understand reaction and monitoring specified reaction condition.
3.	Learn to work-up after the completion of practical.

4.	Confirm the results with the references.
5.	Understand the calculation with reference to respective factors.
6.	Appreciate good laboratory practices.

Bachelor of Architecture

Name of Programme	Bachelor of Architecture
Abbreviation	B. Arch.
Duration	5 years
Eligibility Criteria	The candidates who have qualified the aptitude test i.e. NATA or JEE, with pass percentage in 10+2 scheme of examination with PCM or 10+3 Diploma with Mathematics shall be eligible for admission to B. Arch. course for the academic session 2020-2021. The candidate from general category shall have passed above mentioned requirements with minimum 50% aggregate marks (minimum 45% aggregate marks for SC/ST/SEBC/EWSs candidates)
Objective of Program	• Learning through experimenting with materials hands on. • Nurturing ability to transform imagination into habitable built environment. • Training an individual to create qualitative physical environment. • Teaching by use of appropriate technological solutions. • Using resource responsibly. • Teaching the process of problem solving. • Understanding history and its application to contemporary times. • To create value system and competence to assimilate the multiple dimensions of the architectural task to generate qualitative built environment.
Program Outcomes	PO1 Fundamental knowledge enrichment of Built Environment Understand the real-life scenario in study; apply and acknowledge the rational relationship between individuals and therefore the designed surroundings with relevancy of their needs, values, activity norms, and social forms. PO2 Understanding the society, nature and built environment Apply understanding of context, environment, technology, history and other parameters for successful design resolution. PO3 Lateral Thinking for design and visualization Deliver the process of design through innovative, visual and verbal communication skills. PO4 Advanced Emerging technology in construction practice Collaborate with multi-disciplinary design and execution teams from the building industry.

Bachelor of Architecture

	PO5 Advanced tool usage Use advance software's and produces professional quality graphic presentation and technical drawing/ documents PO6 Nurturing Construction Planning, Technology and Management Demonstrate knowledge and understanding of the architectural and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. PO7 Ethical practice in Construction industry Accept professional standards and implement the same with social and ethical responsibilities to effectively encounter architectural field issues. PO8 Critical thinking through Research and Design Conduct investigations of complex problems through research-based knowledge and research methods including experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions in architectural and allied field.
Program Specific Outcomes	PSO1: Acquaint, develop and strengthen the fundamental core concepts about the trends in the field of architecture to solve practical problems. PSO2: Train students to gather and apply the knowledge of building materials, services, construction techniques, structural and environmental systems to design sensitive building envelope responsive to context, climate, culture, societal and ecological concerns. PSO3: Develop the professional and entrepreneurship skills to suffice current needs of the industry like independent, logical and analytical thinking, team work and leadership. PSO4: Nurture students to investigate using managerial skills and innovative approach for the design and development of a workable solution for real world problems. PSO5: Inspire students for making successful professional carrier by accomplishing design solutions on basis of physical, social, economic, environmental parameters in the field of architecture.

Bachelor of Architecture

Mapping Between PO and PSO		PSO1	PSO2	PSO3	PSO4	PSO5
	PO1					
	PO2					
	PO3					
	PO4					
	PO5					
	PO6					
	PO7					
	PO8					
Medium of Instruction	English					

Almehdi



Bachelor of Architecture

Course: ARC-901: Architectural Design-IX

Course Code	ARC-901																								
Course Title	Architectural Design –IX (Research Thesis)																								
Marks	900																								
Teaching per Week	06 hours/ week																								
Minimum weeks per Semester	23 weeks(including class work, examination, preparation, holidays, etc)																								
Effective From	Dec. 2019																								
Purpose of Course	Research On Architecture Design																								
Course Objective	Acquire a strong theoretical foundation, clarity of thought and also to orient the students to structured research in a focused manner. Develop research capabilities and individual scholarly attitude. Develop analytical, synthesizing and interpretive skills and be able to present the same in standardized and systematic academic formats.																								
Course Outcomes	CO1: Systematically abstract, analyze, synthesize and interpret existing literature. CO2: Develops a specialized knowledge in a subject area which maybe an extension to the prescribed coursework. CO3: Builds his his/her capacity to work independently and methodically in a variety of intellectually demanding contexts.																								
Mapping between COs with PSOs	<table><tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td></tr><tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO1	PSO2	PSO3	PSO4	PSO5	CO1						CO2						CO3					
	PSO1	PSO2	PSO3	PSO4	PSO5																				
CO1																									
CO2																									
CO3																									
Pre-requisite	Diverse perspectives to build an evidence-based, cogent and coherent body of analysis and answers.																								
Course Content	Unit 1: 1.1 Selection and research of thrust area 1.1.1 Identification & brief Description of Literature/ library/ case studies to form background study. 1.1.2 Thesis Plan: Identifying aims and objectives (for implementing thrust area in subsequent design proposals), methodology, scope and limitations. Unit 2: 2.1 Detailed Literature Review of selected Thrust Area 2.1.1 Issue forming the Design Criteria for Thesis Project. 2.1.2 All Literature and Library studies including prescribed																								

Bachelor of Architecture

	standards for selected Thesis Project. 2.1.3 Selection of Site(s) for implementation of Thesis Project. 2.1.4 Selection of case Studies, along with criteria.
Reference Books	----NA----(depending on topic)
Teaching Methodology	literature self-studies, seminars , juries/reviews
Evaluation Method	Internal assessment – 70% (attendance, case studies, juries/review) External assessment – 30% (University exam- Jury/viva)

Signature



Bachelor of Architecture

Course: ARC-902: Professional Practice

Course Code	ARC-902																
Course Title	Professional Practice																
Marks	200																
Teaching per Week	02 hours/ week																
Minimum weeks per Semester	23 weeks(including class work, examination, preparation, holidays, etc)																
Effective From	Dec.2019																
Purpose of Course	Comprehensive Introduction To Architectural Professional Practice																
Course Objective	The objective is to introduce to the architectural profession and its regulatory and statutory bodies. Develop an understanding of legal liabilities and obligations as an architect and the importance of code of conduct and ethics in professional practice																
Course Outcomes	CO1: Familiarity with the procedures for tendering, arbitration, valuation of works and real estate and aspects of international practice. Proficiency in preparation of projects proposals and presentations for procuring projects.																
Mapping between COs with PSOs	<table border="1"> <tr> <th></th><th>PSO1</th><th>PSO2</th><th>PSO3</th><th>PSO4</th><th>PSO5</th></tr> <tr> <th>CO1</th><td></td><td></td><td></td><td></td><td></td></tr> </table>						PSO1	PSO2	PSO3	PSO4	PSO5	CO1					
	PSO1	PSO2	PSO3	PSO4	PSO5												
CO1																	
Pre-requisite	Understanding of the Code of Practice in Architecture																
Course Content	Unit-1: 1.1 Organisation of Profession 1.1.1 Introduction to the professional Organisations e.g. the Indian Institute of Architects, the Uttar Pradesh Architects Association. 1.1.2 Their Objectives, working constitution, byelaws, categories of membership, election procedure etc. 1.1.3 Detailed Study of the Architects' Act 1972, Council of Architecture and its role. Unit-2: 2.1 Professional Conduct, Conditions of Engagement 2.1.1 Conditions of engagement of an architect - Duties: Responsibilities and liabilities of an architect towards the profession and society, Scale of Professional charges and mode of payment etc.,																

Bachelor of Architecture

 	2.1.2 Code of professional conduct and ethics, Need and types of competitions, procedure for conducting competitions. Unit 3: 3.1 Tenders and Contracts 3.1.1 Concept of Contract and essential elements of contract. Tenders, their need and types. 3.1.2 Preparation of tender documents and procedure for awarding tenders and award of projects. 3.1.3 Type of building contracts. 3.2 Preparation of contract document – 3.2.1 General conditions of contract, defect liability period, running & final payment, retention amount and virtual completion. Unit 4: 4.1 Office Organisation and Management 4.1.1 Setting up practice- Business organization, Types of offices proprietorship, partnership, Private Limited etc., Salaried appointments - public sector, private sector. 4.1.2 Basic understanding of Income tax and GST, Basic understanding of Office accounting procedures. 4.1.3 Office Procedure in government organization. Unit 5: 5.1 Valuation of Properties 5.1.1 Fundamental concepts of Valuation 5.1.2 classification and types of valuation 5.1.3 Elements and factors affecting valuation; 5.1.4 Valuation of immovable properties, 5.1.5 Techniques for valuation of landed and building property. Unit 6: 6.1 Arbitration Concept and need of Arbitration. 6.1.1 Law governing arbitration in India – Salient features of the Indian Arbitration Act 1940 and provisions in subsequent amendments. 6.1.2 Role of Arbitrator. 6.1.3 Nature of arbitration. 6.1.4 Appointment of arbitrator/s, Umpire, Conduct, Powers, and duties of arbitrators and umpires, Procedure of arbitration and preparation of awards etc.
Reference Books	1. Dr. Roshan H. Namavati, Professional practice 2. Council of Architecture, handbook of professional document. 3. The Indian Institute of architects, the handbook of Professional Practice. 4. Madhav Devshaktu, Professional Practice.
Teaching Methodology	discussions, seminars , juries/reviews
Evaluation Method	Internal assessment – 70% (attendance, case studies, juries/review) External assessment – 30% (University exam- Jury/viva)

Bachelor of Architecture

Course: ARC-903: Universal Design

Course Code	ARC-903					
Course Title	Universal Design					
Marks	100					
Teaching per Week	2 hours/ week					
Minimum weeks per Semester	23(including class work, examination, preparation, holidays, etc)					
Effective From	Dec. 2019					
Purpose of Course	Sensitizing students towards needs of disabled people and make them capable to design barrier free buildings.					
Course Objective	To study the needs of people with disabilities and provide them barrier free built environment to move about safely and freely and to use the facilities within the built environment. To create an environment that supports the independent functioning of individuals and participates without assistance, in everyday activities.					
Course Outcomes	CO1: Development of sensitivity and understanding of architectural design elements for creating barrier free built environments. CO2: Understanding of different types of accessibility and material for disabled persons. CO3: Knowledge of different signages and planning concepts for disabled persons.					
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5
	CO1					
	CO2					
	CO3					
Pre-requisite	Design resolution and understanding of bye-laws and standards					
Course Content	Unit 1: 1.1 Introduction 1.1.1 Types of disability, Mobility devices and controls. 1.1.2 Guidelines and space standards for barrier free built Environment for disabled and elderly persons in various buildings such as institutes, hospitals, public spaces, shopping complexes and office buildings etc.					

Bachelor of Architecture

	1.1.3 Construction and maintenance standards, classifications of buildings and access provisions. Unit 2: 2.1 Design 2.1.1 Design elements within buildings, Site planning, parking, approach to plinth levels, corridors, entrance and exit, windows, stairways, lifts, toilets, signage, guiding and warning systems. 2.1.2 Floor materials. 2.1.3 Design elements outside the buildings - kerb at footpath, road crossing, public toilet, bus stop, toilet booth, and signage. 2.1.4 Provisions for residential buildings and public buildings and places like auditorium, parks, restaurants, railway station. 2.1.4 Access audit and implication in building byelaw.
Reference Books	1. NC State University(1997) Universal Design, Copyright 2. The Center for Universal Design, Version 2.0 3. The John F. Kennedy Center for the Performing Arts., Accessibility Tipsheet: Universal Design Resources on the Web, 2006 (accessed 27.12.2012)(www.kennedy-center.org Similar) Preiser, 4. W.F.E. (2002). Infusing Universal Design into the Curriculum. 5. In Universal Design: 17 Ways of Thinking and Teaching. Edited by Christophersen, J., pp 217-241. Husbanken, Norway. Preiser, W.F.E., & Ostroff, E. (2001). 6. Universal Design Handbook. McGraw Hill, New York.
Teaching Methodology	Theory lectures, Guest lectures, site visits of barrier free built environment
Evaluation Method	Access audits, evaluating systems and tools, design problem Attendance (10%)+ continuous evaluation(70%)+end semester viva(20%)

Signature



Bachelor of Architecture

Course: ARE-904: ELECTIVE

Course Code	ARE-904																														
Course Title	Elective (Building Science)																														
Marks	100																														
Teaching per Week	02 hours/ week																														
Minimum weeks per Semester	23 weeks (including class work, examination, preparation, holidays, etc)																														
Effective From	Dec. 2019																														
Purpose of Course	Understanding of inter relation of built environment with material environment also issues of climatic balance in traditional and contemporary built environments																														
Course Objective	Understanding of Thermal balance in Human beings Designing Climate responsive structure Conceptual understanding of Air flow in Buildings																														
Course Outcomes	CO1: To study human heat balance and comfort. CO2: To familiarize students with the design and settings for buildings for daylight and factors that influence temperature. CO3: To inform about the air pattern around buildings and the effect of wind on design and siting of buildings CO4: To expose the students to the various design strategies for building in different types of climatic zones.																														
Mapping between COs with PSOs	<table><tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td></tr><tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO4</td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO1	PSO2	PSO3	PSO4	PSO5	CO1						CO2						CO3						CO4					
	PSO1	PSO2	PSO3	PSO4	PSO5																										
CO1																															
CO2																															
CO3																															
CO4																															
Pre-requisite	Understanding of climate responsive architecture																														
Course Content	Unit 1: 1.1 Climate And Human Comfort 1.1.1 Factors that determine climate of a place 1.1.2 Components of Climate 1.1.3 Climate classifications for building designers in tropics 1.1.4 Climate characteristics. 1.1.5 Human body heat balance – Human body heat loss – Effects of climatic factors on human body heat loss																														

Bachelor of Architecture

	1.1.6 Effective temperature – Human thermal comfort Unit 2: 2.1 Design Of Solar Shading Devices 2.1.1 Movement of sun 2.1.2 Locating the position of sun – Sun path diagram – Overhead period–Solar shading–Shadow angles 2.1.3 Design of appropriate shading devices Unit 3: 3.1 Heat Flow Through Building Envelope Concepts 3.1.1 The transfer of heat through solids – Definitions – Conductivity, Resistivity, Specific heat, Conductance, Resistance and Thermal capacity – Surface resistance and air cavities 3.1.2 Air to air transmittance (U value) – Time lag and decrement 3.1.3 Types of envelopes with focus on glass. Unit 4: 4.1 Air Movement Due To Natural And Built Forms 4.1.1 The wind – The effects of topography on wind patterns 4.1.2 Air currents around the building 4.1.3 Air movement through the buildings -The use of fans – Thermally induced air currents – Stack effect, Venturi effect – Use of court yard. Unit 5: 5.1 Climate And Design Of Buildings 5.1.1 Design strategies in warm humid climates, hot humid climates, hot and dry climates and cold climates 5.1.2 Climate responsive design exercises
Reference Books 	1.O.H. Koenigsberger and Others, "Manual of Tropical Housing and Building" – Part I - Climate design, Orient Longman, Madras, India, 2010. 2. Bureau of Indian Standards IS 3792, "Hand book on Functional requirements of buildings other than industrial buildings", 1987. 3.Martin Evans, "Housing Climate and Comfort", Architectural Press, London, 1980 4. B. Givoni, "Man, Climate and Architecture", Architectural Sciences Series – Applied Science Publishers Ltd., London, 1981. 5. B. Givoni, "Passive and Low Energy Cooling of building", Van Norstrand Reinhold New York, USA, 1994. 6. Galloe, Salam and Sayigh A.M.M., "Architecture, Comfort and Energy", Elsevier Science Ltd., Oxford, U.K., 1998.
Teaching Methodology	Lecture notes , Climatology lab, Group discussion , Debates , Case studies , Analysis, E-resource
Evaluation Method	Internal assessment – 70% (attendance, case studies, juries/review) External assessment – 30% (University exam- Jury/viva)

Bachelor of Architecture

Course: ARE-904: Elective

Course Code	ARE-904																												
Course Title	Elective (Social Science And Architecture)																												
Marks	100																												
Teaching per Week	02 hours/ week																												
Minimum weeks per Semester	23 weeks(including class work, examination, preparation, holidays, etc)																												
Effective From	Dec. 2019																												
Purpose of Course	To expose the students to the relationship between man and environment.																												
Course Objective	To familiarize the students with basic concepts, theories and issues of Sociology and its relevance to Architecture.																												
Course Outcomes	CO1: Comprehend what have been the major issues in the development of architectural design in socio- cultural context. CO2: Illustrate the place specific nature of architectural design. CO3: Appraise about architecture and its relationship to its historical, political, social, economic, technological contexts.																												
Mapping between COs with PSOs	<table border="1"> <thead> <tr> <th></th><th>PSO1</th><th>PSO2</th><th>PSO3</th><th>PSO4</th><th>PSO5</th></tr> </thead> <tbody> <tr> <td>CO1</td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>CO2</td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>CO3</td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>						PSO1	PSO2	PSO3	PSO4	PSO5	CO1						CO2						CO3					
	PSO1	PSO2	PSO3	PSO4	PSO5																								
CO1																													
CO2																													
CO3																													
Pre-requisite	Understanding of Society																												
Course Content	Unit 1: 1.1 Introduction Study of Sociology 1.1.1 Sociology and Architecture, Basic concepts –Society, Group, Community (Rural and Urban), Association, Institution. Unit 2: 2.1 Culture and Society Concepts of culture 2.1.1 Cultural identity and cultural diversity, Factors of sociocultural changes. Unit 3: 3.1 Social Development 3.1.1 Introduction to the concept of development, 3.1.2 Types of development - rural, urban and rural. Unit 4: 4.1 Demography																												

Bachelor of Architecture

	4.1.1 Population growth and its impact 4.1.2 Population subsistence, Migration. Unit 5: 5.1 Social Institutions Family, Marriage, Religion. Unit 6: 6.1 Social Infrastructure Education, Health, Recreation.
Reference Books	1. An Introduction to Sociology. (n.d.). VidyaBhushan. 2. Bart, P. and Frankel, L. (n.d.). <i>The student's sociological handbook</i>. 3. Brinkerhoff, D. and White, L. (1998). <i>Sociology</i>. St. Paul, MN [etc.]: WestPubl. 4. Chitambar, J. (n.d.). <i>Introductory ruralsociology</i>. 5. Dr. Kumar, K. (n.d.). <i>RuralSociology</i>. 6. Dr. Valsyayan (n.d.). <i>UrbanSociology</i>. 7. McCurdy, D., Shandy, D. and Spradley, J. (n.d.). <i>Conformity and conflict: Readings in Cultural Anthropology</i>.
Teaching Methodology	discussions, presentations , juries/reviews
Evaluation Method	Internal assessment – 70% (attendance, case studies, juries/review) External assessment – 30% (University exam- Jury/viva)

Admohli



Bachelor of Architecture

Course: ARE-904: Elective

Course Code	ARE-904					
Course Title	Elective (Humanities And Architecture)					
Marks	100					
Teaching per Week	02 hours/weeks					
Minimum weeks per Semester	23 weeks (including class work, examination, preparation, holidays, etc)					
Effective From	Dec. 2019					
Purpose of Course	Basic study of human behaviour and interaction with environment.					
Course Objective	Forces that shape the built environment and how it (architecture and urban form) contributes to the cultural identity of people, period, and place.					
Course Outcomes	CO1:Comprehend what have been the major issues in the development of architectural design in socio- cultural context CO2: Illustrate the place specific nature of architectural design CO3: Appraise about architecture and its relationship to its historical, political, social, economic, technological contexts.					
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5
	CO1					
	CO2					
	CO3					
Pre-requisite	Society, architecture and settlement pattern					
Course Content	Unit 1: 1.1 Sociology and Its Relation to Architecture 1.1.1 Definition of Sociology; nature, scope and utility of Sociology; branches of sociology. 1.1.2 Different social processes - cooperation, conflict, competition, accommodation, assimilation, progress and evolution. 1.1.3 Forms of social organization: society, community, family, culture 1.1.4 Different family structures and architectural responses to different family types and housing typologies (traditional and contemporary) 1.1.5 Relationship of social, economic and political systems to the built environment, relevance in Architecture. Unit 2: 2.1 Man, Environment and Society					

Bachelor of Architecture

 	2.1.1 Journey of man from ancient through medieval to contemporary; formation of group living, settlements and beginning of community living as rural & urban. 2.1.2 Concepts of society, culture, traditions & civilization and their progressive development through different ages from Paleolithic to contemporary. 2.1.3 Culture and society, cultural lag, Deviant subculture, Culture and civilization. 2.1.4 Different theories about culture and social identity with reference to architecture, social construction of space. 2.1.5 Relation between culture and built form (exploration of architectural examples) based on design practices followed across India and the world. 2.1.6 Social development for Sustainable development, Sustainable Indigenous communities with case examples. Unit 3: 3.1 Indigenization and Cultural Change 3.1.1 Society and environment, Social change, Factors of social change, Social stratification, Rural & Urban, class & caste 3.1.2 Social and cultural aspects of building practices; Architecture as an identity; Loss of architectural identity and role of culture. 3.1.3 Social changes in Gujarat (structural, occupational, rural, religious and housing) including renaissance and social reform movement. 3.1.4 Gujarat Model Social development - characteristics, advantages and disadvantages 3.1.5 Urban Sociology focusing on study of life and interaction in cities and metropolitan areas, the economic, cultural and social changes of urbanisation leading to production or disintegration of identities. 3.1.6 Study of demography, migration Social aspects of migration, , gentrification, ghettoization, housing & slums and its effect on urbanisation and architecture
Reference Books	1. An Introduction to Sociology. (n.d.). Vidya Bhushan. 2. Bart, P. and Frankel, L. (n.d.). The student's sociological handbook. 3. Brinkerhoff, D. and White, L. (1998). Sociology. St. Paul, MN [etc.]: West Publ. 4. Chitambar, J. (n.d.). Introductory rural sociology. 5. Dr. Kumar, K. (n.d.). Rural Sociology. 6. Dr. Valsyayan (n.d.). Urban Sociology.
Teaching Methodology	discussions, seminars, juries/reviews
Evaluation Method	Internal assessment – 70% (attendance, case studies, juries/review) External assessment – 30% (University exam- Jury/viva)

Bachelor of Architecture

Course: ARE-904: Elective

Course Code	ARE-904																																									
Course Title	Elective (Art And Design)																																									
Marks	100																																									
Teaching per Week	02 hours/week																																									
Minimum weeks per Semester	23 weeks (Including class work, examination, preparation, holidays, etc)																																									
Effective From	Dec. 2019																																									
Purpose of Course	To develop the importance in Art in Architecture																																									
Course Objective	1. Exposure to various mediums and techniques. 2. Bold enough to handle to the colours for the presentation sheets. 3. To develop mastery in sketching and expression through forms. 4. The skill and knowledge gained through the subject is most useful to their profession																																									
Course Outcomes	CO1: To develop presentation skills, visual expression and representation, imaginative thinking and creativity through hands on working with various mediums and materials. CO2:To familiarize the students with the various mediums and techniques of art through which artistic expression can be achieved CO3: To familiarize students with the grammar of art by involving them in a series of free hand exercises both indoor and outdoor to understand form, proportion, scale, etc CO4: Involving them in a series of exercises which will help them experiment with form and volume. CO5: To involve students in a series of exercises which will look at graphic and abstract representations of art.																																									
Mapping between COs with PSOs	<table><tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td></tr><tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO4</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO5</td><td></td><td></td><td></td><td></td><td></td></tr></table>							PSO1	PSO2	PSO3	PSO4	PSO5	CO1						CO2						CO3						CO4						CO5					
	PSO1	PSO2	PSO3	PSO4	PSO5																																					
CO1																																										
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CO5																																										
Pre-requisite	Understanding of various art forms.																																									
Course Content	Unit 1 1.1 Introduction to art																																									

Bachelor of Architecture

 	1.1.1 Elements and principles of drawing 1.1.2 Types of drawing 1.1.3 Visual effects of drawing 1.1.4 Scale drawing Composition 1.1.5 Approach to sketching 1.1.6 Study of light, shade and shadow. 1.1.7 Exercise involving Indoor and outdoor sketching – Spot sketching – Drawing from Imagination – Study of 3 D effects through light and shade from nature – Tools and materials – Illustration – Study of human being and mobiles. Unit 2 2.1 Painting I 2.1.1 Introduction of painting – Colour – Properties of colour – Colour schemes – Types of colours . 2.1.2 Application and visual effects of colour. 2.1.3 Exercise involving Study of colour – Properties of paper, brush and other tools – Basic washes – 3D effects from still-life, nature and built environment using mono chromatic and multi colour. Unit 3 3.1 Painting II 3.1.1 Indoor and out door painting – Rendering techniques Exercise Involving Water colour 3.1.2 Water soluble colour pencil – Tempra – Acarali – Water soluble oil colour – Oil colour – Pen and ink – Brush – Air brush 3.1.3 Mixed mediums – Study of multi colour and 3D effects from nature and built environment. Unit 4 4.1 Sculpture 4.1.1 Introduction of sculpture –Sculpture using various materials such as clay, plaster of Paris, paper mache, and wire. Unit 5 5.1 Applied Art 5.1.1 Graphic representations – 5.1.2 Visual composition and Abstraction- 5.1.3 Exercises involving Logo design, collage, calligraphy and printing.
Reference Books	1. Moivahuntly, "The artist drawing book", David & Charles, U.K., 1994. 2. Arundell (Jan) Exploring sculpture, Mills and Boon, London/Charles, T. Brand Ford Company, U.S.A. 3. The art of drawing trees, heads, colours, mixing, drawing, landscape and painting, water colour, oil colour, etc. – The Grumbacher Library Books, New York, 1996. 4. Caldwell peter, "Pen and Ink Sketching", B.T. Bats ford Ltd., London, 1995.
Teaching Methodology	discussions, presentations , juries/reviews
Evaluation Method	Internal assessment – 70% (attendance, case studies, juries/review) External assessment – 30% (University exam- Jury/viva)

Master of Architecture [Landscape Architecture]

Name of Programme	Masters in Architecture [Landscape Architecture]
Abbreviation	M. Arch. [Landscape Architecture]
Eligibility Criteria	The candidate shall have passed Bachelor of Architecture degree program from a recognized University/Institution. The candidate from general category shall have passed above mentioned degree program with minimum 50% aggregate marks (minimum 45% aggregate marks for SC/ST/SEBC/EWSs candidates)
Objective of Program	The core objective of the Masters in Architecture [Landscape Architecture] programme is to prepare the students for productive career in industry and academia by developing professional skills in design, planning, management and stewardship of the land; natural and built elements, cultural and scientific knowledge, and concern for resource conservation
Medium of Instruction	English
Program Outcomes	PO-1: Build Knowledge & Develop Reasoning Skills in applying broad and deep knowledge across academic disciplines and fields and using this knowledge to develop design proposals in landscape architecture PO-2: Apply knowledge to guide design decisions and activities taking into account natural resource constraints that impact land use. PO-3: Strengthen Social Awareness to better understand the social and cultural influences on human behavior and the social, political, economic, and legal institutions which influence land-use and design decisions. PO-4: Employ Creative Inquiry and Discovery in addition to a range of analytical skills, and general knowledge to develop design proposals, solve problems, generate new ideas, and produce creative work. PO-5: Demonstrate Responsible Leadership in working with the land and the people for whom we design
Program Specific Outcomes	PSO1. To develop an understanding of the plants and systems influencing in Landscape Design PSO2. To equip the students with the knowledge base regarding history of landscape Architecture with the various theories that have guided the landscape design through the ages. PSO3. To develop an advanced understanding of a site and the surroundings, with a whole-to-part approach on a holistic basis PSO4. To Familiarize the Students to The Environmental Legislation and Its Components PSO5. To develop an understanding of the land and its

	designed modifications, with an integration of Earth sciences					
Mapping Between PO and PSO		PSO-1	PSO-2	PSO-3	PSO-4	PSO-5
	PO-1					
	PO-2					
	PO-3					
	PO-4					
	PO-5					
Medium of Instruction	English					

Adhikari



Master of Architecture [Landscape Architecture]

Course Outcome

Course Code: MLA11

Course title: Landscape Architecture Studio-I

Course Code	MLA11																														
Course Title	Landscape Architecture Studio-I																														
Credit	12																														
Teaching per Week	12 Hours																														
Minimum weeks per Semester	16																														
Effective From	February 2020																														
Purpose of Course	The purpose of the course is to make the student capable of implementing the concepts, methods, and tools of Landscape Architecture																														
Course Objective	To develop an understanding about space design at local level																														
Course Outcomes	CO1: Landscape Analysis of small recreational or civic spaces at community level for medium sized sites of area up to 2 Hectare CO2: Landscape Design of small recreational or civic spaces at community level for medium sized sites of area up to 2 Hectare CO3: Site Planning of small recreational or civic spaces at community level for medium sized sites of area up to 2 Hectare CO4: Application of the learning from other subjects of the present semester to add value to the Studio outcome																														
Mag between COs with PSO	<table><tr><td></td><td>PSO-1</td><td>PSO-2</td><td>PSO-3</td><td>PSO-4</td><td>PSO-5</td></tr><tr><td>CO-1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-4</td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	CO-1						CO-2						CO-3						CO-4					
	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5																										
CO-1																															
CO-2																															
CO-3																															
CO-4																															
Pre-requisite	Basic Inclination towards Landscape Architecture																														
Course Content	Studio project in Landscape Analysis, Landscape Design and Site Planning of small recreational or civic spaces at community level for medium sized sites of area up to 2 Hectare; Students are expected to incorporate the learning from other subjects of the present semester to add value to the Studio outcome. Various materials, which can be used on Site for different components of the built form, may be explored through Site visits and observatory studies. Design may be a cumulative result of an informed decisions of varied nature with due care to prevent Soil erosion, promote ground water recharge processes Understanding and Conceptualisation of Landscape Design Interventions/ Justification of Landscape Design Interventions / Detailing of Landscape Design Interventions																														

Master of Architecture [Landscape Architecture]

Reference Books	1. C, H.T. (n.d) Land Form Designs , P D A Publication. 2. H, P.P. (n.d) Concrete Floors Finishes . 3. Michael, L. (1988) Tree Detailing, London: Butterworth Architecture. 4. Michael, L. (n.d) Landscape Detailing Vol.1 Enclosure. 5. Stevens. D. (n.d) Ultimate Water Garden Book.
Teaching Methodology	Studio-work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	40% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 60% External based on semester end University examination (Viva/ Jury)

Almohd



Master of Architecture [Landscape Architecture]

Course Code	MLA12																														
Course Title	Plant Systematics, Plant Processes, and field Study																														
Credit	6																														
Teaching per Week	6 Hours																														
Minimum weeks per Semester	16																														
Effective From	February 2020																														
Purpose of Course	The purpose of the course is to make the student capable of implementing the concepts, methods, and tools of Landscape Architecture																														
Course Objective	To develop an understanding of the plant material in Landscape Design. Examine the characteristics of Plants with reference to the plant material in design. Field trips with experts are required to identify the specific characteristics of the plants. Students are required to prepare a herbarium.																														
Course Outcomes	CO1: To develop an understanding of the plants and systems influencing in Landscape Design CO2: General study of plant morphology and anatomy to understand the plant functions. CO3: Classification of Plant Kingdom, Taxonomy, Principles of nomenclature and identification CO4: Structural characteristics of plants, trees, shrubs and ground covers																														
Mapping between COs with PSOs	<table><tr><td></td><td>PSO-1</td><td>PSO-2</td><td>PSO-3</td><td>PSO-4</td><td>PSO-5</td></tr><tr><td>CO-1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-4</td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	CO-1						CO-2						CO-3						CO-4					
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CO-2																															
CO-3																															
CO-4																															
Pre-requisite	Basic Inclination towards Landscape Architecture																														
Course Content	Unit – I Fundamentals of plants, identification of physiological characteristics, deciduous and evergreen, and user's pattern Unit – II General study of plant morphology and anatomy to understand the plant functions.																														

Master of Architecture [Landscape Architecture]

	Unit – III Plant identification criteria: growth habits, habitat, origin, growth duration, leaf arrangement, leaf type, main flower colour, flowering period, family, genus Unit – IV Classification of Plant Kingdom. Taxonomy Principles of nomenclature and identification. Unit – V Structural characteristics of plants, trees, shrubs and ground covers. Plant formations in Eco zones. Interdependence of animals and plants Field visit(s) required to identify the characteristics of various flora. by visiting a greenhouse / Nursery / seedbed
Reference Books	1. Randhwa, M.S. (1957) Flowering Trees, New Delhi: Indian Council Of Agricultural Research. 2. H. S. (1966) Common Trees –India, The Land And the People, New Delhi: National Book Trust. 3. Bose, T.K., Chowdhury, B. and Sharma, S.P. (2011) Tropical Garden Plants in Colour, New Delhi: Horticulture And Allied Publishers. 4. M., L. a. G.H. (1964) Taxonomy of Vascular Plants, New York: Oxford. P. M. (2008) Trees of India (WWF Natures Guide), London: Oxford; Edition edition. 5. Raunkier, C. (1934) The Life forms of Plants and statistical Plant Geography, London: Oxford At The Clarendon Press. S, R.M. (1971) Flowering trees (India-The land and people), New Delhi: National Book Trust. 6. S.G, N. (2004) Forest Trees of South India, Bengaluru: Navabharath Press
Teaching Methodology	Studio-work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	40% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 60% External based on semester end University examination (Viva/ Jury)

Admsh



Master of Architecture [Landscape Architecture]

Course Code	MLA13																														
Course Title	Theory of Landscape Architecture - I																														
Credit	3																														
Teaching per Week	3 Hours																														
Minimum weeks per Semester	16																														
Effective From	February 2020																														
Purpose of Course	The purpose of the course is to make the student capable of implementing the concepts, methods, and tools of Landscape Architecture																														
Course Objective	To equip the students with the knowledge base regarding history of landscape Architecture with the various theories that have guided the landscape design through the ages.																														
Course Outcomes	CO1: To equip the students with the knowledge base regarding history of landscape Architecture with the various theories that have guided the landscape design through the ages. CO2: Relating landscape design to societal, cultural, technological and belief systems of the period CO3: Man, and nature, Process of transforming landscapes CO4: Cultural landscapes: identity, collective memory; landscape as text, Landscape as an Art																														
Mapping between COs with PSOs	<table><tr><td></td><td>PSO-1</td><td>PSO-2</td><td>PSO-3</td><td>PSO-4</td><td>PSO-5</td></tr><tr><td>CO-1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-4</td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	CO-1						CO-2						CO-3						CO-4					
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Pre-requisite	Basic Inclination towards Landscape Architecture																														
Course Content	Unit – I Traces of landscape planning and design from pre-history through Eastern. Egyptian. Roman. Islamic and Medieval gardens to Renaissance, Italian, French and English landscape approaches, culminating in the mid-19th century. Unit – II Relating landscape design to societal, cultural, technological and belief systems of the period. Study of works of renowned Landscape Architects and Architects Unit – III Man and nature, Process of transforming landscapes; landscapes of Power, Faith and Place. Development of landscape design and gardens till the early 19th century. Unit – IV Detailed study of selected examples from eastern, central and western traditions; Ancient: Mesopotamia, Egypt, Greece, Rome Western: Europe, Italy, France, England Middle-east: Persian																														

Master of Architecture [Landscape Architecture]

	traditions Eastern: China and Japan; ancient and medieval period in India; Mughal and Rajput Landscapes Unit – V Cultural landscapes: identity, collective memory; landscape as text. Landscape as an Art. Theoretical terrain of landscape architecture: nature of theory in landscape architecture, design process, form, meaning and experience. Society, language, representation of landscape: ecological design, aesthetics of sustainability
Reference Books	1. Schaal ,Hans Dieter (1993) , New Landscape Architecture. Ernst and Sohn 2. Dee, C. (2001) Form and Fabric: A Visual Introduction, London: Spon Press- Taylor and Francis Group. 3. etal., A.a. (n.d) Building and Landscape.? 4. G.B.Tobey (1973) A history of American Landscape architecture, American elsevier Publishing Co.,NY. 5. Hill, P. (2004) Contemporary history of garden design . Birkhauser publishers. 6. Jellico, G.a.S. (1995) The Landscape of Man, Thames & Hudson Publication. 7. Lehrman, J. (1980) Earthly Paradise- Garden and courtyard in Islam, Thames and Hudson. 8. Maria, C.B.J. (n.d) Mastaedi Arain: Landscape Design Today, Spain . 9. Newton, N.T. (n.d) Design on the Land: The Development of Landscape Architecture . 10. Repishti, P.a.F. (2003) Dictionary of today's landscape designers, SkiraEditores P.A
Teaching Methodology	Studio-work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	40% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 60% External based on semester end University examination (Viva/ Jury)

(Signature)



Master of Architecture [Landscape Architecture]

Course Code	MLA14																														
Course Title	Site Planning and Landscape Engineering - I																														
Credit	3																														
Teaching per Week	3 Hours																														
Minimum weeks per Semester	16																														
Effective From	February 2020																														
Purpose of Course	The purpose of the course is to make the student capable of implementing the concepts, methods, and tools of Landscape Architecture																														
Course Objective	To develop an advanced understanding of a site and the surroundings, with a whole-to-part approach on a holistic basis. Students must examine the natural, cultural, and social systems that affect design decisions, as well as the language and literature of landscape architecture. Studies to be undertaken on land development planning to appraise students in environmental, economic, legal, and visual issues associated with land planning process																														
Course Outcomes	CO1: To develop an advanced understanding of a site and the surroundings, with a whole-to-part approach on a holistic basis CO2: Site mobilisation; Sequence of site activity, site protection measures, site implementation checklist CO3: Environment-friendly material specifications and methodologies in landscape, to reduce carbon Footprint. CO4: Estimation of costs for civil works and plantation works. Preparation of bill of quantities. Specifications and Tender documents																														
Mapping between COs with PSOs	<table><tr><td></td><td>PSO-1</td><td>PSO-2</td><td>PSO-3</td><td>PSO-4</td><td>PSO-5</td></tr><tr><td>CO-1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-4</td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	CO-1						CO-2						CO-3						CO-4					
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Pre-requisite	Basic Inclination towards Landscape Architecture																														
Course Content	Components of Landscape Engineering, Site mobilisation, Soil conservation and erosion control measures and Estimation of costs for civil works and plantation works Unit – I Components of Landscape Engineering and their consideration in Site Planning and Landscape design. Appraisal of site factors in large scale developments with above correlation. Use of relevant software and advanced mapping technology for analysis. Unit – II Site mobilisation; Sequence of site activity, site protection measures, site implementation checklist. Landscape Engineering and water conservation: Watersheds and their characteristics, protection of																														

Master of Architecture [Landscape Architecture]

	natural water bodies; water retention structures, water harvesting techniques and devices. Unit – III Understanding Land/environmental modifications and engineering intervention in : Soil conservation and erosion control measures; Land reclamation and rehabilitation process; Disposal of sludge, fly-ash, solid and liquid waste; Strip-mines and quarries; Transportation corridors. Horticulture and Forestry techniques. Unit – IV Environment-friendly material specifications and methodologies in landscape, to reduce carbon Footprint. Energy saving techniques in landscape engineering for planning of services and utilities. Design parameters and certification criteria for green buildings. Evaluating energy efficient site planning and landscape development. Design of sustainable landscape features such as bioswales, bio retention ponds etc. Unit – V Estimation of costs for civil works and plantation works. Preparation of bill of quantities. Specifications and Tender documents
Reference Books	1. ines, C.W.H.N.T. (2001) Time saver Standards for Landscape Architecture, Mc. Graw Hill. 2. Hack, K.L.a.G. (1984) Site Planning , MIT PRESS. 3. Hamid, S. (1985) Urban Design Process , Van Nostrand Reinhold. 4. Hopper (n.d) Landscape Architectural Graphic Standards Student Ed., John Wiley and Sons Inc. 5. Ingels, J.E. (1992) Landscaping – Principles & Practices , Pelmer Publishers Inc. 6. Lovejoy. D. (1973) Land use and Landscape Planning. Barnes & Noble. 7. Lynch, K. (1994) A Good City Form , MIT PRESS. 8. Mukoda, N. (1990) Street furniture, Bijutsushuppan – sha Ltd. 9. Niall, K.a. (n.d) The Art of Landscape Detail: Fundamentals, Practices and Case Studies
Teaching Methodology	Studio-work. Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	40% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 60% External based on semester end University examination (Viva/ Jury)

Signature



Master of Architecture [Landscape Architecture]

Course Code	MLA15																														
Course Title	Environmental Legislation and EIA																														
Credit	3																														
Teaching per Week	3 Hours																														
Minimum weeks per Semester	16																														
Effective From	February 2020																														
Purpose of Course	The purpose of the course is to make the student capable of implementing the concepts, methods, and tools of Landscape Architecture																														
Course Objective	To Familiarize The Students To The Environmental Legislation And Its Components And It's Role In Checking The Damage To The Environment																														
Course Outcomes	CO1: To Familiarize the Students to The Environmental Legislation and Its Components CO2: Human Impact On Ecosystems Environmental Impact Of Man's Activities On Earth CO3: Environmental Impact Assessment – Definitions, Methodologies, Techniques, Advantages And Disadvantages CO4: Conservation And Preservation Legislation																														
Mapping between COs with PSOs	<table><tr><td></td><td>PSO-1</td><td>PSO-2</td><td>PSO-3</td><td>PSO-4</td><td>PSO-5</td></tr><tr><td>CO-1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-4</td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	CO-1						CO-2						CO-3						CO-4					
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Pre-requisite	Basic Inclination towards Landscape Architecture																														
Course Content	UNIT 1 Components Of Environment Environmental Sciences, Environment – Definition, Important Components, Quality Of Total Environment. UNIT 2Human Impact On Ecosystems Environmental Impact Of Man's Activities On Earth, Impacts Of Agriculture, Industrialization, Urbanization. Relations Between Local Modification And Global Phenomena. Green House Effect, Acid Rain Etc., Pollution – Definition, Pollution Of Air, Water, Land And Noise. Effect On Humans, Vegetation And Other Life Forms, Degradation Of Land. International Treaties On Environment, Sustainable Development –																														

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	Ecological And Environmental Parameters, Public Participation And Role Of Ngos. Status Of Environment In India. UNIT 3 Environmental Legislation Concept Of Law Constitution In Relation To Environment. Introduction To Town Planning Legislation And Legal Tools For Development Control And Their Relationship For Landscape Design Objectives. Indian Forests Acts – Preserved, Protected, Private And Village Forests, Wild Life Sanctuaries Act. Legislative And Administrative Framework For National Parks In U.K., U.S.A. And India. Periphery Control Legislation And Green Belt Concept. Preservation Of The Countryside. UNIT4 Conservation And Preservation Legislation Relating To Preservation Of Parks, Open Spaces, Playgrounds, Trees And Ancient Monuments. Legislation Related To Air, Water, Land Pollution Prevention UNIT 4 Environmental Impact Assessment Environmental Impact Assessment – Definitions, Methodologies, Techniques, Advantages And Disadvantages. Process – Data Collection, Identification Of Study Area. Scope, Aim, Environmental Standards And Their Measurement. EIA In India, Legislation Related To EIA, EIA In Developed And Developing Countries
Reference Books	1. Michael Allaby, Basics Of Environmental Science, Routledge, 2000. 2. Avjit Gupta And Mukul.G.Asher, Environment And The Developing World, John Wiley And Sons, Inc, 2000. 3. Larry W.Canter, Environmental Impact Assessment, Mcgraw – Hill, Inc,1996 4. H.N.Tiwari, Environmental Law, Allahad Law Agency. 1997. 5. Rosencrany, A.Diwan, Noble.M, Environmental Law And Policy In India (Cases, Materials. And Statutues). Tripathi Bombay. 1991
Teaching Methodology	Studio-work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	40% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 60% External based on semester end University examination (Viva/ Jury)

Signature



Master of Architecture [Landscape Architecture]

Course Code	MLA16																														
Course Title	Sustainability and Energy Conservation in Landscape Architecture																														
Credit	3																														
Teaching per Week	3 Hours																														
Minimum weeks per Semester	16																														
Effective From	February 2020																														
Purpose of Course	The purpose of the course is to make the student capable of implementing the concepts, methods, and tools of Landscape Architecture																														
Course Objective	To expose the students on the issues of sustainability at the global level. To focus on the energy conservation landscape and sustainability at the micro level. Sustainable landscape design for various climates of Indi																														
Course Outcomes	CO1: Introduction To Sustainability Need and concept of sustainability CO2: Introduction To Energy Conservation In Landscape Energy conservation and sustainability CO3: Energy Conservation Methods In Landscape Architecture CO4: Sustainable Landscape Practices																														
Mapping between COs with PSOs	<table><tr><td></td><td>PSO-1</td><td>PSO-2</td><td>PSO-3</td><td>PSO-4</td><td>PSO-5</td></tr><tr><td>CO-1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-4</td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	CO-1						CO-2						CO-3						CO-4					
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Pre-requisite	Basic Inclination towards Landscape Architecture																														
Course Content	UNIT 1 Introduction To Sustainability Need and concept of sustainability. Brundtland report, World Commission on environment and development, sustainable development, sustainable growth, sustainable economy and sustainable use. Visions of sustainability. Source and ethics of sustainability. Sustainability and Climate Change UNIT 2 Sustainable Site Sustainable site – LEEDS, BREAM, rating erosion and sedimentation control, site selection, urban development, landscape and exterior design etc., Green Building in the context of sustainability. Ecology and sustainability. Eco-City																														

Master of Architecture [Landscape Architecture]

	UNIT 3 Introduction To Energy Conservation In Landscape Energy conservation and sustainability, principles of energy systems, energy and global environment, scope for energy conservation in landscape. UNIT 4 Energy Conservation Methods In Landscape Architecture-Case Studies Various methods of energy conservation in landscape architecture, energy conservation techniques in various climates- hot and humid, hot dry, etc. Energy efficient site planning and landscape development. Energy efficient planting design UNIT 5 Sustainable Landscape Practices Sustainable landscape maintenance and management. Sustainable planning and city form. Sustainable urban landscape, landscape sustainability at the national and regional level
Reference Books	1. John.F.Benson and Maggie.H.Roe, Landscape and sustainability, John Wiley Publication, New York. 2000. 2. O.R.Gray, Landscape Planning for Energy Conservation, 3. Anne Simon Moffat and Marc Schiller, Landscape design that saves energy, William Monow and co.,Inc., New York, 1981. 4. Publications of Centre for science and environments, TERI, New Delhi
Teaching Methodology	Studio-work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	40% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 60% External based on semester end University examination (Viva/ Jury)

Signature



Master of Architecture [Landscape Architecture]

Course Code	MLA21																														
Course Title	Landscape Architecture Studio-II																														
Credit	12																														
Teaching per Week	12 Hours																														
Minimum weeks per Semester	16																														
Effective From	February 2020																														
Purpose of Course	The purpose of the course is to make the student capable of implementing the concepts, methods, and tools of Landscape Architecture																														
Course Objective	To develop the skill to integrate various knowledge systems to arrive at a design proposal of an urban scale, the process used for the same																														
Course Outcomes	CO1: application of ecological principles CO2: Urban Open Space systems CO3: Rural Landscape CO4: Heritage and Cultural Landscape																														
Mapping between COs with PSOs	<table><tr><td></td><td>PSO-1</td><td>PSO-2</td><td>PSO-3</td><td>PSO-4</td><td>PSO-5</td></tr><tr><td>CO-1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-4</td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	CO-1						CO-2						CO-3						CO-4					
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Pre-requisite	Basic Inclination towards Landscape Architecture																														
Course Content	Exercise related to the application of ecological principles in a range of situations directed towards understanding and proposing design possibilities in: Urban Open Space systems Rural Landscape Heritage and Cultural Landscape																														
Reference Books	1. C, H.T. (n.d) Land Form Designs , P D A Publication. 2. H, P.P. (n.d) Concrete Floors Finishes .																														

Master of Architecture [Landscape Architecture]

	3. Michael, L. (1988) Tree Detailing. London: Butterworth Architecture. 4. Michael, L. (n.d) Landscape Detailing Vol.1 Enclosure. 5. Stevens, D. (n.d) Ultimate Water Garden Book.
Teaching Methodology	Studio-work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	40% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 60% External based on semester end University examination (Viva/Jury)

Almehdi



Master of Architecture [Landscape Architecture]

Course Code	MLA22																																			
Course Title	Plants and Design																																			
Credit	6																																			
Teaching per Week	6 Hours																																			
Minimum weeks per Semester	16																																			
Effective From	February 2020																																			
Purpose of Course	The purpose of the course is to make the student capable of implementing the concepts, methods, and tools of Landscape Architecture																																			
Course Objective	To develop an enhanced understanding of the plant material in Landscape Design and to examine the characteristics of Plants with reference to the plant material in design																																			
Course Outcomes	CO1: Planting design through the ages - a historic perspective CO2: Visual, aesthetic and functional considerations in planting design. CO3: Plants and sustainability CO4: Maintenance of plant material																																			
Mapping between COs with PSOs	<table><tr><td></td><td>PSO-1</td><td>PSO-2</td><td>PSO-3</td><td>PSO-4</td><td>PSO-5</td></tr><tr><td>CO-1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-4</td><td></td><td></td><td></td><td></td><td></td></tr></table>							PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	CO-1						CO-2						CO-3						CO-4					
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Pre-requisite	Basic Inclination towards Landscape Architecture																																			
Course Content	Unit – I Planting design through the ages - a historic perspective. Planting as a design element for structuring the landscape. Differentiation between trees, shrubs, ground cover and creepers. Planting for appearance of form, leaf color and texture, branching habit and trunk form and their texture, color of flowers and fruits. Spring, winter summer and autumn variation in appearance. Unit – II Visual, aesthetic and functional considerations in planting design. Planting for visual effect and accent. The role of plant material in environmental improvement, (e.g. soil conservation, modification of microclimate). Planting for shelter, windbreaks and shelter belts.																																			

Master of Architecture [Landscape Architecture]

	Unit – III Planting in various environments such as woodlands, forests, rural areas, urban areas, roadside planting in urban and rural areas, industrial sites etc. Planting design for habitat such as grasslands, woodlands, sloping areas, marshes, bogs, wetlands, waterside and aquatic planting etc. Planting design and ecological considerations, stratification of plant material in nature, herbal plants and their uses. Unit – IV Plants and sustainability. Growth rate of plants as a criterion for plant choice for particular situations. Comparison of advantages and disadvantages of fast, medium and slow growing trees. The concept of nurse planting. Creating conditions for plant establishment, planting and transplanting trees and shrubs. Unit – V Maintenance of plant material; The preparation of planting concepts, planting plans and plant schedules for various scales of project. Estimation of costs and Bill of quantities
Reference Books	1. Randhwa, M.S. (1957) Flowering Trees, New Delhi: Indian Council Of Agricultural Research. 2. H. S. (1966) Common Trees – India, The Land And the People, New Delhi: National Book Trust. 3. Bose, T.K., Chowdhury, B. and Sharma, S.P. (2011) Tropical Garden Plants in Colour, New Delhi: Horticulture And Allied Publishers. 4. M., L. a. G. H. (1964) Taxonomy of Vascular Plants, New York: Oxford. P. M. (2008) Trees of India (WWF Natures Guide), London: Oxford; Edition edition. 5. Raunkier, C (1934) The Life forms of Plants and statistical Plant Geography, London: Oxford At The Clarendon Press. S. R. M. (1971) Flowering trees (India-The land and people), New Delhi: National Book Trust. 6. S. G. N. (2004) Forest Trees of South India, Bengaluru: Navabharath Press
Teaching Methodology	Studio-work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	40% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 60% External based on semester end University examination (Viva/ Jury)

Signature



Master of Architecture [Landscape Architecture]

Course Code	MLA23																														
Course Title	theory of Landscape Architecture – II																														
Credit	3																														
Teaching per Week	3 Hours																														
Minimum weeks per Semester	16																														
Effective From	February 2020																														
Purpose of Course	The purpose of the course is to make the student capable of implementing the concepts, methods, and tools of Landscape Architecture																														
Course Objective	To develop an understanding of contemporary landscapes and as to how environmental issues and ecological issues have been resolved in them; and understanding regional scale of landscape architecture and its allied aspects																														
Course Outcomes	CO1: Garden design CO2: growth and development of landscape CO3: multi functional landscape CO4: urban landscape																														
Mapping between COs with PSOs	<table><tr><td></td><td>PSO-1</td><td>PSO-2</td><td>PSO-3</td><td>PSO-4</td><td>PSO-5</td></tr><tr><td>CO-1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-4</td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	CO-1						CO-2						CO-3						CO-4					
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CO-1																															
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CO-3																															
CO-4																															
Pre-requisite	Basic Inclination towards Landscape Architecture																														
Course Content	Garden design, growth and development of landscape , multi functional landscape and urban landscape Unit – I Modern garden design and innovations in landscape architecture; The contemporary history of the profession with study of theory and works of Andrew Jackson Downing, Frederick Law Olmsted, Ian McHarg, Thomas Church, Lawrence Halprin, Burle Marx to present day significant designers. Unit – II Growth and development of Landscape as a profession: Professional education, the environmental movement, large scale regional planning, significant landscape architectural projects of the past century. Unit – III Landscape and cities: rural settlements and civic transformations; landscape fragmentation, sensitivity and change.																														

Master of Architecture [Landscape Architecture]

	Unit IV Multifunctional landscape, Continuous Productive Urban Landscape - urban agriculture for sustainable cities Unit –V Market gardens; Landscape as a historic preservation resource; Green pilgrimage network, Sacredlandscape and Historic Urban Landscape
Reference Books	1. Andre Viljone, K.B.J.H. (2005) Continuous Productive Urban Landscapes: Designing Urban Agriculture for Sustainability, Elsevier- Architectural Press. 2. Du, G.W.a.B.S. (2016) Mohammad Shaheer NOTES : A selection of Articles published in LA. Journal of Landscape Architecture, A special edition. 3. McHarg, I.L. (1995) Design with Nature , Wiley. 4. National ParkService Conference. (1999) Preserving Modern Landscape Architecture, Spacemaker press 5. Newton, N.T. (n.d) Design on the Land: The Development of Landscape Architecture . 6. Spens,M(1996)Landscape Transformed, Academy Edition. 7. Modern Landscape Architecture: a CriticalReview , MIT press. 8. Moore, C. (n.d) Poetics of Garden . 9. Shaheer, M. (2013) Landscape Architecture in India : A Reader, LA Journal of Landscape Architecture. 10. Singh, M.J.a.I. (2017) Landscape Architecture: History, Ecology and Patterns. copal publication
Teaching Methodology	Studio-work, Discussion. Self-Study, Seminars and/or Assignment
Evaluation Method	40% Internal assessment based on class attendance, participation, class test, quiz. assignment, seminar, internal examination, etc. 60% External based on semester end University examination (Viva/ Jury)

Signature



Master of Architecture [Landscape Architecture]

Course Code	MLA24-																														
Course Title	Site Planning and Landscape Engineering - II																														
Credit	3																														
Teaching per Week	3 Hours																														
Minimum weeks per Semester	16																														
Effective From	February 2020																														
Purpose of Course	The purpose of the course is to make the student capable of implementing the concepts, methods, and tools of Landscape Architecture																														
Course Objective	To develop an advanced understanding of a site and the surroundings, with a whole-to-part approach on a holistic basis. Students must examine the natural, cultural, and social systems that affect design decisions, as well as the language and literature of landscape architecture. Studies to be undertaken on land development planning to appraise students in environmental, economic, legal, and visual issues associated with land planning process																														
Course Outcomes	CO1: Components of Landscape Engineering CO2: Site mobilisation; Sequence of site activity, site protection measures, site implementation checklist. Landscape Engineering and water conservation CO3: Understanding Land/environmental modifications and engineering intervention CO4: Environment-friendly material specifications and methodologies in landscape																														
Mapping between COs with PSOs	<table><tr><td></td><td>PSO-1</td><td>PSO-2</td><td>PSO-3</td><td>PSO-4</td><td>PSO-5</td></tr><tr><td>CO-1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-4</td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	CO-1						CO-2						CO-3						CO-4					
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Pre-requisite	Basic Inclination towards Landscape Architecture																														
Course Content	Components of Landscape Engineering, Site mobilisation, Soil conservation and erosion control measures and Estimation of costs for civil works and plantation works Unit – I Components of Landscape Engineering and their consideration in Site Planning and Landscape design. Appraisal of site factors in																														

Master of Architecture [Landscape Architecture]

	large scale developments with above correlation. Use of relevant software and advanced mapping technology for analysis. Unit – II Site mobilisation; Sequence of site activity, site protection measures, site implementation checklist. Landscape Engineering and water conservation; Watersheds and their characteristics, protection of natural water bodies: water retention structures, water harvesting techniques and devices. Unit – III Understanding Land/environmental modifications and engineering intervention in : Soil conservation and erosion control measures; Land reclamation and rehabilitation process; Disposal of sludge, fly-ash, solid and liquid waste; Strip-mines and quarries; Transportation corridors. Horticulture and Forestry techniques. Unit – IV Environment-friendly material specifications and methodologies in landscape, to reduce carbon Footprint. Energy saving techniques in landscape engineering for planning of services and utilities. Design parameters and certification criteria for green buildings. Evaluating energy efficient site planning and landscape development. Design of sustainable landscape features such as bioswales, bio retention ponds etc. Unit – V Estimation of costs for civil works and plantation works. Preparation of bill of quantities, specifications and Tender documents
Reference Books	1. Ines, C.W.H.N.T. (2001) Time saver Standards for Landscape Architecture, Mc. Graw Hill. 2. Hack, K.L.a.G. (1984) Site Planning, MIT PRESS. 3. Hamid, S. (1985) Urban Design Process, Van Nostrand Reinhold. 4. Hopper (n.d) Landscape Architectural Graphic Standards Student Ed., John Wiley and Sons Inc. 5. Ingels, J.E. (1992) Landscaping – Principles & Practices, Pelmer Publishers Inc. 6. Lovejoy, D. (1973) Land use and Landscape Planning. Barnes & Noble. 7. Lynch, K. (1994) A Good City Form, MIT PRESS. 8. Mukoda, N. (1990) Street furniture, Bijutsushuppan – sha Ltd. 9. Niall, K.a. (n.d) The Art of Landscape Detail: Fundamentals, Practices and Case Studies. 10. Reid, G.W. (1987) Landscape Graphics, Watson, New York: Guptill publication
Teaching Methodology	Studio-work, Discussion, Self-Study, Seminars and/or Assignment

Master of Architecture [Landscape Architecture]

Evaluation Method	40% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 60% External based on semester end University examination (Viva/Jury)

Adm. Officer



Master of Architecture [Landscape Architecture]

Course Code: MLA25 Course title: Urban Governance

Course Code	MLA25																														
Course Title	Urban Governance																														
Credit	3																														
Teaching per Week	3 Hours																														
Minimum weeks per Semester	16																														
Effective From	February 2020																														
Purpose of Course	The purpose of the course is to make the student capable of implementing the concepts, methods, and tools of Landscape Architecture																														
Course Objective	Exposure to the Urban governance																														
Course Outcomes	CO1: Overview of Urban Governance CO2: Legislations pertaining to Urban Governance CO3: Institutions and Organizations CO4: Urban Local Governance and Participatory Processes System,																														
Mapping between COs with PSOs	<table><tr><td></td><td>PSO-1</td><td>PSO-2</td><td>PSO-3</td><td>PSO-4</td><td>PSO-5</td></tr><tr><td>CO-1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-4</td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	CO-1						CO-2						CO-3						CO-4					
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CO-4																															
Pre-requisite	Basic Inclination towards Landscape Architecture																														
Course Content	Unit 1: Overview of Urban Governance Definition, concepts, components, government and governance, hierarchy and structure, forms of governance, process of inclusion and exclusion, Unit e 2: Legislations pertaining to Urban Governance Institutional frame and mechanism for urban governance as envisaged in the 73rd and 74th Constitution Amendment Acts. Unit 3: Institutions and Organizations Differences between institutions and organizations; approaches to understanding organizations; types, structure and functions, their interface and conflicts, reach, and their																														

Master of Architecture [Landscape Architecture]

	effectiveness; Methods, process and evaluation; Present organizations and involved in urban governance. Unit 4: Urban Local Governance and Participatory Processes System, structure, functions, powers, process and resource, performance, interface with NGO's, other agencies. Stakeholders' participation, roles and responsibilities, access to government by various stakeholder
Reference Books	NIL
Teaching Methodology	Studio-work, Discussion. Self-Study, Seminars and/or Assignment
Evaluation Method	40% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 60% External based on semester end University examination (Viva/ Jury)

Abhishek



Master of Architecture [Landscape Architecture]

Course Code	MLA26																														
Course Title	Geoinformatics for Landscape Architecture																														
Credit	3																														
Teaching per Week	3 Hours																														
Minimum weeks per Semester	16																														
Effective From	February 2020																														
Purpose of Course	The purpose of the course is to make the student capable of implementing the concepts, methods, and tools of Landscape Architecture																														
Course Objective	To develop an understanding of the land and its designed modifications, with an integration of Earth sciences To develop understanding and capacity building to use information science in landscape architecture to address various problems of geography, cartography, geosciences and related branches of science and engineering in landscape design and planning																														
Course Outcomes	CO1: Concept and Foundation of Remote Sensing CO2: Introduction to Air Photo Interpretation CO3: Digital Image Processing CO4: Geographical Information Systems																														
Mapping between COs with PSOs	<table><tr><td></td><td>PSO-1</td><td>PSO-2</td><td>PSO-3</td><td>PSO-4</td><td>PSO-5</td></tr><tr><td>CO-1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-4</td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	CO-1						CO-2						CO-3						CO-4					
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CO-4																															
Pre-requisite	Basic Inclination towards Landscape Architecture																														
Course Content	Concept ,Foundation and application of Remote Sensing and GIS Unit – I Concept and Foundation of Remote Sensing, Elements of Photographic System Types of Aerial Photographs:Vertical Photographs, Oblique Photographs, Satellite Imagery Unit – II Introduction to Air Photo Interpretation, Photogrammetry for Map Making :Introduction /Definition, Geometric Elements of a Vertical Photograph, Relief Displacement, Ground Control for Aerial Photography Unit – III Digital Image Processing, Applications : Geologic & Soil mapping, Land-use / land cover Mapping a) Land use Classification, Agriculture Applications, Forestry Applications, Water resource																														

Master of Architecture [Landscape Architecture]

	Applications: Water Pollution Detection, Flood Damage Estimation, Urban & Regional Planning Applications, Wetland mapping Unit – IV Geographical Information Systems :Definition, Composition of Geographical Information System, Computer Hardware Module. GIS Software Module, Data Input. Data Storage, Data Output, Database Structures Unit – V Presentations / Workshop Application of GIS & Remote Sensing, Automated Mapping / Facility Management. (AM/FM), 3-D GIS Digital Elevation Model & Digital Terrain Model, Digital Image Processing and Editing; Error Detection and Correction, Geo Spatial Analysis : Turning Data into Meaningful information. Comparison of Vector & Raster Methods, Internal G.I.S., Network Analysis. Open GIS
Reference Books	1. Batty, D.M.a.M. (ed.) (2005) GIS, Spatial Analysis and Modeling, ESRI Press. 2. Brewer, C.A. (n.d) Designing Better Maps: A Guide for GIS Users. ESRI Press. 3. C, H.T. (n.d) Land Form Designs, P D A Publication. 4. C.Hanna, K. (1999) GIS for Landscape Architects, ESRI press. 5. G.S.Srivastava (2014) An Introduction to Geoinformatics, McGraw Hill Education. 6. Garcia, J. (2017) Introduction to Geographic Information System, Larsen and Keller Education. 7. H, P.P. (1995) Concrete Floors Finishes . Butterworth-Heinemann. 8. K.R, B. (1990) Integrating GIS into Urban Regional Planning, Alternative approaches for developing countries regional development Dialogue , Japan: UNCRD. 9. Michael, L. (1988) Tree Detailing , London: Butterworth Architecture. 10. Michael, L. (1993) Landscape Detailing Vol.1 Enclosure , 3rd edition. Architectural Pres
Teaching Methodology	Studio-work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	40% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 60% External based on semester end University examination (Viva/ Jury)

Signature



Master of Architecture [Landscape Architecture]

Course Code	MLA31																														
Course Title	Landscape Architecture Studio - III																														
Credit	12																														
Teaching per Week	12 Hours																														
Minimum weeks per Semester	16																														
Effective From	February 2020																														
Purpose of Course	The purpose of the course is to make the student capable of implementing the concepts, methods, and tools of Landscape Architecture																														
Course Objective	To develop the skill to integrate various knowledge systems to arrive at a design proposal of an urban scale, the process used for the same																														
Course Outcomes	CO1: Institutional Campuses CO2: Urban civic spaces at urban design scale CO3: Transportation and interchange systems and complexes CO4: Eco-Tourism projects																														
Mapping between COs with PSOs	<table><tr><td></td><td>PSO-1</td><td>PSO-2</td><td>PSO-3</td><td>PSO-4</td><td>PSO-5</td></tr><tr><td>CO-1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-4</td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	CO-1						CO-2						CO-3						CO-4					
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Pre-requisite	Basic Inclination towards Landscape Architecture																														
Course Content	Exercise related to the application of ecological principles in a range of situations directed towards understanding and proposing design possibilities in: Institutional Campuses Urban civic spaces at urban design scale																														

Master of Architecture [Landscape Architecture]

	Transportation and interchange systems and complexes Eco-Tourism projects
Reference Books	1. C, H.T. (n.d) Land Form Designs , P D A Publication, 2. H, P.P. (n.d) Concrete Floors Finishes . 3. Michael, L. (1988) Tree Detailing, London: Butterworth Architecture. 4. Michael, L. (n.d) Landscape Detailing Vol.1 Enclosure. 5. Stevens. D. (n.d) Ultimate Water Garden Book
Teaching Methodology	Studio-work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	40% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 60% External based on semester end University examination (Viva/ Jury)

Admohli



Master of Architecture [Landscape Architecture]

Course Code	MLA32																														
Course Title	Landscape Project Management and Professional Practice																														
Credit	06																														
Teaching per Week	06 Hours																														
Minimum weeks per Semester	16																														
Effective From	February 2020																														
Purpose of Course	The purpose of the course is to make the student capable of implementing the concepts, methods, and tools of Landscape Architecture																														
Course Objective	Basic overview of Landscape Project Management and Professional Practice																														
Course Outcomes	CO1: Regulations and Legal Aspects Codes, Standards, Bye laws and planning regulations CO2: Construction administration, Implementation process Sequence of activities from inception to completion CO3: Construction documents Contract Procedure; Criteria for selecting contractors CO4: Professional Practice Types of client: Private, Government, Corporate etc.																														
Mapping between COs with PSOs	<table><tr><td></td><td>PSO-1</td><td>PSO-2</td><td>PSO-3</td><td>PSO-4</td><td>PSO-5</td></tr><tr><td>CO-1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-4</td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	CO-1						CO-2						CO-3						CO-4					
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Pre-requisite	Basic Inclination towards Landscape Architecture																														
Course Content	(a) Regulations and Legal Aspects Codes, Standards, Bye laws and planning regulations applicable to building and landscape development. The role of statutory and regulatory bodies such as the Municipal Corporation, N.D.M.C. D.D.A and Urban Art commission etc. (b) Construction administration , Implementation process Sequence of activities from inception to completion; agencies involved at each stage, their professional relationships and obligations. Co-ordination of agencies and activities on site. Practical examples. Budgetary control, progress evaluation and monitoring; various kinds of estimates, review and updating, simple examples of pert charts and bar diagrams. Site																														

Master of Architecture [Landscape Architecture]

	documentation: importance of written records. Site instruction book. periodic reports, visual records, bar charts etc. Techniques of inspection and quality control: visits to site under development. (c) Construction documents Contract Procedure; Criteria for selecting contractors: the process of calling tenders. Comparison of various kind of tenders with regard to objectives, utility and appropriateness. Tender Documentation and evaluation of tender; negotiations with contractors. Contract Documentation: Forms of contract; General and special conditions, specifications, Bill of quantities; significant clauses pertaining to defects, maintenance, arbitrations, etc. Parties to the contract: their roles, contractual relationships and legal obligations. (d) Professional Practice Types of client: Private, Government, Corporate etc. The scope and meaning of professional services. Professional relationship between client and Landscape Architect: Forms of agreement, conditions of engagement, scope of work and services to be provided. Scale of Professional Fees: Common and accepted methods of charging fees, percentage, lump sum, time-basis etc. Calculation and estimation of fee based on work involved. Taxes, remuneration and reimbursement. Role of Professional Institute: Professional code of conduct. Relationship of Landscape Architect with other professionals. Practical illustrations of various aspects of Client-Landscape Architect transactions, especially with regards to the establishment of credibility and trust.
Reference Books	NIL
Teaching Methodology	Studio-work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	40% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 60% External based on semester end University examination (Viva/ Jury)

Signature



Master of Architecture [Landscape Architecture]

Course Code	MLA33																														
Course Title	Geology & Edaphic parameters																														
Credit	06																														
Teaching per Week	06 Hours																														
Minimum weeks per Semester	16																														
Effective From	February 2020																														
Purpose of Course	The purpose of the course is to make the student capable of implementing the concepts, methods, and tools of Landscape Architecture																														
Course Objective	Overview of Geology & Edaphic parameters																														
Course Outcomes	CO1: Understanding origin and interior of the earth CO2: Understanding Structural geology CO3: Application of geological information in the interpretation of landscapes on maps and in the field CO4: The relationships between geology, soils and vegetation																														
Mapping between COs with PSOs	<table><tr><td></td><td>PSO-1</td><td>PSO-2</td><td>PSO-3</td><td>PSO-4</td><td>PSO-5</td></tr><tr><td>CO-1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-4</td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	CO-1						CO-2						CO-3						CO-4					
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Pre-requisite	Basic Inclination towards Landscape Architecture																														
Course Content	Earth in space; origin and interior of the earth. Early history of the Earth. The origin of life and meaning of fossils as keys to the past. Earthquakes: causes and effects, seismic microzonation, seismic zones of India. Minerals and Metals.Rocks: Igneous. Sedimentary, Metamorphic.Isostasy, plate tectonics, crustal deformation and mountain building.																														

Master of Architecture [Landscape Architecture]

	Structural geology: dip, strike, folds, faults, joints, unconformities. Stratigraphy: principles, stratigraphy and geology of India. Application of geological information in the interpretation of landscapes on maps and in the field. The relationships between geology, soils and vegetation: Practical examples. SOILS Genesis, morphology and classification of soils. Properties of Soils: Physical, Chemical, Biological and Mineralogical. Soil use and Management: (a) Soil evaluation and land-use planning. (b) Soil and water conservation. (c) Soil fertility and plant nutrition. (d) Soil degradation control, remedial actions and reclamation techniques. Managing difficult soils
Reference Books	NIL
Teaching Methodology	Studio-work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	40% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 60% External based on semester end University examination (Viva/Jury)

Signature



Master of Architecture [Landscape Architecture]

Course Code	MLA34																														
Course Title	Ecology and Ecosystem Analysis																														
Credit	03																														
Teaching per Week	03 Hours																														
Minimum weeks per Semester	16																														
Effective From	February 2020																														
Purpose of Course	The purpose of the course is to make the student capable of implementing the concepts, methods, and tools of Landscape Architecture																														
Course Objective	Concept of Ecosystem: General Structure and Function:																														
Course Outcomes	CO1: Energy flow, Primary & Secondary Production CO2: Types of Biogeochemical cycles CO3: Analysis and evaluation CO4: Description and Evaluation Systems																														
Mapping between COs with PSOs	<table><tr><td></td><td>PSO-1</td><td>PSO-2</td><td>PSO-3</td><td>PSO-4</td><td>PSO-5</td></tr><tr><td>CO-1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-4</td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	CO-1						CO-2						CO-3						CO-4					
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CO-1																															
CO-2																															
CO-3																															
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Pre-requisite	Basic Inclination towards Landscape Architecture																														
Course Content	Evolution: Earth and Life Concept of Ecosystem: General Structure and Function: i) Energy flow, Primary & Secondary Production ii) Types of Biogeochemical cycles; Carbon cycle, Global water cycles, nitrogen cycle bioaccumulation and biomagnifications and iii) Analysis and evaluation. Concept of ecosystem services. Types of Ecosystems The Plant Community: General i) Structure, ii) Concept of ecological Succession and Maturity, Types of succession iv) Analysis,																														

Master of Architecture [Landscape Architecture]

	v) Description and Evaluation Systems Ecology: Introduction to systems approach and mathematical models in ecology Population Dynamics: Selected topics in ecosystem management: Climate change – causes and consequences. Aquatic ecology – fresh water and marine Field ecology: Quadrat, line transect, community analysis Field work and laboratory analysis of data
Reference Books	NIL
Teaching Methodology	Studio-work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	40% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 60% External based on semester end University examination (Viva/Jury)

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Master of Architecture [Landscape Architecture]

Course Code	MLA35																																			
Course Title	Landscape Economics Management and horticultural practice																																			
Credit	03																																			
Teaching per Week	03 Hours																																			
Minimum weeks per Semester	16																																			
Effective From	February 2020																																			
Purpose of Course	The purpose of the course is to make the student capable of implementing the concepts, methods, and tools of Landscape Architecture																																			
Course Objective	Overview of Landscape Economics Management and horticultural practice																																			
Course Outcomes	CO1: Economics: CO2: management CO3: Horticulture Practice CO4: Horticulture practice and maintenance																																			
Mapping between COs with PSOs	<table><tr><td></td><td>PSO-1</td><td>PSO-2</td><td>PSO-3</td><td>PSO-4</td><td>PSO-5</td></tr><tr><td>CO-1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-4</td><td></td><td></td><td></td><td></td><td></td></tr></table>							PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	CO-1						CO-2						CO-3						CO-4					
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CO-1																																				
CO-2																																				
CO-3																																				
CO-4																																				
Pre-requisite	Basic Inclination towards Landscape Architecture																																			
Course Content	Economics: Cost and benefits related to open space development; Tangible costs of development; capital and maintenance costs; intangible costs, depletion of natural resources, modification of ecological systems rehabilitation cost, social and cultural changes. Unit cost of development of open space. Management: Landscape management at the regional scale in relation to soil conservation, water management, grassland management, forestry and agriculture .Management practices related to urban ecology and urban habitats, such as urban forests, river banks, regional parks and green belts; ecological, economic and administrative issues. Management models. Horticulture Practice: Nursery establishment and Plant propagation. Establishment and maintenance of grass, shrubs and trees with respect																																			

Master of Architecture [Landscape Architecture]

	to: ground preparation, planting and transplanting, pruning. Horticulture practice and maintenance. Common plant pests, diseases and their control; manures and insecticides and their application. Protection of plant material. Water Budgeting. Equipment for landscape maintenance.
Reference Books	NIL
Teaching Methodology	Studio-work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	40% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 60% External based on semester end University examination (Viva/ Jury)

Amali



Master of Architecture [Landscape Architecture]

Course Code	MLA36																		
Course Title	Landscape thesis																		
Credit	30																		
Teaching per Week	30 Hours																		
Minimum weeks per Semester	16																		
Effective From	February 2020																		
Purpose of Course	The purpose of the course is to make the student capable of implementing the concepts, methods, and tools of Landscape Architecture																		
Course Objective	Student to work on the topic of his / her preference a built a Thesis																		
Course Outcomes	CO1: Theoretical Framework on the topic of his / her preference a built a thesis CO2: Landscape intervention on the topic of his / her preference a built a Thesis																		
Mapping between COs with PSOs	<table><tr><td></td><td>PSO-1</td><td>PSO-2</td><td>PSO-3</td><td>PSO-4</td><td>PSO-5</td></tr><tr><td>CO-1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-2</td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	CO-1						CO-2					
	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5														
CO-1																			
CO-2																			
Pre-requisite	Basic Inclination towards Landscape Architecture																		
Course Content	Landscape Architecture thesis will consist of two parts: (a) Research oriented towards establishing a strong theoretical background for the chosen subject. (b) Application to a Landscape Planning or Landscape Design proposal with appropriate details. Professional Communication III: Application of skills and techniques acquired in the past three semesters to specialized requirements of the Thesis, including the use of video or other digital multimedia for a short, specific exercise related to presentation of thesis work.																		
Reference Books	NIL																		

Master of Architecture [Landscape Architecture]

Teaching Methodology	Studio-work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	40% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 60% External based on semester end University examination (Viva/Jury)



Master of Architecture [Landscape Architecture]

Course Code	MLA36																														
Course Title	Research Methodology																														
Credit	03																														
Teaching per Week	03 Hours																														
Minimum weeks per Semester	16																														
Effective From	February 2020																														
Purpose of Course	The purpose of the course is to make the student capable of implementing the concepts, methods, and tools of Landscape Architecture																														
Course Objective	Overview of Research Methodology in Landscape Architecture																														
Course Outcomes	CO1: Defining the Research Problem and Research Design CO2: Sampling Design Census and sample survey CO3: Methods of Data Collection CO4: Data Analysis, Interpretation and Report Writing																														
Mapping between COs with PSOs	<table><tr><td></td><td>PSO-1</td><td>PSO-2</td><td>PSO-3</td><td>PSO-4</td><td>PSO-5</td></tr><tr><td>CO-1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO-4</td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	CO-1						CO-2						CO-3						CO-4					
	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5																										
CO-1																															
CO-2																															
CO-3																															
CO-4																															
Pre-requisite	Basic Inclination towards Landscape Architecture																														
Course Content	UNIT I: Research Methodology: An Introduction Meaning of Research, Objective of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Importance of Knowing How Research is Done, Research Process, Criteria of Good Research, Problems Encountered by Researchers in India UNIT II: Defining the Research Problem and Research Design What is a Research Problem?, Selecting the Problem, Necessity of Defining the Problem, Meaning of Research Design, Need for Research Design, Future of a Good Design, Important Concepts Relating to Research																														

Master of Architecture [Landscape Architecture]

	Design, Different Research Design, Basic Principals of Experimental Designs UNIT III: Sampling Design Census and sample survey, Implications of a Sample Design, Steps in sampling Design, Criteria of Selecting a Sampling Procedure, Characteristics of a Good Sample Design, Different Types of ample Designs, How to Select a Random Sample?, Random Sample from an Infinite Universe, Complex Random Sampling Designs UNIT IV: Methods of Data Collection Collection of Primary Data, Observation Method, Interview Method, Collection of Data through Questionnaires, Collection of Data through Schedules, Difference between Questionnaires and Schedules, Some Other Methods of Data Collection, Collection of Secondary Data, Selection of Appropriate Method for Data Collection UNIT V: Data Analysis, Interpretation and Report Writing Data Analysis and Presentation Editing and coding of data, tabulation, graphic presentation of data, cross tabulation, Testing of hypotheses; type I and II errors, one tailed and two tailed tests of significance, Parametric and nonparametric tests for Univariate and Bivariate data. Tests of association; simple linear regression and other nonparametric tests, Meaning of Interpretation, Why Interpretation? Technique of Interpretation, Significance of Report Writing, Deferent Steps in Writing Report. Layout of the Research Report, Types of Report, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing a Research Reports
Reference Books	Research Methodology – C R Kothari
Teaching Methodology	Studio-work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	40% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 60% External based on semester end University examination (Viva/ Jury)

Admsh



Name of Program	Master of Urban and Regional Planning						
Abbreviation	M.U.R.P.						
Duration	2 Years						
Eligibility Criteria	Bachelor of Architecture, B.E./ B.Tech.(Civil Engineering), B.Plan., M.A. / M.Sc with (Economics/ Sociology/Geography)						
Objective of Program	The core objective of the MURP programme is to prepare the students for professional career in Urban Planning industry and opportunities in Government/Non Govt. Organizations by providing an outstanding environment of teaching and research in the core and emerging areas of the discipline.						
Program Outcome	PO1: Apply knowledge of statistics, social-science, architecture and civil engineering to urban planning problems. PO2: Identify, formulate, research literature and solve repetitive urban planning problems. PO3: Planning of various infrastructure meeting desired specifications and requirements for sustainable development. PO4: Explore inventory and surveyed data, interpret and analyze the information to provide conclusion. PO5: Select and use appropriate planning techniques and software tools to analyze urban planning problems with understanding of limitations. PO6: Assess local and global impact of societal issues on planning profession. PO7: Able to understand the impact of planning solutions on society and demonstrate the knowledge of, and need for sustainable development.						
Program Specific Outcomes	PSO1: To develop strong understanding of fundamentals in urban and regional planning among the students. PSO2: To provide technical knowledge to formulate, solve and analyse urban planning problems for research and development programmes suitable for Doctoral research to be recognised at a global level. PSO3: To produce students with the necessary theoretical background, technical skills and knowledge of government policies to work professionally in the area of urban planning. PSO4: To prepare students for successful career and technical knowhow with the values and social concern to meet the requirements at National and International levels. PSO5: To provide exposure to the students in emerging technologies, adequate training and opportunities to work on research problems with effective skills. PSO6: To train the students with effective communication skills and leadership to impart professional and ethical practices						
Mapping between POs and PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	PO1						
	PO2						
	PO3						
	PO4						
	PO5						
	PO6						
	PO7						
Medium of Instruction	English						

Signature



	Module 3: Learning Demography Sources of demographic data in India, Settlement type, growth pattern and structure: urban settlement analysis, Concentration: spatial, vertical and size, peri urban sprawl, economic base; Rural Settlements – Size, occurrence and character, transformation, Policies towards various size class settlements. Population structure and composition – Age, sex, gender, marital status, caste, religion, literacy level, etc.; Age - sex ratio, structure, pyramid; dependency ratio; occupational structure; Fertility; mortality, migration analysis, natural growth of population, migration and its implications in spatial planning.
Reference Books	
Teaching Methodology	Audio Visual Presentations, Class work, Use of Software and tools, Discussion, self study Seminar and /or Assignment
Evaluation Method	60% internal assessment based on class attendance, participation, assignment, seminar, presentation, internal examination, etc. 40 % external based on viva or university examination.

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	growing city, impact of industrialization and urbanization, metropolis and megalopolis. Module 3: Definitions and Objectives of Planning Definitions of town and country planning; Orthodoxies of planning; Goal formulation, objective, scope, limitations; Sustainability and rationality in planning; Components of sustainable urban and regional development. Module 4: Theories of City Development and Planning Theories Theories of city development including Concentric Zone Theory, Sector Theory, Multiple Nuclei Theory and other latest theories; Land use and land value theory of William Alonso; Ebenezer Howard's Garden City Concept; and Green Belt Concept; City as an organism: a physical, social, economic and political entity; Emerging Concepts: global city, inclusive city, safe city, etc.;
Reference Books	
Teaching Methodology	Audio Visual Presentations, Class work, Use of Software and tools, Discussion, self study Seminar and /or Assignment
Evaluation Method	60% internal assessment based on class attendance, participation, assignment, seminar, presentation, internal examination, etc. 40 % external based on viva or university examination.

Signature



Course: MURP 13: Socio-economic basis for Planning

Course Code	MURP 13						
Course Title	Socio-economic basis for Planning						
Credit	3						
Teaching per Week	3 hr/week						
Minimum weeks per Semester	18						
Effective From	June 2019						
Purpose of Course	The Purpose of the course is to make the student understand socio-economic aspects which affects Urban and Regional Planning.						
Course Objective	To make student understand the importance of socio economic aspects in Urban Planning and how the physical planning and growth of a city takes place revolving around socio economic activity.						
Course Outcomes	CO1 – To study Sociological concepts and methods, man and environment relationships; Socio-cultural profile of Indian society and urban transformation; Tradition and modernity in the context of urban and rural settlements. CO2 – To understand how town planning is based on sociological criteria like social problems of slums and squatters communities, urban and rural social transformation and their impact on social life, safety, security; Crimes in urban areas and their spatial planning implications CO3 – To make students aware about concepts of demand, supply, elasticity and consumer markets; concept of revenue costs; Economies of scale, economic and social costs, production and factor market CO4- To teach students the theories of growth and development, quality of life; Human development index, poverty and income distribution, employment and livelihood; Economic principles in land use planning						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
	CO4						
Pre-requisites	B.Plan, B.Arch, B.E (civil), M.A./M.Sc.(Economics, Sociology, GEography)						
Course Content	Module 1: Nature and Scope of Sociology Sociological concepts and methods, man and environment relationships; Socio-cultural profile of Indian society and urban transformation; Tradition and modernity in the context of urban and rural settlements; Issues related to caste, age, sex, gender, health safety, and marginalized groups; Displacement, resettlement and rehabilitation due to						

	compulsory land acquisition. Module 2: Community and Settlements Social problems of slums and squatters communities, urban and rural social transformation and their impact on social life, safety, security; Crimes in urban areas and their spatial planning implications, social structure and spatial planning; Role of socio-cultural aspects on growth patterns of city and neighbourhood communities; Social planning and policy, and community participation; Marginalization and concepts of inclusive planning, and gender concerns in planning. Settlement Policy: National Commission on Urbanization, Rural Habitat Policy and experiences from developing countries regarding settlement structure, growth and spatial distribution. Module 3: Elements of Micro and Macro Economics Concepts of demand, supply, elasticity and consumer markets; concept of revenue costs; Economies of scale, economic and social costs, production and factor market; Different market structures and price determination; market failures, cost-benefit analysis, public sector pricing; Determinants of national income, consumption, investment, inflation, unemployment, capital budgeting, risk and uncertainty, and long-term investment planning. Module 4: Development Economics and Lessons from Indian Experiences Economic growth and development, quality of life; Human development index, poverty and income distribution, employment and livelihood; Economic principles in land use planning; Policies and strategies in economic planning, balanced versus unbalanced growth, public sector dominance; changing economic policies, implications on land.
Reference Books	
Teaching Methodology	Audio Visual Presentations, Class work, Use of Softwares and tools, Discussion, self study Seminar and /or Assignment
Evaluation Method	60% internal assessment based on class attendance, participation, assignment, seminar, presentation, internal examination, etc. 40 % external based on viva or university examination.

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Course: MURP 14: Planning Techniques

Course Code	MURP 14						
Course Title	Planning Techniques						
Credit	3						
Teaching per Week	3 hr/week						
Minimum weeks per Semester	18						
Effective From	June 2019						
Purpose of Course	The Purpose of the course is to make the student understand techniques and tools used in urban planning exercise.						
Course Objective	To make student understand the latest techniques used in physical planning exercise and importance of appropriate type of techniques for each different problems of urban planning.						
Course Outcomes	CO1 – Learning data base for physical surveys including land use, building use, density, building age, etc., and socio-economic surveys; Survey techniques; Land use classification or coding and expected outputs CO2 – To understand classification of regions, delineation techniques of various types of regions, analysis of structure of nodes, hierarchy, nesting and rank size; Scalogram, sociogram, etc CO3 – Learning methods of population forecasts and projections; Lorenz Curve, Ginni Ratio, Theil's index, ratios: urban – rural, urban concentration, metropolitan concentration CO4- To teach students methods of population forecasts and projections; Lorenz Curve, Ginni Ratio, Theil's index, ratios: urban – rural, urban concentration, metropolitan concentration.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
	CO4						
Pre-requisites	B.Plan, B.Arch, B.E (civil), M.A./M.Sc.(Economics, Sociology, GEography)						
Course Content	Module 1: Survey Techniques and Mapping Learning data base for physical surveys including land use, building use, density, building age, etc., and socio-economic surveys; Survey techniques; Land use classification or coding and expected outputs; Techniques of preparing base maps including understanding the concepts of scales, components and detailing for various levels of plans like regional plan, city plan, zoning plan, and local area plan. Module 2: Analytical Methods Learning classification of regions, delineation techniques of various types of regions, analysis of structure of nodes, hierarchy, nesting and rank size; Scalogram, sociogram, etc.;						

	Planning balance sheet; Threshold analysis; Input output analysis, SWOT analysis; Module 3: Demographic Methods Learning methods of population forecasts and projections; Lorenz Curve, Ginni Ratio, Theil's index, ratios: urban – rural, urban concentration, metropolitan concentration; Location dimensions of population groups – social area and strategic choice approach – inter connected decision area analysis. Module 4: Planning Standards Learning spatial standards, performance standards and benchmarks, and variable standards; UDPFI guidelines, zoning regulations and development control rules and regulations.
Reference Books	
Teaching Methodology	Audio Visual Presentations, Class work, Use of Softwares and tools, Discussion, self study Seminar and /or Assignment
Evaluation Method	60% internal assessment based on class attendance, participation, assignment, seminar, presentation, internal examination, etc. 40 % external based on viva or university examination.

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Course: MURP 15: Development Finance							
Course Code	MURP 15						
Course Title	Development Finance						
Credit	3						
Teaching per Week	3 hr/week						
Minimum weeks per Semester	18						
Effective From	June 2019						
Purpose of Course	The Purpose of the course is to make the student understand financial aspects in urban planning exercise.						
Course Objective	To make student understand the relationship between financial aspects of a development region and its planning problems solution with respect to income and expenditure of the local bodies.						
Course Outcomes	CO1 – Learning the development finance approaches, concepts, components, process, credit rating CO2 – To understand Finance Commissions, functions, relationship between Central, State and Urban Local Government. CO3 – to understand municipal finance by Urban reform incentive fund, Sources of revenues; Equities; Loans; Debt financing; City challenge fund, Pooled finance development fund, National urban infrastructure fund, Municipal Bonds, Miscellaneous sources. CO4- To teach students Investment Planning and Financing Mechanism Link with spatial plans, process, components, investment needs, budgeting, financial investments in infrastructure and services. Financing of urban development, infrastructure and services						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
	CO4						
Pre-requisites	B.Plan, B.Arch, B.E (civil), M.A./M.Sc.(Economics, Sociology, Geography)						
Course Content	Module 1: Overview of Development Finance Approaches, concepts, components, process, credit rating.						

	Module 2: State Finance Finance Commissions, functions, relationship between Central, State and Urban Local Government. Module 3: Municipal Finance Urban reform incentive fund, Sources of revenues; Equities; Loans; Debt financing; City challenge fund, Pooled finance development fund, National urban infrastructure fund, Municipal Bonds, Miscellaneous sources; Structure of finances, fiscal problems and issues of financial management, implications of 74th Constitution Amendment Act for municipal finance, expenditure pattern, Bilateral and multi-lateral lending intuitions mobilizing resources for a project - financial resources, land resources, project resources, and other resources. Module 4: Investment Planning and Financing Mechanism Link with spatial plans, process, components, investment needs, budgeting, financial investments in infrastructure and services. Financing of urban development, infrastructure and services – mechanisms and instruments, subsidy reduction, cost recovery, public private partnerships; Financial appraisal, investment appraisal; Financial Risk – Sources, Measures and perspectives on risk, Sensitivity analysis.
Reference Books	
Teaching Methodology	Audio Visual Presentations, Class work, Use of Softwares and tolls, Discussion, self study Seminar and /or Assignment
Evaluation Method	60% internal assessment based on class attendance, participation, assignment, seminar, presentation, internal examination, etc. 40 % external based on viva or university examination.

Signature



Course: MURP 16: Planning for Tourism

Course Code	MURP16						
Course Title	Planning for Tourism						
Credit	3						
Teaching per Week	3hr/week						
Minimum weeks per Semester	18						
Effective From	June 2019						
Purpose of Course	The Purpose of the course is to make the student capable of implementing the concept and methods of planning tourism. To make student aware of different policies and program related to tourism and its implementation and impact.						
Course Objective	To make student aware of the growing importance of Tourism in Planning and understand different aspects related to it.						
Course Outcomes	CO1 - To explain sustainable tourism development with the least amount of negative influence on the environment. CO2 – Explain Students the importance of tourism promotion in a country's economic development. CO3 – Train students for current tourism planning and development approaches.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
Pre-requisite	B.Plan, B.Arch, B.E (civil)						
Course Content	Module 1: Introduction to Tourism Definitions, scope, nature, classification and dimension, tourism as an industry, tourism in developed and developing world. Module 2: Tourism Sector – impacts Relationship between Tourism and Urban Development, Tourism multiplier and forecasting methods: capacity building and carrying capacity planning for tourism projects, tourism and cultural and social change: Socio-cultural problems, environmental degradation. Module 3: Planning for Tourism Nature and scope of a tourism plan- key issues and stages, data requirements, surveys, role of key players / stake holders in tourism policy and planning, sustainable tourism development planning; community planning and tourism; implementation and management, role of travel and tourism promoting agencies, monitoring the tourism development; Tourism marketing - Concept, techniques and strategies. Module 4: Policies and Programmes Tourism policies at various levels.						

Reference Books	1. Colin Michael Hall (2008), "Tourism Planning: Policies, Process & relationship", Prentice Hall. 2. David Newsome (2008), " Natural area tourism Ecology impacts and management", Chainal View Publication 3. Clare Gunn (2009)," Tourism Planning: Basics, Concepts, cases", France & Taylor Publication 4. Charles R. Goeldner , J. R. Brent Ritchie "Tourism: Principles, Practices,Philosophies" (2009) John Wiley & Sons 5. A. Satish Babu "Tourism Development in India" (2008) 6. APH Publishing Corporation, New Delhi 7. Christopher M Law "Urban Tourism: The Visitor Economy and the Growth of Large Cities (2009),Continuum 8. K.K. Sharma, "Planning for Tourism" (2003) Sarup & Sons, New Delhi 9. Planning Commission "Working Group Report on Tourism (2012-2017)"(2012) Planning Commission, Government of India 10. Ministry of Tourism "Strategic Action Plan for Tourism in India" (2011) Ministry of Tourism, Government of India
Teaching Methodology	Class work, Discussion, self study Seminar and /or Assignment
Evaluation Method	60% internal assessment based on class attendance, participation, assignment, seminar, presentation, internal examination, etc. 40 % external based on viva or university examination.

Amal



Course: MURP 21: Urban & Regional Planning Studio-II							
Course Code	MURP 21						
Course Title	Urban & Regional Planning Studio-II						
Credit	15						
Teaching per Week	15hr/week						
Minimum weeks per Semester	18						
Effective From	December 2019						
Purpose of Course	The Purpose of the course is to make the student understand Urban and Regional Development Plan formulations and implementation mechanics by a live case example and studying government policies and standard norms.						
Course Objective	To make student aware about Urban Planning exercise by studying Urban development plans formulation by Urban local bodies in cities, and big towns.						
Course Outcomes	CO1 - The studio program involves learning the exercise pertains to large cities and emerging metropolitan cities which ranges from preparation of sustainable development plans to sector specific themes CO2 – Enables the students to develop an approach/framework for the task of urban development by a field based data collection and data generation which is then analyzed for generation of development plans and strategies. CO3 – Train students to understand similar case studies, awareness of relevant norms and standards through extensive literature search. Students are required to prepare a comprehensive list of required data and identify probable sources. CO4- Train the students to translate learning from the core and elective subjects to the studio exercise. The introduction of GIS in the studio enables them to apply the tool in the studio exercise.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
	CO4						
Pre-requisite	B.Plan, B.Arch, B.E (civil), M.A./M.Sc.(Economics/Sociology/geography)						
Course Content	The studio exercise focuses on the planning, development and design aspect (in line with the other core and elective courses offered in the semester). Module 1: The exercise pertains to large cities and emerging metropolitan cities and ranges from preparation of sustainable development plans to sector specific themes pertaining to tourism, SEZs, etc. Module 2: The studio exercise enables them to develop an						

	approach/ framework for the task; it is field based as a database is generated that is analyzed and the plan and strategies are formulated. Module 3: Initial study involves understanding of the exercise through theories, study of similar case studies, awareness of relevant norms and standards through extensive literature search. Students are required to prepare a comprehensive list of required data and identify probable sources before making a field visit to the case study town/city. Module 4: Students are encouraged to translate learning from the core and elective subjects to the studio exercise. The introduction of GIS in the studio enables them to apply it in the studio exercise.
Reference Books	
Teaching Methodology	Audio Visual Presentations, Class work, Use of Softwares and tools, Discussion, self study Seminar and /or Assignment
Evaluation Method	60% internal assessment based on class attendance, participation, assignment, seminar, presentation, internal examination, etc. 40 % external based on viva or university examination.

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Course: MURP 22: Infrastructure and Transportation Planning							
Course Code	MURP 22						
Course Title	Infrastructure and Transportation Planning						
Credit	3						
Teaching per Week	3hr/week						
Minimum weeks per Semester	18						
Effective From	December 2019						
Purpose of Course	The Purpose of the course is to make the student understand role of infrastructure development and transportation planning in Urban Planning implementation						
Course Objective	To make student aware about infrastructure development and transportation planning with latest trends and technological advancement in Urban Planning across globe.						
Course Outcomes	CO1 – to learn elements of Infrastructure (physical, social, utilities and services); Basic definitions, concepts, significance and importance; Data required for provision and planning of urban networks and services CO2 – Enables the students to develop an understanding of planning and management of water, sanitation and storm Water. CO3 – Train students to learn about municipal and other wastes – generation, typology, quantity, collection, storage, transportation, treatment, disposal, recycling and reuse, wealth from waste, norms and standards, institutional arrangements, planning provisions and management issues. CO4- Train the students to understand role of transport, types of transport systems, evolution of transport modes, transport problems and mobility issues; Urban form and Transport patterns, land use – transport cycle, concept of accessibility; Hierarchy, capacity and geometric design elements of roads and intersections; Basic principles of Transport infrastructure design; Traffic and transportation surveys and studies						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1							
CO2							
CO3							
CO4							
Pre-requisite	B.Plan, B.Arch, B.E (civil), M.A./M.Sc.(Economics/Sociology/geography)						

Course Content	Module 1: Role of Infrastructure in Development Elements of Infrastructure (physical, social, utilities and services); Basic definitions, concepts, significance and importance; Data required for provision and planning of urban networks and services; Resource analysis, provision of infrastructure, and land requirements; Principles of resource distribution in space; Types, hierarchical distribution of facilities, Access to facilities, provision and location criteria, Norms and standards, etc. Module 2: Planning and Management of Water, Sanitation and Storm Water Water – sources of water, treatment and storage, transportation and distribution, quality, networks, distribution losses, water harvesting, recycling and reuse, norms and standards of provision, institutional arrangements, planning provisions and management issues; Sanitation – points of generation, collection, treatment, disposal, norms and standards, grey water disposal, DEWATS, institutional arrangements, planning provisions and management issues. Storm water – rainfall data interpretation, points of water stagnation, system of natural drains, surface topography and soil characteristics, ground water replenishment, storm water collection and disposal, norms and standards, institutional arrangements, planning provisions and management issues; Module 3: Planning and Management of Municipal Wastes, Power and Fire Municipal and other wastes – generation, typology, quantity, collection, storage, transportation, treatment, disposal, recycling and reuse, wealth from waste, norms and standards, institutional arrangements, planning provisions and management issues. Power – Sources of power procurement, distribution networks, demand assessment, norms and standards, planning provisions and management issues. Fire – History of fire hazards, vulnerable locations, methods of fire fighting, norms and standards, planning provisions and management issues. Module 4: City Development and Transport Infrastructure Planning, Management and Design .Role of transport, types of transport systems, evolution of transport modes, transport problems and mobility issues; Urban form and Transport patterns, land use – transport cycle, concept of accessibility; Hierarchy, capacity and geometric design elements of roads and intersections; Basic principles of Transport infrastructure design; Traffic and transportation surveys and studies, traffic and travel characteristics; Urban transport planning process – stages, study area, zoning, data base, concept of trip generation Transport, environment and safety issues; principles and approaches of traffic management, transport system management.
Reference Books	
Teaching Methodology	Audio Visual Presentations, Class work, Use of Softwares and tools, Discussion, self study Seminar and /or Assignment
Evaluation Method	60% internal assessment based on class attendance, participation, assignment, seminar, presentation, internal examination, etc. 40 % external based on viva or university examination.

Course: MURP 23: Housing and Environmental Planning							
Course Code	MURP 23						
Course Title	Housing and Environmental Planning						
Credit	3						
Teaching per Week	3hr/week						
Minimum weeks per Semester	18						
Effective From	December 2019						
Purpose of Course	The Purpose of the course is to make the student understand role of environmental issues and challenges in urban planning with respect to environmental aspects and planning of Housing						
Course Objective	To make student aware about environmental issues, impact and assessment in preparation of urban development. The subject also explains the importance of housing in urban planning exercise.						
Course Outcomes	CO1 – to learn about shelter as a basic requirement, determinants of housing form, Census of India definitions, Introduction to policies, housing need, demand and supply, dilapidation, structural conditions, materials of constructions, housing age, occupancy rate, crowding, housing shortage, income and affordability, poverty and slums CO2 – Enables the students to develop an understanding of Housing as social security, role of housing in development of family and community well being, status and prestige related to housing, safety, crime and insecurity, deprivation and social vulnerability, ghettoism, gender issues, housing for the elderly CO3 – Train students to learn about housing as an important land use component of city plan / master plan, considerations for carrying out city level housing studies, projections, and land use provisions. CO4- Approaches to neighborhood living in traditional and contemporary societies, elements of neighborhood structure, Planning and design criteria for modern neighborhoods, norms and criteria for area distribution, housing and area planning standards.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
	CO4						
Pre-requisite	B.Plan, B.Arch, B.E (civil), M.A./M.Sc.(Economics/Sociology/geography)						
Course Content	Module 1: Concepts and Definitions Shelter as a basic requirement, determinants of housing form, Census of India definitions, Introduction to policies, housing need, demand and supply, dilapidation, structural conditions, materials of constructions, housing age, occupancy rate, crowding, housing shortage, income and affordability, poverty and slums, houseless						

	population Various housing typologies viz. traditional houses, plotted development, group housing, multi storied housing, villas, chawls, etc., slums and squatters, night shelters, public health issues related to housing, various theories of housing, concept of green housing, green rating of housing projects. Module 2: Social and Economic Dimensions Housing as social security, role of housing in development of family and community well being, status and prestige related to housing, safety, crime and insecurity, deprivation and social vulnerability, ghettoism, gender issues, housing for the elderly. Contribution of housing to micro and macro economy, contribution to national wealth and GDP, housing taxation, national budgets, fiscal concessions, forward and backward linkages. Module 3: Housing and the City Understanding housing as an important land use component of city plan / master plan, considerations for carrying out city level housing studies, projections, land use provisions; Suitability of land for housing, housing stress identification, projecting housing requirements, calculating housing shortages, housing allocation. Module 4: Planning for Neighborhoods Approaches to neighborhood living in traditional and contemporary societies, elements of neighborhood structure, Planning and design criteria for modern neighborhoods, norms and criteria for area distribution, housing and area planning standards, net residential density and gross residential density, development controls and building byelaws, UDPFI guidelines, NBC 2005 provisions and Case studies of neighborhood planning.
Reference Books	
Teaching Methodology	Audio Visual Presentations, Class work, Use of Software and tools, Discussion, self study Seminar and /or Assignment
Evaluation Method	60% internal assessment based on class attendance, participation, assignment, seminar, presentation, internal examination, etc. 40 % external based on viva or university examination.

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Course: MURP 25: Politics and Planning

Course Code	MURP 25						
Course Title	Politics and Planning						
Credit	3						
Teaching per Week	3hr/week						
Minimum weeks per Semester	18						
Effective From	December 2019						
Purpose of Course	The Purpose of the course is to make the student understand role of Interface between Politics and Planning						
Course Objective	To make student aware about how politics affect the urban planning and growth based on state and national level policies with reference to preferences of industrial development by governments of various states.						
Course Outcomes	CO1 – To learn about Social and economic context; State in India – political culture of the Indian State – Centre – State – Local political economy: 74th Constitution Amendment Act, State Finance Commissions; Emergence of the State in the federal set up. CO2 – Enables the students to develop an understanding of State as a manager of resources – property rights, norms and standards – Government market and market by Government – Regulatory State, Reforming State, and Rent Seeking State – their spatial implications CO3 – Train students to learn about Politics related to land, shelter, urban infrastructure, resources; Regeneration and redevelopment politics; politics of provision, financing and pricing; decision-making and decision taking CO4- Approaches to Politics and emergence of civil society – NGO, CBO and their role in planning, development and management, collective bargaining and collective action						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
	CO4						
Pre-requisite	B.Plan, B.Arch, B.E (civil), M.A./M.Sc.(Economics/Sociology/geography)						
Course Content	Module 1: Interface between Politics and Planning Social and economic context; State in India – political culture of the Indian State – Centre – State – Local political economy: 74th Constitution Amendment Act, State Finance Commissions; Emergence of the State in the federal set up.						

	Module 2: City and the State State as a manager of resources – property rights, norms and standards – Government market and market by Government – Regulatory State, Reforming State, and Rent Seeking State – their spatial implications; Development planning and the Indian state – Centralization, powerlessness and decentralization; spatial politics and competition; Politics of the State and bureaucracy; New State spaces, invited and contested spaces – changing role of the state Module 3: Politics related to Planning and Development Politics related to land, shelter, urban infrastructure, resources; Regeneration and redevelopment politics; politics of provision, financing and pricing; decision-making and decision taking Module 4: Politics and Civil Society Politics and emergence of civil society – NGO, CBO and their role in planning, development and management, collective bargaining and collective action
Reference Books	
Teaching Methodology	Audio Visual Presentations, Class work, Use of Software and tools, Discussion, self study Seminar and /or Assignment
Evaluation Method	60% internal assessment based on class attendance, participation, assignment, seminar, presentation, internal examination, etc. 40 % external based on viva or university examination.

Admohli



Course:MURP 26: Inclusive Urban Planning							
Course Code	MURP 26						
Course Title	Inclusive Urban Planning						
Credit	3						
Teaching per Week	3hr/week						
Minimum weeks per Semester	18						
Effective From	December 2019						
Purpose of Course	The Purpose of the course is to make the student understand the inclusiveness Urban Planning and policy formulation for urban development.						
Course Objective	To make student aware about all sections of the societies and their needs are included in the urban planning exercise by the government for the development of urban areas in an effective and equitable manner.						
Course Outcomes	CO1 – To learn about Definitions and components of inclusive and equitable urban planning CO2 – Enables the students to develop an understanding of Stakeholders Profile and Needs, Access to Shelter, Services and Livelihoods Urban Poor, Informal Sector, Gender, Children, Elderly, Disabled, Displaced people, etc CO3 – Train students to learn about Participatory Planning Process and Policies, Programmes and Legislation CO4- Approaches Inclusive zoning, development and building regulation						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
	CO4						
Pre-requisite	B.Plan, B.Arch, B.E (civil), M.A./M.Sc.(Economics/Sociology/geography)						
Course Content	Module 1: Understanding Inclusive Planning Definitions and components Module 2: Stakeholders Profile and Needs, Access to Shelter, Services and Livelihoods Urban Poor, Informal Sector, Gender, Children, Elderly, Disabled, Displaced people, etc.; Slums - dimensions, causative factors, determinants, location characteristics of settlements; Informal sector - growth, characteristics, functions, economic contributions, linkages with formal sector, impact on Urban Development Module 3: Participatory Planning Process and Policies, Programmes						

	and Legislation Methods, role of stakeholders (including civil society organizations), etc.; Related Acts, Five year plans, policies and programmes at various levels. Module 4: Planning interventions Inclusive zoning, development and building regulations
Reference Books	
Teaching Methodology	Audio Visual Presentations, Class work, Use of Software and tools, Discussion, self study Seminar and /or Assignment
Evaluation Method	60% internal assessment based on class attendance, participation, assignment, seminar, presentation, internal examination, etc. 40 % external based on viva or university examination.

Signature



Course:MURP 31: Urban & Regional Planning Studio-III							
Course Code	MURP 31						
Course Title	Urban & Regional Planning Studio-III						
Credit	15						
Teaching per Week	15hr/week						
Minimum weeks per Semester	18						
Effective From	December 2019						
Purpose of Course	The Purpose of the course is to make the student understand Urban and Regional planning management and its governance aspects.						
Course Objective	To make student aware about Urban Planning and its management in the implementation of physical planning exercise by governance from Urban local authorities.						
Course Outcomes	CO1 - The focus of the studio is on management and governance aspects (in line with the other core and elective courses offered in the semester). The exercise pertains to metropolitan cities and mega cities and ranges from preparing management plans CO2 – Students are also required to identify and formulate projects, work out the appraisals and do the feasibility, viability and implementation mechanisms of the projects CO3 – Students work on a case study town/city and have to visit the field for collection of data and interaction with city officials and stakeholders. CO4- students are also exposed to project identification, formulation, and appraisal, financing mechanisms and institutional framework.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
	CO4						
Pre-requisite	B.Plan, B.Arch, B.E (civil), M.A./M.Sc.(Economics/Sociology/geography)						
Course Content	Module 1: The focus of the studio is on management and governance aspects (in line with the other core and elective courses offered in the semester). The exercise pertains to metropolitan cities and mega cities and ranges from preparing management plans and projects related to various sectors pertaining to infrastructure, disaster risk, riverfront development etc. Module 2: Students are also required to identify and formulate projects, work out the appraisals and do the feasibility, viability and implementation mechanisms of the projects. Students work on a case study town/city and have to visit the field for collection of data and interaction with city						

	officials and stakeholders. Module 3: Although planning continues to be an important aspect of the exercise, students are also exposed to project identification, formulation, and appraisal, financing mechanisms and institutional framework. Module 4: Students draw from the theoretical knowledge provided in the core and elective subjects related to management, finance and governance offered in the semester and translate them in their studio exercise. The culmination of the exercise is in the form of group presentations and studio report.
Reference Books	
Teaching Methodology	Audio Visual Presentations, Class work, Use of Softwares and tools, Discussion, self study Seminar and /or Assignment
Evaluation Method	60% internal assessment based on class attendance, participation, assignment, seminar, presentation, internal examination, etc. 40 % external based on viva or university examination.

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Course Code	MURP 32						
Course Title	City and Metropolitan Planning						
Credit	3						
Teaching per Week	3 hr/week						
Minimum weeks per Semester	18						
Effective From	June 2020						
Purpose of Course	The Purpose of the course is to make the student understand urban Growth and System of Cities Growth of cities scale, complexity and its impact on national development, cities as engines of growth, cities as ecosystems, resources in cities .						
Course Objective	To make student aware about Urban Planning and its implementation for Metropolitan Cities.						
Course Outcomes	CO1 - to learn about urban growth and System of Cities Growth of cities scale, complexity and its impact on national development, cities as engines of growth, cities as ecosystems, resources in cities CO2 – Students are also required to identify City – Region Linkages City, fringe and the periphery - physical and functional linkages, peri-urban development. CO3 – Metro and Mega Cities: Problems and Issues Growth trends and processes, characteristics, problems, concepts and concerns of urban sustainability CO4- To learn about Human Settlement Planning, Urban Development Policies and Programmes Concepts, approaches, strategies and tools						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
	CO4						
Pre-requisite	B.Plan, B.Arch, B.E (civil), M.A./M.Sc.(Economics/Sociology/geography)						
Course Content	Module 1: Urban Growth and System of Cities Growth of cities scale, complexity and its impact on national development, cities as engines of growth, cities as ecosystems, resources in cities. Module 2: City – Region Linkages City, fringe and the periphery - physical and functional linkages, peri-urban development. Module 3: Metro and Mega Cities: Problems and Issues Growth trends and processes, characteristics, problems, concepts and concerns of urban sustainability, issues related to diversity and unintended growth, economic, social and						

	environmental sustainability, quality of life, inclusivity and equity, climate change, transit oriented development, participatory planning. Inner city – issues and problems, approach to development. Module 4 : Human Settlement Planning, Urban Development Policies and Programmes Concepts, approaches, strategies and tools; Policies and programmes at various levels, impact on metro and mega city development.
Reference Books	
Teaching Methodology	Audio Visual Presentations, Class work, Use of Softwares and tools, Discussion, self study Seminar and /or Assignment
Evaluation Method	60% internal assessment based on class attendance, participation, assignment, seminar, presentation, internal examination, etc. 40 % external based on viva or university examination.

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Course:MURP 33: Urban Heritage Conservation							
Course Code	MURP33						
Course Title	Urban Heritage Conservation						
Credit	3						
Teaching per Week	3hr/week						
Minimum weeks per Semester	18						
Effective From	June 2019						
Purpose of Course	The Purpose of the course is to make the student capable of implementing the concept, methods and tools of Urban Heritage Conservation. To make student acquaint of different policies and program related to Urban Heritage conservation at national level as well as at international level.						
Course Objective	To make students acquainted with the concept of Urban heritage Conservation and its importance in planning.						
Course Outcomes	CO1 - To explain Heritage conservation and its importance in sustainable development. CO2 – Explain Students the importance Urban heritage conservation in order understand the legacy. CO3 – To explain and train for the different methods that are adopted for urban heritage and conservation CO4 – Train students for current urban heritage and conservation development approaches.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
	CO4						
Pre-requisite	B.Plan, B.Arch, B.E (civil)						
Course.Content	Module 1: Introduction to Urban Heritage Typology / classification, inventories, mapping; Human habitation in historical context; Heritage as a motivating force in sustainable urban conservation and development, Module 2: Heritage Conservation Natural heritage conservation - typologies, policies for conservation, regulatory measures, community participation; Concept of Historic Urban Landscapes; Built heritage conservation - determinants of built form on heritage; Historic urban infrastructure and traditional water harvesting systems. Integration of historic monuments / areas / cores / urban systems in the developmental process and land use, regulatory measures and community involvement; Intangible cultural heritage and development: issues, conservation strategies. Preparation of conservation and heritage management plans. Module 3: Heritage and Tourism, Policies and Programmes, Legislation Cultural and heritage based tourism - nature, potential and prospects, marketing aspects; Acts and laws recognizing conservation / regeneration; Heritage toolkit; Implications of 74th Constitution Amendment Act.						

	Module 4: Design in Human Habitation Social / cultural / ecological / energy determinants of design; Imaginability of the city; Structure of urban spaces – location criteria of activities and urban uses; Urban Regeneration, renewal, rehabilitation, revitalization, reconstruction and redevelopment - concepts, interventions, processes, approaches and methods, tools.
Reference Books	1. A History of Architectural Conservation by Jukka Jokilehto 2. Our Architectural Heritage from Consciousness to Conservation. Paris, UNESCO. By Erder Cevat. 3. Heritage Conservation 1996, New Delhi. By Batra, N.L. 4. Archaeological Works Code, New Delhi. By ASI 5. Archaeological Remains: Monuments and Museums, New Delhi. By ASI 6. Urban Conservation, MIT Press, Cambridge 1999. By Cohen, Nahoum
Teaching Methodology	Class work, Discussion, self study Seminar and /or Assignment
Evaluation Method	60% internal assessment based on class attendance, participation, assignment, seminar, presentation, internal examination, etc. 40 % external based on viva or university examination.

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Course:MURP 34: Infrastructure Planning								
Course Code		MURP 34						
Course Title		Infrastructure Planning						
Credit		3						
Teaching per Week		3 hr/week						
Minimum weeks per Semester		18						
Effective From		June 2020						
Purpose of Course		The Purpose of the course is to make the student understand various aspects of urban infrastructure.						
Course Objective		To make student aware about Urban Planning with reference to development of various physical and social infrastructure facilities as per standards.						
Course Outcomes		CO1 - to learn about urban Water Supply and Sanitation Quantity and quality, source of supply, transmission and distribution, treatment methods, design guidelines. Sanitation – concepts, disposal systems CO2 – Students are also required to learn Solid Waste Disposal and Management Basic principles, generation, characteristics, collection, disposal, management CO3 – to learn about Fire and Electrification, and Social Infrastructure Planning for fire protection, services and space standards, location criteria; Planning for Education, health, civic, cultural infrastructure CO4- To learn about Planning for infrastructure and facilities for transport						
Mapping between COs with PSOs			PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1								
CO2								
CO3								
CO4								
Pre-requisite		B.Plan, B.Arch, B.E (civil), M.A./M.Sc.(Economics/Sociology/geography)						
Course Content		Module 1: Water Supply and Sanitation Quantity and quality, source of supply, transmission and distribution, treatment methods, design guidelines. Sanitation – concepts, disposal systems, low cost sanitation options; engineering aspects of sewage disposal; Wastewater – generation, disposal system Storm water drainage – systems						

	Module 2: Solid Waste Disposal and Management Basic principles, generation, characteristics, collection, disposal, management. Module 3: Fire and Electrification, and Social Infrastructure Planning for fire protection, services and space standards, location criteria; Planning for Education, health, civic, cultural infrastructure Module 4: Traffic and Transportation Planning for infrastructure and facilities for transport
Reference Books	
Teaching Methodology	Audio Visual Presentations, Class work, Use of Softwares and tools, Discussion, self study Seminar and /or Assignment
Evaluation Method	60% internal assessment based on class attendance, participation, assignment, seminar, presentation, internal examination, etc. 40 % external based on viva or university examination.

Amal



Course:MURP 35: Urban Development Management								
Course Code		MURP 35						
Course Title		Urban Development Management						
Credit		3						
Teaching per Week		3 hr/week						
Minimum weeks per Semester		18						
Effective From		June 2020						
Purpose of Course		The Purpose of the course is to make the student understand various aspects of urban development management.						
Course Objective		To make student aware about Urban Planning with reference to management of urban development by local bodies						
Course Outcomes		CO1 - to learn about Introduction to Development Management and Concept, approaches, components, interface with national goals and political economic system CO2 – to learn about Urban Development Management Strategies, Tools and Techniques; organizations involved CO3 – to learn about Land and Real Estate Development Economic concepts of land, Land Pricing / valuation CO4- To learn about Information System and Urban Reforms						
Mapping between COs with PSOs			PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
		CO1						
		CO2						
		CO3						
		CO4						
Pre-requisite		B.Plan, B.Arch, B.E (civil), M.A./M.Sc.(Economics/Sociology/geography)						
Course Content		Module 1: Introduction to Development Management Concept, approaches, components, interface with national goals and political economic system. Module 2: Urban Development Management Strategies, Tools and Techniques; organizations involved Module 3: Land and Real Estate Development Economic concepts of land, Land Pricing / valuation; Economic principles of land use; demand forecasting for land use: factors affecting land supply and demand; Land development methods, Supply Management, Demand side Management; Real estate markets, type of property development and its impact on supply and demand, method of development, environmental considerations.						

	** Module 4: Information System and Urban Reforms Spatial and Non - spatial information systems; Urban reforms and acts and policies.
Reference Books	
Teaching Methodology	Audio Visual Presentations, Class work, Use of Softwares and tools, Discussion, self study Seminar and /or Assignment
Evaluation Method	60% internal assessment based on class attendance, participation, assignment, seminar, presentation, internal examination, etc. 40 % external based on viva or university examination.

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Course: MURP 36: Energy, Climate change and Urban development							
Course Code	MURP 36						
Course Title	Energy, Climate change and Urban development						
Credit	3						
Teaching per Week	3 hr/week						
Minimum weeks per Semester	18						
Effective From	June 2020						
Purpose of Course	The Purpose of the course is to make the student understand various aspects of urban development with respect to Climate change.						
Course Objective	To make student aware about Urban Planning with reference to Energy, Climate change and Urban development						
Course Outcomes	CO1 - to learn Energy, Climate change and Urban Development – Interface. CO2 – to learn about Energy Generation and Consumption. Energy Supply and Demand, Energy Consumption in cities CO3 – to learn about Energy Planning and Management, and Mitigation and Adaptation to Climate Change. CO4- To learn about Plans, Policies and Strategies. Related to energy planning, conservation, climate change						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1							
CO2							
CO3							
CO4							
Pre-requisite	B.Plan, B.Arch, B.E (civil), M.A./M.Sc.(Economics/Sociology/geography)						
Course Content	Module 1: Introduction Energy, Climate change and Urban Development – Interface. Module 2: Energy Generation and Consumption. Energy Supply and Demand, Energy Consumption in cities, determinants of energy demand, phenomenon of climate change, factors influencing climate change, impacts of climate change Module 3: Energy Planning and Management, and Mitigation and Adaptation to Climate Change. Energy efficient development, Compact city form, Transit oriented development. Mechanisms and measures for mitigating and adapting to climate change at various levels						

	Module 4: Plans, Policies and Strategies. Related to energy planning, conservation, climate change mitigation and adaptation.
Reference Books	
Teaching Methodology	Audio Visual Presentations, Class work, Use of Softwares and tools, Discussion, self study Seminar and /or Assignment
Evaluation Method	60% internal assessment based on class attendance, participation, assignment, seminar, presentation, internal examination, etc. 40 % external based on viva or university examination.

Signature



Course:MURP 41: Thesis																																				
Course Code	MURP 41																																			
Course Title	Thesis																																			
Credit	3																																			
Teaching per Week	3 hr/week																																			
Minimum weeks per Semester	18																																			
Effective From	June 2020																																			
Purpose of Course	The Purpose of the course is to make the students choose a core area of their interest in urban planning program and prepare a dissertation																																			
Course Objective	To make student learn about choosing a topic of their choice and solve a real time urban planning problem.																																			
Course Outcomes	CO1 - to learn developing a urban planning problem CO2 – to learn developing and understand the hypothesis generation. CO3 – to learn about methods of data colletion and data analysis in order to identify issues and chaalleges for their dissertation topics. CO4- To give appropriate planning level solution for the problem identified for the dissertation.																																			
Mapping between COs with PSOs	<table><tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td><td>PSO6</td></tr><tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO4</td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	CO1							CO2							CO3							CO4						
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6																														
CO1																																				
CO2																																				
CO3																																				
CO4																																				
Pre-requisite	B.Plan, B.Arch, B.E (civil), M.A./M.Sc.(Economics/Sociology/geography)																																			
Course Content	Module 1: Introduction to urban planning thesis and dissertation Module 2: Developing an understating about real time urban planning problem and developing a hypothesis Module 3: Methods of data collection, data analysis, structure of the thesis. Module 4: Plans, Policies and Strategies. Related to identified problem from thesis.																																			

Reference Books	
Teaching Methodology	Audio Visual Presentations, Class work, Use of Softwares and tools, Discussion, self study Seminar and /or Assignment
Evaluation Method	60% internal assessment based on class attendance, participation, assignment, seminar, presentation, internal examination, etc. 40 % external based on viva or university examination.

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Course Code	MURP 42						
Course Title	Project Planning and Management						
Credit	3						
Teaching per Week	3 hr/week						
Minimum weeks per Semester	18						
Effective From	December 2020						
Purpose of Course	The Purpose of the course is to make the students understand the urban level Projects; Nature of planning projects; Project Life Cycle; Identification of projects						
Course Objective	The objective of the course is to make students competent to develop project management skills for urban planning projects at large.						
Course Outcomes	CO1 - to learn the basics of Projects planning; Nature of planning projects; Project Life Cycle; Identification of projects CO2 – to understand relationship between projects and planning issues including sectoral policy at: Local, State and National levels Project appraisal CO3 – to learn about Project Management and Implementation, and Project Evaluation and Monitoring Project characteristics - pitfalls in management of a project; Techniques of management; Planning milestones - responsibility charts and principle responsibility CO4- To learn Regulatory Frameworks Governing Projects National Rehabilitation and Resettlement Policy (2007)						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
	CO4						
Pre-requisite	B.Plan, B.Arch, B.E (civil), M.A./M.Sc.(Economics/Sociology/geography)						
Course Content	Module 1: Project planning Introduction to Projects; Nature of planning projects; Project Life Cycle; Identification of projects Module 2: Project Formulation and Appraisal Relationship between projects and planning issues including sectoral policy at: Local, State and National levels Project appraisal: Market analysis – Macro environment survey, survey methods, market characterization, demand forecasting; Technical Analysis – Magnitude, processes, materials, equipment, factors of production availability, implementation schedule; suitability of the plans, layout and design, location of						

	the project; location analysis; supporting infrastructure requirements- Capital Budgeting – Estimation of costing of components; developing over project cost; Social cost benefit analysis – UNIDO, Merles, ZOPP/GOPP, etc Module 3: Project Management and Implementation, and Project Evaluation and Monitoring Project characteristics - pitfalls in management of a project; Techniques of management; Planning milestones - responsibility charts and principle responsibility, principles of activity planning; Project Implementation – methods, hurdles, facilitative factors; Project culture: line management, steering committee, role of project manager; Project Control: cost and time, quality - ISI standards and its application to Indian context; Introduction to Project Management Software (Ms Projects) and its usage. Types of evaluation - concurrent, ex-ante and ex-post. Methods of evaluation, techniques of evaluation, end results, Presentation of evaluation findings, Techniques of Monitoring of Development Works. Module 4: Regulatory Frameworks Governing Projects National Rehabilitation and Resettlement Policy (2007) - Social Impact mitigation; National Environmental Policy (2006) – Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP)
Reference Books	
Teaching Methodology	Audio Visual Presentations, Class work, Use of Softwares and tolls, Discussion, self study Seminar and /or Assignment
Evaluation Method	60% internal assessment based on class attendance, participation, assignment, seminar, presentation, internal examination, etc. 40 % external based on viva or university examination.

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Course:MURP 43: Legal issues and Professional Practice								
Course Code		MURP 43						
Course Title		Legal issues and Professional Practice						
Credit		3						
Teaching per Week		3 hr/week						
Minimum weeks per Semester		18						
Effective From		December 2020						
Purpose of Course		The Purpose of the course is to make the students understand the legislative framework in urban planning						
Course Objective		The objective of the course is to make students competent to understand legal aspects in urban planning in order to practice.						
Course Outcomes		CO1 - to learn the Interface between policy and legislation pertaining to urban development CO2 – to understand Concepts, sources, terminologies, significance of law and its relationship to Urban Planning benefits of statutory backing for schemes - eminent domain and police powers CO3 – to learn about Planning Legislation and Policy Formulation and Appraisal Evolution; An over view of legal tools connected with Urban Planning and Development, Town and Country Planning Act, Improvement Trust Act, Urban Planning and Development Authorities Act CO4- To learn about Aims and objectives of professional Institutes, sister bodies, professional role and responsibility of planning consultants, professional ethics, code of conduct and scale of professional charges						
Mapping between COs with PSOs			PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1								
CO2								
CO3								
CO4								
Pre-requisite		B.Plan, B.Arch, B.E (civil), M.A./M.Sc.(Economics/Sociology/geography)						
Course Content		Module 1: Introduction Interface between policy and legislation pertaining to urban development. Module 2: Understanding of Law Concepts, sources, terminologies, significance of law and its relationship to Urban Planning benefits of statutory backing for schemes - eminent domain and police powers; Indian Constitution: concept and contents; 73rd and 74th Constitution Amendment Act, provision regarding property						

	rights. Module 3: Planning Legislation and Policy Formulation and Appraisal Evolution; An over view of legal tools connected with Urban Planning and Development, Town and Country Planning Act, Improvement Trust Act, Urban Planning and Development Authorities Act – objectives, contents, procedures for preparation and implementation of Regional Plans, Master Plans and Town Planning Schemes. Various Acts related to urban governance, planning and development organizations, land resources, environment protection, and public participation in statutory planning process; Approaches of formulation of policies, appraisal of policies. Module 4: Professional Practice Aims and objectives of professional Institutes, sister bodies, professional role and responsibility of planning consultants, professional ethics, code of conduct and scale of professional charges; Formulation of project proposal and outlines, consultancy agreements and contracts, managerial aspects; Role in inter disciplinary groups: Appreciation of the decision-making processes and the process in relation to varied consultancy assignments of planning.
Reference Books	
Teaching Methodology	Audio Visual Presentations, Class work, Use of Softwares and tools, Discussion, self study Seminar and /or Assignment
Evaluation Method	60% internal assessment based on class attendance, participation, assignment, seminar, presentation, internal examination, etc. 40 % external based on viva or university examination.

Signature



Course: MURP 24: Advanced Planning Techniques							
Course Code	MURP 24						
Course Title	Advanced Planning Techniques						
Credit	3						
Teaching per Week	3hr/week						
Minimum weeks per Semester	18						
Effective From	June 2019						
Purpose of Course	The Purpose of the course is to make the student capable of implementing the concept, methods and tools planning techniques. To make student acquaint of different methods of planning techniques.						
Course Objective	The primary objective of this course is to provide understanding of the application of quantitative research methods and techniques to analysis of planning problems.						
Course Outcomes	CO1 – to train student for data collection, data processing and source of data and presentation of the same. CO2 – Explain and train Students for GIS and application of it for planning. CO3 – Train student for research design and implementation of it by using different methods i.e. questionnaire design. CO4 – to acquaint student for planning research and report writing.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
	CO4						
Pre-requisite	B.Plan, B.Arch, B.E (civil), M.A./M.Sc.(Economics/Sociology/geography)						
Course Content	Module 1: Survey Techniques Data Base for Physical surveys (including land use / building use / density / building age, etc.) and Socio-economic surveys; Questionnaire formulation, Sampling and survey techniques, etc. Land use classification / coding. Module 2: GIS Mapping Coordinate system, Georeferencing and geo-coding; GIS data processing (Digitization, topology building and metadata creation), Data structures and modeling, GIS analysis (Buffer, proximity and overlay), Decision making through GIS, Information systems (Land Information system, Urban Information system for various activity sectors). Module 3: Research Design and implementation Approaches in research, developing a method for research; Questionnaire Design, Types of data, sampling methods; developing aims, objectives, scope, limitations; and literature research – using library, accessing the Internet Module 4: Analytical Techniques, Presentation and Report Writing Data tabulation; Interpretation of information; Graphical presentation of data; Spatial representation of data; Types of reports with specific focus on technical report writing; Organizing						

	the report, structure chapter organization, Writing the report (analytical findings); Referencing in text, use of software in referencing
Reference Books	1. MARGARET ROBERTS, "Town Planning Techniques", Hutchinson Educational Publication. 2. R.G. GUPTA, "Planning and Development of Towns", New Delhi. 3. Philip R. Berke (2009), "Urban Land use Planning", University of Illinois Press. 4. Kennedy M., The Global Positioning System & GIS: An Introduction, Ann Arbor Press, 1996
Teaching Methodology	Class work, Discussion, self study Seminar and /or Assignment
Evaluation Method	60% internal assessment based on class attendance, participation, assignment, seminar, presentation, internal examination, etc. 40 % external based on viva or university examination.

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Course 1

Title	Develop a Contributor Personality: <i>Practical Vedanta as applied to Career & modern Workplaces</i>
Duration	45 Hours
Course Credits	3 Credits
Eligibility Criteria	Any person with 10 th pass
Type of Course	Multi-disciplinary
Mode of Lectures	Online or Offline
Medium of Instruction	English (in semester beginning January 2022) English/ Hindi/ Gujarati (subsequently)
Pre-requisite	Basic computer, sound, and internet facility to access course materials
Evaluation Method	- Continuous Evaluation - End of course examination
Course Content	Unit 1: The contributor ideal [3 hours] - Swami Vivekananda's vision of combining effectiveness & human values, in work. - Understanding the ideal through lives of great Contributor Personalities - Understanding the ideal through everyday Contributors - The need for a new "Contributor" ideal in a changing world of work - Application/ Lab Exercise Unit 2: Developing a growth identity [3 hours] - Swami Vivekananda's vision of atmashraddha - Growing on multiple dimensions - Continuous growth: Expanding zone of "I can" 4 Strategies to systematically expand our zone of "I can" Unit 3: Become a creator of your own destiny [3 hours] - Swami Vivekananda's vision of "face the brute" - Dealing with life's challenges: "Caged response" versus "Creator response" 6 ways to develop "creator thinking" - Application/ Lab Exercise

	Unit 4: Achieving sustainable success [3 hours] - Swami Vivekananda's vision of "success-worthiness" - The Tree of Success – understanding the key to sustainable success - Building strong "roots" in our approach to everything we do - Application/ Lab Exercise
	Unit 5: Six career development pathways to build a contributive career [3 hours] - Swami Vivekananda's vision of "infinite human possibilities" - Widening our career possibilities: 6 career development pathways - How to open multiple career possibilities in any career/ profession - Application/ Lab Exercise
	Unit 6: Unleashing our 'power to contribute' [3 hours] - Swami Vivekananda's vision of "service" - Understanding what is 'power to contribute' in a role - Finding everyday opportunities to develop our 'power to contribute' - Expanding our contribution to various stakeholders - How to systematically widen the zone of our contribution - Application/ Lab Exercise
	Unit 7: Project session – Building a contributor profile for a real-life contributor [3 hours] - Project roadmap & building a research questionnaire - Interviewing real life contributors (field work) - Building project output & presentations
	Unit 8: Think solutions [3 hours] - Swami Vivekananda's message of "solving the problems of life" - What it means to "think solutions" - The shift in thinking and response in Solution Thinkers - The need for solution thinking in a changing world - Solution thinkers stand out from others - The need for solution thinking in society - How to think solutions: Learning a method - Application/ Lab Exercise
	Unit 9: Focus on value creation [3 hours] - Swami Vivekananda's message of combining intelligence and practicality with work - Widening our understanding of what is "value" - Discovering value possibilities: Learning a Tool - Application/ Lab Exercise

	Unit 10: Engage deeply [3 hours] - Swami Vivekananda's message of "make one idea your life" - Learning from people in various walks of life, on how to dive deep - 3 practices for engaging deeply - Application/ Lab Exercise
	Unit 11: Project session – Building a solution to a citizen challenge [3 hours] - Project roadmap & identifying a citizen challenge to work on - Developing a solution approach (field work) - Building project output & presentations
	Unit 12: Think in enlightened self-interest [3 hours] - Swami Vivekananda's message of "unselfishness" - The hidden costs of narrow self-interest - How to think in Enlightened Self-interest: Learning a tool - Application/ Lab Exercise
	Unit 13: Human-centric thinking & empathy [3 hours] - Swami Vivekananda's message of "feeling for others" - What happens when there is lack of empathy in our direct interactions with people - What happens when there is lack of human-centric thinking when we are disconnected or distant from people - Imaginative sympathy as a practice (imagine + sympathy) - How to practice imaginative sympathy: Learning 2 tools - Application/ Lab Exercise
	Unit 14: Trust conduct [3 hours] - Swami Vivekananda's message of "truth-seeking" - Trust conduct in action & common trust issues in everyday life - Practicing trust conduct
	Unit 15: Project session – Building a vision & plan to run a contributor company [3 hours] - Project roadmap & identifying a business opportunity to work on - Building a vision and plan for it - Building project output & presentations
Evaluation Method	• Continuous Evaluation Based on student presentations in Application/ Lab exercises in every unit. And project submissions and presentations of the 3 projects. • End of course examination MCQ testing. This is digitally conducted via a testing platform

Expected outcome of the course	• To build a contributive orientation in the way students approach career and work, through principles of Practical Vedanta. • To build the core mindsets and inner thinking abilities to equip students to engage positively in a dynamic and changing world. • To expose students to real-world career and work scenarios, so they are better prepared to deal with the changing world of work.
Reference Books	1. On Contributors, Srinivas V.; Illumine Ideas, 2011 2. Universal Message of the Bhagavad Gita (Vol 1-3); Swami Ranganathananda; Advaita Ashrama, Kolkata. 3. Eternal Values for a Changing Society (Vol 1-4); Swami Ranganathananda; Bharatiya Vidya Bhavan 4. Complete Works of Swami Vivekananda (Vol 1-9); Swami Vivekananda; Advaita Ashrama, Kolkata 5. Letters of Swami Vivekananda; Swami Vivekananda; Advaita Ashrama, Kolkata

Course 2

Title	Lectures from Colombo to Almora: Swami Vivekananda's <i>message on Indian Culture and Nation Building</i>
Duration	30 Hrs.
Course Credits	2 credits
Eligibility Criteria	Any person with 10th pass
Type of Course	Multi-disciplinary
Mode of Lectures	Online or Offline lectures
Medium of Instruction	English/ Gujarati
Pre-requisite	Basic computer and internet facility to access course materials
Evaluation Method	• Continuous Evaluation • End of course examination
Course Content	Unit 1: Introductory sessions [2 hours] - A Quick Introduction to Swami Vivekananda's Life [1hr] - Lectures from Colombo to Almora – the basis and impact [1hr] Unit 2: India - Our motherland [2 hours] - The Punya Bhumi [1hr] - The giant awakens [1hr] Unit 3: Vedantism [4 hours] - Defining Hinduism & the Books of the Hindus [1hr] - Core principles of Hinduism [2 hrs] - The practice and application of Hinduism [30 min] - The task ahead of us [30 min] Unit 4: The responsibility placed on us [1 hour] - India continues to be ever active on the spiritual plane [30 min] - The world is looking to India for spiritual food [30 min] Unit 5: On real worship [1 hour] - External worship vs. internal worship [30 min] - Unselfishness – the test of religion [30 min] Unit 6: Re-examining our models of social life [2 hours] - The choice before India [1hr] - India's solution to the challenge of materialism [1hr]

	Unit 7: What India must do [1 hour] - India is living – who says she is dead [30 min] - Where we must focus now [30 min]
	Unit 8: What is the right attitude to religion in the Indian context? [1 hour] - 3 big challenges for India due to revival of religion [30 min] - Solution to these challenges [30 min]
	Unit 9: Mission of the Vedanta [4 hours] - Power of Vedanta as a universal religion [2hrs] - Role of Vedanta in awakening India [2hrs]
	Unit 10: Plan of Campaign [4 hours] - Challenges of reform in India and some principles of reform [1hr] - Survey of reform in India [1hr] - Swami Vivekananda's approach to reform [2hrs]
	Unit 11: Vedanta in its application to Indian life [5 hours] - Our Vedantic roots as a race [1hr] - Uniqueness of the Upanishads and some key Upanishadic ideas [1hr] - Power of Upanishadic ideas of strength, fearlessness, and solidarity – for today's times [2hrs] - Why India needs Upanishadic ideas even more than the West [1hr]
	Unit 12: Sages of India [3 hours] - The Personal and Impersonal Vision in Indian thought [30 min] - The Rishi Ideal of India [30 min] - Some world moving sages of India [2 hrs]
Evaluation Method	• Continuous Evaluation Based on group presentations in the class, for every unit • End of course examination MCQ testing. This is digitally conducted via a testing platform
Expected outcome of the course	• Able to appreciate the significance and relevance of Swami Vivekananda and his message in our current times • Able to widen and deepen their appreciation of Indian Culture & heritage • Able to recognize what is necessary for nation building going forward
Reference Books	1. Life of Swami Vivekananda – by his Eastern and Western Disciples, Volume 1 & 2 2. Lectures from Colombo to Almora – by Swami Vivekananda Complete Works of Swami Vivekananda (Vol 1-9); Swami Vivekananda; Advaita Ashrama, Kolkata



Vivekananda Way

ISSUE 39

PULLOUT FOR REFERENCE

In this Issue, we begin exploring Swami Vivekananda's second lecture in Madras. This is the first of a 2-part exploration of the lecture titled — Vedanta in its application to Indian life.

focus in this issue:

Vedanta in its application to Indian Life - 1

In this lecture, Swami Vivekananda dives deep into the essential source of Hinduism — which are the Upanishads. He exhorts us to return to this sublime source of Hinduism and recover its deepest and most glorious messages to humankind.

Why should modern Hindus rightfully call themselves Vedantists or Vaidikas?

Swami Vivekananda begins by examining the origins of the word Hindu, which is a common appellation of the race and religion.

This word "Hindu" was the name that the ancient Persians used to apply to the river Sindhu. Now this word "Hindu" as applied to the inhabitants of the other side of the Indus, whatever might have been its meaning in ancient times has lost all its force in modern times; for all the people that live on this side of the Indus no longer belong to one religion. There are the Hindus proper, the Mohammedans, the Parsees, the Christians, the Buddhists, and Jains. The word "Hindu" in its literal sense ought to include all these; but as signifying the religion, it would not be proper to call all these Hindus.

Swami Vivekananda then points out that Hinduism is characterised by extraordinary variety and diversity, and the only point where there is agreement is belief in the scriptures, i.e. the Vedas. Therefore, designating ourselves around what we all agree upon may be more appropriate in modern times.

The only point where, perhaps, all our sects agree is that we all believe in the scriptures — the Vedas. This perhaps is certain that no man can have a right to be called a Hindu who does not admit the supreme authority of the Vedas.



All these Vedas, as you are aware, are divided into two portions — the Karma Kānda and the Jnāna Kānda. The Karma Kānda includes various sacrifices and ceremonials, of which the larger part has fallen into disuse in the present age.

The Jnana Kanda, as embodying the spiritual teachings of the Vedas known as the Upanishads and the Vedanta, has always been cited as the highest authority by all our teachers, philosophers, and writers, whether dualist, or qualified monist, or monist.



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2. What is the scope of Vedantism/ Vedanta?

Swami Vivekananda clarifies that Vedantism or Vedanta must cover the whole ground of Indian religious life, and include not just dualism, qualified monism and Advaitism, but also parts of Buddhism and Jainism.



The word Vedanta must cover the whole ground of Indian religious life, and being part of the Vedas, by all acceptance it is the most ancient literature that we have...

...Advaitism is only one branch of the various philosophic systems that have been founded on the Upanishads. The followers of the Vishishtadvaitic system have as much reverence for the Upanishads as the followers of the Advaita, and the Vishishtadvaitists claim as much authority for the Vedanta as the Advaitist. So do the dualists; so does every other sect in India...

Swami Vivekananda also points out that upon severe analysis one would find that even the essence of Buddhism (including its ethics), and many of the good doctrines of Jainism are found in the Upanishads.

The distinction between Vedantism and Advaitism

The word Vedantist has become somewhat identified in the popular mind with the word Advaitist. This needs a little clarification.

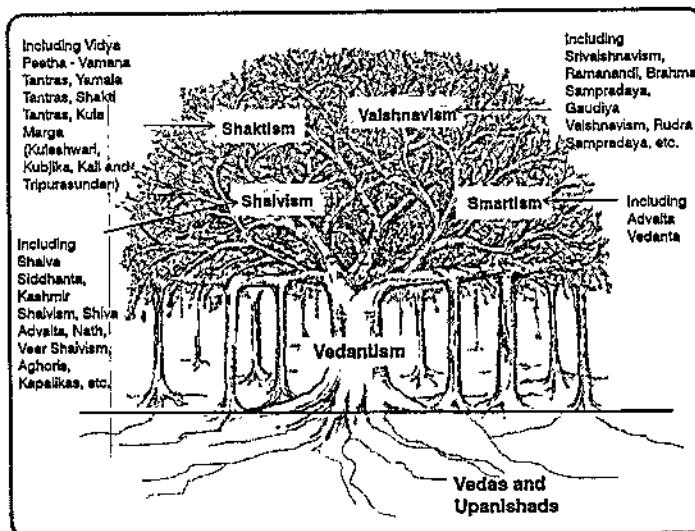
In India, along with the Vedas, we also have the Smritis and Puranas which aim to illustrate and elaborate upon the Vedas.

The Vedas or Shrutis have more authority, and the Smritis and the Puranas, though more accessible, have less authority.

According to Swami Vivekananda, different schools of thought give varying importance to the Shrutis and Smritis in their expositions. While the dualist sects gave too much importance to the latter, Shankara, the founder of the Advaitic school, relies predominantly on the Upanishads which are considered more authoritative.

As a result, the Advaitists were considered Vedantists par excellence, leading to the common misconception that Vedanta is identified with Advaita.

3. In the Upanishads we find the germs of all subsequent development of religious thought



...there is not one full-grown Indian ideal that cannot be traced back to the same source — the Upanishads.

According to Swami Vivekananda, there is not one full grown Indian ideal that cannot be traced back to the same source — the Upanishads. Many of the ideas, especially connected to Bhakti, are in the germ form in the Upanishads and are found fully developed in later times in the Puranas and other Smritis.



Certain ludicrous attempts have been made by persons without much Upanishadic scholarship to trace Bhakti to some foreign source; but as you know, these have all been proved to be failures, and all that you want of Bhakti is there, even in the Samhitas, not to speak of the Upanishads — it is there, worship and love and all the rest of it; only the ideals of Bhakti are becoming higher and higher.

4. What are the difficulties we face in understanding the Upanishads?

Swami Vivekananda speaks about three sets of challenges that we face while understanding the Upanishads. These are elucidated below:

Challenge 1: The mixture of Vedantism and local culture

According to Swami Vivekananda, the Upanishads are the scriptures, but they have been differently explained and interpreted in subsequent Pauranika literature.

While it is true that the Upanishads have more authority than subsequent interpretations, it is found that much of the religious opinion and practice in India is 90% Pauranika and only 10% Vaidika.

The dominance of local interpretation over scriptures has resulted in tremendous confusion and contradiction. Furthermore, this has meant that most people cannot distinguish between Vedantism and their little local customs.

This has also meant that an ignorant villager, for example, cannot recognise that some of his customs do not have the sanction of the scriptures and that if he gave them up it would not hurt him at all, and may, in fact, make him a better human being.

And we all find the most contradictory usages

prevailing in our midst and also religious opinions prevailing in our society which scarcely have any authority in the scriptures of the Hindus; and in many cases we read in books, and see with astonishment, customs of the country that neither have their authority in the Vedas nor in the Smritis or Puranas, but are simply local. And yet each ignorant villager thinks that if that little local custom dies out, he will no more remain a Hindu. In his mind Vedantism and these little local customs have been indissolubly identified. In reading the scriptures it is hard for him to understand that what he is doing has not the sanction of the scriptures, and that the giving up of them will not hurt him at all, but on the other hand will make him a better man



Challenge 2: The lost portions of our scriptures



We read in the Mahâbhâshya of Patanjali, that great philological work, that the Sâma-Veda had one thousand branches. Where are they all? Nobody knows. So with each of the Vedas; the major portion of these books have disappeared, and it is only the minor portion that remains to us. They were all taken charge of by particular families; and either these families died out, or were killed under foreign persecution, or somehow became extinct; and with them, that branch of the learning of the Vedas they took charge of became extinct also.

According to Swami Vivekananda, our scriptures have been very vast, but a large portion of them have been lost over time.

For example, the major portion of the Vedas have disappeared, and only a minor portion remains to us.

The reason: The Vedas have several branches, each of which was taken up by particular families; and over the centuries these families became extinct due to foreign persecution and other reasons, leading to the dying out of that branch.

The loss of whole portions of the Vedas has meant that whenever some local beliefs are challenged, (and it is pointed out that the local custom is against the scriptures), the argument put forward is that this custom existed in some branch of the Shrutis which is now extinct.

As a result, it becomes very difficult to work through these various interpretations and discover the common plan or structure which has held our religion together for so long.

In the midst of all these varying methods of reading and commenting on our scriptures, it is very difficult indeed to find the thread that runs through all of them; for we become convinced at once that there must be some common ground underlying all these varying divisions and subdivisions. There must be harmony, a common plan, upon which all these little bits of buildings have been constructed, some basis common to this apparently hopeless mass of confusion which we call our religion. Otherwise it could not have stood so long, it could not have endured so long.



Challenge 3: Text torturing by commentators



The Advaitic commentator, whenever an Advaitic text comes, preserves it just as it is; but the same commentator, as soon as a dualistic text presents itself, tortures it if he can, and brings the most queer meaning out of it. Sometimes the "Unborn" becomes a "goat", such are the wonderful changes effected. To suit the commentator, "Ajâ" the Unborn is explained as "Aja" a she-goat. In the same way, if not in a still worse fashion, the texts are handled by the dualistic commentator.

According to Swami Vivekananda, the other big difficulty we face is the text torturing by commentators. When an Advaitic commentator sees an Advaitic text, he preserves it just as it is. However, when presented with a dualist text, he will interpret it in the most odd manner until it supports his point of view. Similarly with a dualist commentator.

Why? The Sanskrit language is intricate, the Sanskrit of the Vedas is ancient, and the philology is so perfect that any amount of discussion can be carried out regarding the meaning of any one word.

This creates further difficulties for us in understanding the Upanishads.

Swami Vivekananda proposes a new way of accessing the scriptures

Swami Vivekananda says that the solution to this complicated challenge was provided by Sri Ramakrishna himself, who was at the same time a dualist, an Advaitist, a Bhakta, and a Jnani. It is he who showed Swami Vivekananda that the Upanishads and the texts of the scriptures can be understood from an independent and better basis rather than by blindly following the commentators.

SWAMI VIVEKANANDA'S CONCLUSION ... in my opinion and in my researches, I came to the conclusion that these texts are not at all contradictory. So we need have no fear of text-torturing at all! The texts are beautiful, ay, they are most wonderful; and they are not contradictory, but wonderfully harmonious, one idea leading up to the other. But the one fact I found is that in all the Upanishads, they begin with dualistic ideas, with worship and all that, and end with a grand flourish of Advaitic ideas.



Lecture to be continued in the next issue

If you have any questions on this lecture, do post your queries on www.vivekanandaway.org.

You can also access previous issues of Vivekananda Way here.





Vivekananda Way

PULLOUT FOR REFERENCE

The lecture covered in this Issue is Vedanta in its application to Indian life. This lecture was one of the four public lectures delivered by Swami Vivekananda in Madras, during the course of a 9-day stay. We covered the first part of this lecture in Issue 39. We now resume the lecture after a break, which was a Covid-Special Issue. After this Issue, there will be another Issue in which we will complete this lecture.

focus in this issue:

Vedanta in its application to Indian Life - 2

In Issue 39, we covered the first part of this lecture, where the following questions were explored:

1. Why should modern Hindus rightfully call themselves Vedantists or Vaidikas?
2. What is the scope of Vedantism/ Vedanta?
3. What is contained in the Upanishads?
4. What are the difficulties we face in understanding the Upanishads?

In this Issue, we will explore the uniqueness and sublimity of the Upanishadic language, and also see some of the key Upanishadic ideas.

I: SRI RAMAKRISHNA – THE KEY TO UNDERSTANDING THE UPANISHADS

According to Swami Vivekananda, Sri Ramakrishna's life shows us that it is better to directly approach the Upanishads in the original rather than depend on commentators.

Seen thus, the Upanishads do not come across like a mass of contradictory ideas. Rather, they are wonderfully harmonious, one idea leading up to the other. Thus, they begin with worship of dualism, and end with the grand flourish of Advaitic ideas.



... Therefore I now find in the light of this man's life that the dualist and the Advaitist need not fight each other. Each has a place, and a great place in the national life. The dualist must remain, for he is as much part and parcel of the national religious life as the Advaitist. One cannot exist without the other; one is the fulfilment of the other; one is the building, the other is the top; the one the root, the other the fruit, and so on. Therefore any attempt to torture the texts of the Upanishads appears to me very ridiculous.



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II: THE LANGUAGE OF THE UPANISHADS



Apart from all its merits as the greatest philosophy, apart from its wonderful merit as theology, as showing the path of salvation to mankind, the Upanishadic literature is the most wonderful painting of sublimity that the world has. Here comes out in full force that individuality of the human mind, that introspective, intuitive Hindu mind.

[II.A] The language of the Upanishads is new

Swami Vivekananda points out that the language of the Upanishads is new because of what they seek to express.

While the poetry of western poets like Milton, Dante, Homer etc are also sublime, he finds that they are always trying to grasp at infinity through the medium of their senses or their muscles. As a result, they are only able to reach the ideal of infinite space and infinite expansion, and no more.



...The language became new in the Upanishads; it is almost negative, it is some times, chaotic, sometimes taking you beyond the senses, pointing out to you something which you cannot grasp, which you cannot sense, and at the same time you feel certain that it is there.

In the Samhita part of the Vedas too, there are wonderful Riks which seek to describe creation. But, the creators of these Riks found out very soon that the Infinite cannot be reached in that way, that even infinite space, and expansion, and infinite external nature could not express the ideas that were struggling to find expression in their minds.

In short, the Upanishads have a new language because they seek to describe something beyond the external world of the senses and the physicality of existence.



What passage in the world can compare with this?

न तत्र सूर्यो भाति न चन्द्रतारकं
नेमा दिद्युतो भान्ति कुतोऽयमग्निः।

— There the sun cannot illumine, nor the moon nor the stars, the flash of lightning cannot illumine the place, what to speak of this mortal fire.

Kathopanishad II.2:15

[II.B] The Upanishads are filled with grand conceptions of the divine

Swami Vivekananda also points our attention to the marvellous poetry of the Upanishads and tells us that endless such examples are scattered like gems across the different Upanishads. Here is one such example which he shares with us:



Where can you find a more perfect expression of the whole philosophy of the world, the gist of what the Hindus ever thought, the whole dream of human salvation, painted in language more wonderful, in figure more marvellous than this?

द्वा सुपर्णा सयुजा सखाया समानं वृक्षं परिषस्वजाते ।
तयोरन्यः पिप्पलं स्वाद्वत्त्यनश्नन्नन्यो अभिचाकशीति ॥
समाने वृक्षे पुरुषो निमग्नोऽनीशया शोचति मुह्यमानः ।
जुष्टं यदा पश्यत्यन्यमीशमस्य महिमानमिति वीतशोकः ॥

Mundakopanishad III.1:1-2

> continued.

This verse, which Swami Vivekananda extols, is an example of the extraordinarily sublime conceptions we see in the Upanishads. The conception described in the verse is translated below along with Swami Vivekananda's explanation. In this single example, the Upanishads take you from the dualistic to the utmost Advaitic conception.

The conception of two birds on a tree as applied to the Journey of the Human Soul...



Upon the same tree there are two birds of beautiful plumage, most friendly to each other, one eating the fruits, the other sitting there calm and silent without eating — the one on the lower branch eating sweet and bitter fruits in turn and becoming happy and unhappy, but the other one on the top, calm and majestic; he eats neither sweet nor bitter fruits, cares neither for happiness nor misery, immersed in his own glory. This is the picture of the human soul.

>> START HERE
6-stages of the
Journey of the Human Soul

1

Man goes on eating the sweet and bitter fruits of life



2

Through joys and sorrows, in moments, the cloud clears, and man catches a glimpse of the other bird. He stops and sees the bird immersed in its own glory (self-content)



3

After the glimpse, man again forgets and goes on eating the fruits of life... perhaps, after some time, catches another glimpse



4

With every hard knock of life, he comes nearer and nearer to the other bird (his life, his friend and companion) — a transformation is going on



5

The nearer he comes, the more he finds himself melting away (until he finds that he has disappeared completely)



6

He discovers he was but a reflection of the majestic bird. Then he becomes fearless, satisfied, and calmly serene



[II.C] There is a vigour and directness in the language of the Upanishads

According to Swami Vivekananda, the language of the Upanishads carries no signs of degradation. By degradation, Swami Vivekananda means too much allegorization, too much piling of adjectives, and too much of intricacy.

No signs of degradation are there — no attempts at too much allegorising, too much piling of adjectives after adjectives, making it more and more intricate, till the whole of the sense is lost, and the brain becomes giddy, and man does not know his way out from the maze of that literature. There was none of that yet.

As a result of which, the language of the Upanishads enables people to 'see' the truth rather than get lost into intricate reasoning and the maze of the literature.



... the language and the thought and everything come direct, they fall upon you like a sword-blade, strong as the blows of a hammer they come. There is no mistaking their meanings. Every tone of that music is firm and produces its full effect; no gyrations, no mad words, no intricacies in which the brain is lost.

Swami Vivekananda makes a significant point that the quality of this literature shows that the race itself had not lost any of its national vigour when the Upanishads were created.

III: THE MESSAGE OF THE UPANISHADS

According to Swami Vivekananda, the Upanishads give us three big messages:

1. The message of strength

Strength, strength is what the Upanishads speak to me from every page. This is the one great thing to remember, it has been the one great lesson I have been taught in my life; strength, it says, strength, O man, be not weak.

2. The message of freedom (not salvation)

Freedom, physical freedom, mental freedom, and spiritual freedom are the watchwords of the Upanishads. Ay, this is the one scripture in the world, of all others, that does not talk of salvation, but of freedom. Be free from the bonds of nature, be free from weakness! And it shows to you that you have this freedom already in you. That is another peculiarity of its teachings.

3. The idea of the solidarity of the universe

... a great idea which the world is waiting to receive from our Upanishads is the solidarity of this universe

These three messages will be explored in the coming issue. TO BE CONTINUED

If you have any questions on this lecture, do post your queries on www.vivekanandaway.org.

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Vivekananda Way

ISSUE 42

PULLOUT FOR REFERENCE

This issue is part 3 of the lecture Vedanta in its Application to Indian life. We covered the first two parts of this lecture in Issue 39 and Issue 41.

focus in this issue:

Vedanta in its Application to Indian Life - 3

In Part 3 of the lecture: What the Upanishads tell us

Strength, strength is what the Upanishads speak to me from every page.

This is the one great thing to remember, it has been the one great lesson I have been taught in my life; strength, it says, strength, O man, be not weak.



1.1 There are human weaknesses, but more weakness will not heal them. The answer is to stand up and be strong

"Are there no human weaknesses? — says man. There are, say the Upanishads, but will more weakness heal them, would you try to wash dirt with dirt? Will sin cure sin, weakness cure weakness? Strength, O man, strength, say the Upanishads, stand up and be strong. Ay, it is the only literature in the world where you find the word "Abhiih", "fearless", used again and again; in no other scripture in the world is this adjective applied either to God or to man. Abhiih, fearless!"

1.2 For centuries, we have weakened ourselves till we have become "earth worms". What we need now is strength

"There are thousands to weaken us, and of stories we have had enough. Every one of our Puranas, if you press it, gives out stories enough to fill three-fourths of the libraries of the world. Everything that can weaken us as a race we have had for the last thousand years. It seems as if during that period the national life had this one end in view, viz how to make us weaker and weaker till we have become real earthworms, crawling at the feet of every one who dares to put his foot on us. Therefore, my friends, as one of your blood, as one that lives and dies with you, let me tell you that we want strength, strength, and every time strength."

1.3 The Upanishads are the great mine of strength through which the whole world can be unified

"And the Upanishads are the great mine of strength. Therein lies strength enough to invigorate the whole world; the whole world can be vivified, made strong, energised through them. They will call with trumpet voice upon the weak, the miserable, and the downtrodden of all races, all creeds, and all sects to stand on their feet and be free."



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1.4 Swami Vivekananda tells us a story that highlights the Upanishadic Idea of strength and fearlessness



And in my mind rises from the past the

vision of the great Emperor of the West, Alexander the Great, and I see, as it were in a picture, the great monarch standing on the bank of the Indus, talking to one of our Sannyâsins in the forest;

the old man he was talking to, perhaps naked, stark naked, sitting upon a block of stone, and the Emperor, astonished at his wisdom, tempting him with gold and honour to come over to Greece.

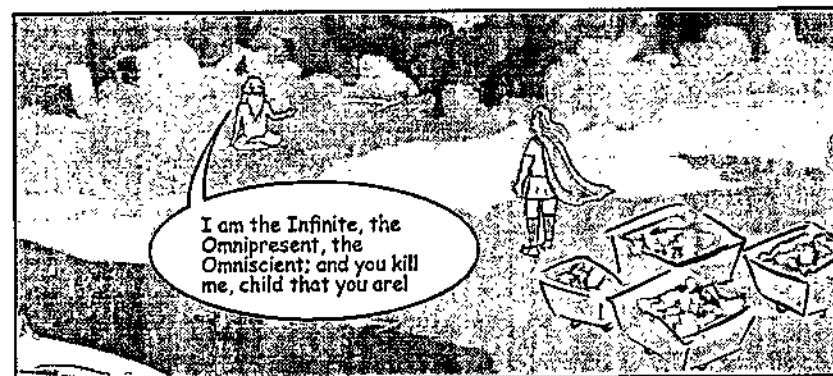
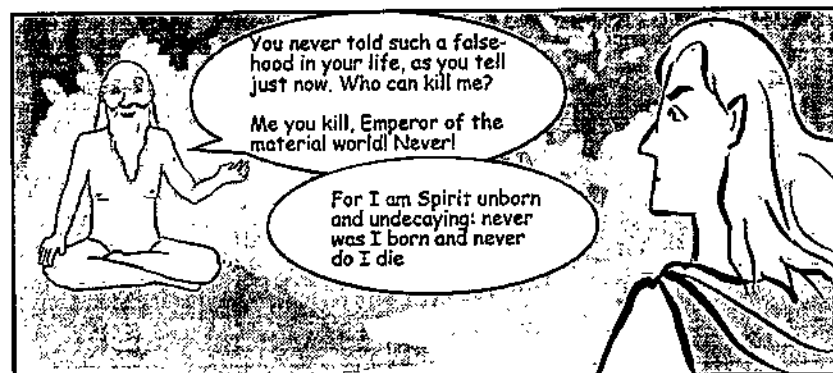
And this man smiles at his gold, and smiles at his temptations, and refuses;

and then the Emperor standing on his authority as an Emperor, says, "I will kill you if you do not come", and the man bursts into a laugh and says, "You never told such a falsehood in your life, as you tell just now.

Who can kill me? Me you kill, Emperor of the material world! Never! For I am Spirit unborn

and undecaying: never was I born and never do I die; I am the Infinite, the Omnipresent, the Omniscient; and you kill me, child that you are!"

That is strength, that is strength!





Freedom, physical freedom, mental freedom, and spiritual freedom are the watchwords of the Upanishads. Ay, this is the one scripture in the world, of all others, that does not talk of salvation, but of freedom. Be free from the bonds of nature, be free from weakness!

2.1 Every one of us must admit this truth – that this freedom is already in you

For dualists (Dvaitists)

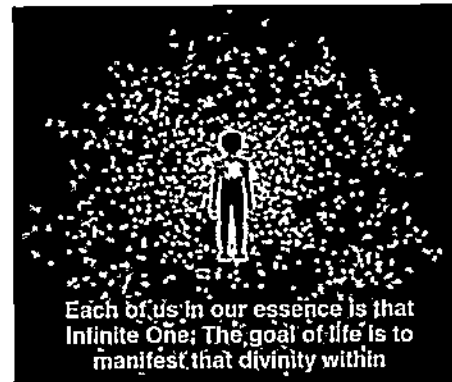
“You are a Dvaitist; never mind, you have got to admit that by its very nature the soul is perfect; only by certain actions of the soul has it become contracted.”

For qualified non-dualists (Vishishtadvaitists)

“Indeed, Rāmānuja’s theory of contraction and expansion is exactly what the modern evolutionists call evolution and atavism. The soul goes back, becomes contracted as it were, its powers become potential; and by good deeds and good thoughts it expands again and reveals its natural perfection.”

For non-dualists (Advaitists)

“With the Advaitist the one difference is that he admits evolution in nature and not in the soul. ... This is the Advaitist’s position with regard to evolution – evolution of nature and manifestation of the Self within. Not that the



Self can by any means be made to contract. It is unchangeable, the Infinite One. It was covered, as it were, with a veil, the veil of Maya, and as this Maya veil becomes thinner and thinner, the inborn, natural glory of the soul comes out and becomes more manifest.”

2.2 The idea of divinity within every one will revolutionize the world

“Do you not find how everything is being revolutionized? Do you not see how it was the custom to take for granted that everything was wicked until it proved itself good? In education, in punishing criminals, in treating lunatics, in the treatment of common diseases even, that was the old law. What is the modern law? The modern law says, the body itself is healthy; it cures diseases of its own nature. Medicine can at the best but help the storing up of the best in the body. What says it of criminals? It takes for granted that however low a criminal may be, there is still the divinity within, which does not change, and we must treat criminals accordingly. All these things are now changing, and reformatories and penitentiaries are established. So with everything.”



The treatment of one man to another will be entirely revolutionized, and these old, old ideas of pointing to the weakness of mankind will have to go. They will have received their death-blow within this century.

Examples of revolutions we should expect:

- ☐ Can we educate assuming that all knowledge exists within every individual?
- ☐ Can we treat assuming that wellness (not illness) is the body’s natural state?
- ☐ Can we develop a psychology based on strength?
- ☐ Can we begin by assuming that criminals are essentially good?



...the world is waiting to receive from our Upanishads the [idea of the] solidarity of this universe.

A world moving towards solidarity is in need of this message from the Upanishads.

The world is moving towards solidarity among nations, in science, in politics and sociology, and in ethics and morality.

3.1 The Upanishads offer us a way to digest the increasing intercommunication and globalization of the world

- According to Swami Vivekananda, the old lines of demarcation and differentiation are vanishing rapidly across the world. The world is in increasing intercommunication (a process that has since accelerated with the birth of the internet).
- As a result, people have encountered each other from across the world, and have gone beyond their medieval notions. In Swami Vivekananda's words, "we Hindus no longer say that every country beyond our own land is peopled with demons and hobgoblins, nor do the people of Christian countries say that India is only peopled by cannibals and savages".
- In practice, we are beginning to recognize that when we go out of our own lands, we find people similar to us, with the same desire to help and the same desire to support each other, as in our own country.



Our Upanishads say that the cause of all misery is ignorance;

and that is perfectly true when applied to every state of life, either social or spiritual. It is ignorance that makes us hate each other, it is through ignorance that we do not know and do not love each other. As soon as we come to know each other, love comes, must come, for are we not one? Thus we find solidarity coming in spite of itself.

3.2 The Idea of solidarity will help address challenges across multiple domains



You speak of matter, the whole universe as one mass, one ocean of matter, in which you and I, the sun and the moon, and everything else are but the names of different little whirlpools and nothing more. Mentally speaking, it is one universal ocean of thought in which you and I are similar little whirlpools; and as spirit it moveth not, it changeth not. It is the One Unchangeable, Unbroken, Homogeneous Atman. ... The explanation of morality, the fountain of ethics, that also the world wants; and that it will get here.

- Problems which were only at a national or a localized level, even late into the 18th century, are now becoming problems that are international or global in nature. And, such problems can only be solved through solidarity at an international level – through international combinations and international laws.
- Science is coming to a broader view of matter (a thought which predated Einstein's formula that energy and matter are one whole)
- There is also a need for a new universal ethics. Note: This has become particularly obvious when we consider that there is a growing tide where people are not depending on religion and social norms alone for supplying their ethics and morality.

TO BE CONTINUED in Part 4: Swami Vivekananda discusses What we want in India

If you have any questions on this lecture, do post your queries on www.vivekanandaway.org.

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Vivekananda Way

ISSUE 43

PULLOUT FOR REFERENCE

In this issue, we cover the last part of the lecture Vedanta in its Application to Indian life. Previously, we have covered this lecture in Issues 39, 41 and 42.

focus in this issue:

Vedanta in its Application to Indian Life - 4

In Part 4 of the lecture: What we want in India

In this part of the lecture Swami Vivekananda,

1. Examines the deeper causes of degradation of our nation and identifies three causes – (i) our physical weakness, (ii) our lack of faith in ourselves, and (iii) our "exclusivism".
2. Shows us that the answer to these challenges is the message of the Upanishads – i.e., developing strength (physical and mental); and recognizing the divinity in oneself, and acknowledging the divinity in others.

**If foreigners
need the
message of the
Upanishads,
India
needs it
twenty
times more**



PART 1: WHAT WE NEED

Physical Strength



First of all, our young men must be strong. Religion will come afterwards.

- According to Swami Vivekananda, "in spite of the greatness of the Upanishads, in spite of our boasted ancestry of sages" we are weak, very weak as compared to other races.
- He diagnoses the cause as physical weakness. The consequences of this physical weakness have been many, the most important being our inability to work hard, work together, work unselfishly, and learning to go beyond petty differences to work towards a common goal.

continued. >>



That is the state in which we are — hopelessly disorganised mobs, immensely selfish, fighting each other for centuries as to whether a certain mark is to be put on our forehead this way or that way, writing volumes and volumes upon such momentous questions as to whether the look of a man spoils my food or not! This we have been doing for the past few centuries.

... We speak of many things parrot-like, but never do them; speaking and not doing has become a habit with us. What is the cause of that? Physical weakness. This sort of weak brain is not able to do anything; we must strengthen it.



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<< continued.

- Swami Vivekananda's solution to this challenge is the development of physical strength — especially in our young people. He says that we must be strong first and religion can come afterwards.



Be strong, my young friends; that is my advice to you. You will be nearer to Heaven through football than through the study of the Gita. These are bold words; but I have to say them, for I love you.

...You will understand the Gita better with your biceps, your muscles, a little stronger. You will understand the mighty genius and the mighty strength of Krishna better with a little of strong blood in you. You will understand the Upanishads better and the glory of the Atman when your body stands firm upon your feet, and you feel yourselves as men. Thus we have to apply these to our needs.

Faith (Assert the divinity within)



I do not mean to preach Advaitism, or Dvaitism, or any ism in the world. The only ism that we require now is this wonderful idea of the soul — its eternal might, its eternal strength, its eternal purity, and its eternal perfection.

- Swami Vivekananda helps us understand our own lack of faith in ourselves by comparing us with Englishmen. He points out that Englishmen (Westerners) believe that they are here to rule the world, and it is this belief that they are great and can do anything they wish to do that makes them great. This is despite the fact that they have a religion which teaches them that they are sinners. In fact, when they do catch India's ideals they are even able to come to India and teach Indians their own religion, despite the ridicule of their own fellow countrymen. In comparison, we Indians talk about reforms and ideals, but do not put anything into practice. The reason for this is weakness (physical and mental), and our lack of faith in ourselves.
- According to Swami Vivekananda, the solution to uphold the Upanishads and affirm the divinity within ourselves. By continuously affirming our divinity, we will not only become strong, but we will be able to manifest our full potential as individuals.



Believe in the divinity within

Let me tell you, strength, strength is what we want. And the first step in getting strength is to uphold the Upanishads, and believe — "I am the Soul", "Me the sword cannot cut; nor weapons pierce; me the fire cannot burn; me the air cannot dry; I am the Omnipotent, I am the Omniscient." So repeat these blessed, saving words.



Believe in yourself

Do not say we are weak; we can do anything and everything. What can we not do? Everything can be done by us; we all have the same glorious soul, let us believe in it.



.... And manifest your greatness

Have faith, as Nachiketâ. At the time of his father's sacrifice, faith came unto Nachiketâ; ay, I wish that faith would come to each of you; and every one of you would stand up a giant, a world-mover with a gigantic intellect — an infinite God in every respect. That is what I want you to become. This is the strength that you get from the Upanishads, this is the faith that you get from there.

Equal chances for all



I have the same God in me as you have in you. And that is what we want, no privilege for any one, equal chances for all

- According to Swami Vivekananda, the dominant idea for many centuries was that the Upanishads was only relevant for the forest life of the recluse. [Although Shankara was a little kind and said that even grihasthas (householders) may study the Upanishads as it would do them good].
- However, Swami Vivekananda reminds us that the most authoritative commentary on the Vedas has been made by Krishna in the Bhagvad Gita – and according to Krishna, it is clear that the Upanishads are meant not just for sanyasins but for everyone in every occupation of life.
- Swami Vivekananda says that the conceptions of Vedanta must not be restricted to a forest or a cave, but must spread to every walk of life.
- The Upanishads call to every man, woman, and child, whatever their occupation may be. People from every occupation can live ideals of the Upanishads, even if it is to a small extent.
- According to Swami Vivekananda, it is the nature of society to form itself into groups, but that should not mean that there should be privileges.
- Swami Vivekananda is clear on the subject when he says that one person may be good at mending shoes, another may be clever at reading Vedas, or governing the country – but that does not give any one of these groups a reason to trample on another group.
- Therefore, if you teach Vedanta, then each group is enabled to assert its essential divinity and demand the removal of privileges and further demand equal chances for all.

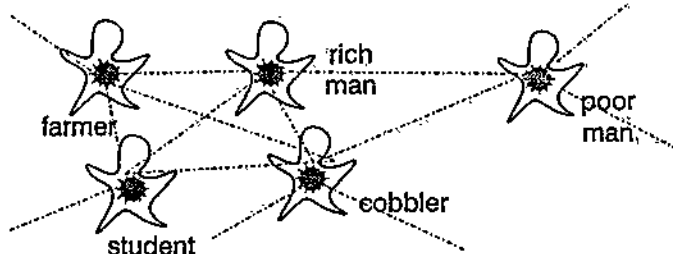


...conceptions of the Vedanta must come out, must remain not only in the forest, not only in the cave, but they must come out to work at the bar and the bench, in the pulpit, and in the cottage of the poor man, with the fishermen that are catching fish, and with the students that are studying. They call to every man, woman, and child whatever be their occupation, wherever they may be.

...Even the least thing well done brings marvellous results; therefore let every one do what little he can. If the fisherman thinks that he is the Spirit, he will be a better fisherman; if the student thinks he is the Spirit, he will be a better student. If the lawyer thinks that he is the Spirit, he will be a better lawyer, and so on

...I can perform one duty in social life, and you another; you can govern a country, and I can mend a pair of old shoes, but that is no reason why you are greater than I, for can you mend my shoes? Can I govern the country? I am clever in mending shoes, you are clever in reading Vedas, but that is no reason why you should trample on my head.

Each person, having been taught about the spirit within, will become better in whatever s/he does, and at the same time will recognize that no human being has special privileges over others.



PART 2: HOW TO SPREAD VEDANTA TO ALL



... let every one be taught that the divine is within, and every one will work out his own salvation

In his closing notes of this lecture, Swami Vivekananda lays out the implications of the divinity of every human being, on the way we serve:

Implication 1:

- Swami Vivekananda says that liberty is the first condition for growth. Therefore, it is fundamentally wrong for any individual to think that s/he will work out the salvation of others.
- Every soul is the soul of God and therefore it would be wrong for us to assume that we know what is good for another soul.



Liberty is the first condition of growth. It is wrong, a thousand times wrong, if any of you dares to say, "I will work out the salvation of this woman or child."

Implication 2:

- When you look upon each person as divine, you cannot help anyone you can only serve. By serving other human beings you are actually serving the Lord himself. The right attitude is to recognize that it is a privilege to be in a position of serving others. In fact, service should be done only as a worship of God in man. It is the greatest privilege of our life to be allowed to serve the Lord coming in the shape of the diseased, or the leper, the lunatic or the sinner.
- We have to give up the idea of ruling over others and instead act as we would in the case of a plant, i.e. supplying the growing seed with materials for making up of its body, such as water, earth, and air. The plant will take all that it wants by its own nature and will assimilate and grow by its own nature.



Look upon every man, woman, and every one as God. You cannot help anyone, you can only serve: serve the children of the Lord, serve the Lord Himself

THE TASK AHEAD



Bring all light into the world. Light, bring light! Let light come unto every one; the task will not be finished till every one has reached the Lord. Bring light to the poor and bring more light to the rich, for they require it more than the poor. Bring light to the ignorant, and more light to the educated, for the vanities of the education of our time are tremendous! Thus bring light to all and leave the rest unto the Lord, for in the words of the same Lord "To work you have the right and not to the fruits thereof." "Let not your work produce results for you, and at the same time may you never be without work."

A Benediction

May He who taught such grand ideas to our forefathers ages ago help us to get strength to carry into practice His commands!

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વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
 ઉપના - મગદલ્લા રોડ, વેસુ, સુરત - ૩૯૫૦૦૭

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ક્રમ	વિષય	એફ.વાય.બી.કોમ		એસ.વાય.બી.કોમ		ટી.વાય.બી.કોમ		કુલ	
		કુલ વર્ગો	કુલ તાસ	કુલ વર્ગો	કુલ તાસ	કુલ વર્ગો	કુલ તાસ	કુલ વર્ગો	કુલ તાસ
૧.	આંકડાશાસ્ત્ર	૦૪	૧૨	૦૧	૦૩	૦૧	૦૩	-	૧૮
અંગ્રેજી									
ક્રમ	વિષય	એફ.વાય.બી.કોમ		એસ.વાય.બી.કોમ		ટી.વાય.બી.કોમ		કુલ	
		કુલ વર્ગો	કુલ તાસ	કુલ વર્ગો	કુલ તાસ	કુલ વર્ગો	કુલ તાસ	કુલ વર્ગો	કુલ તાસ
૧.	અંગ્રેજી	૦૪	૧૨	૦૪	૧૨	૦૪	૧૨	-	૩૬



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વિષય (વિભાગ) વાર અધ્યાપકોની સંખ્યા તથા કાર્યભાર (જો વિષય એક થી વધુ ડીગ્રી પ્રોગ્રામમાં ભરોવવામાં આવતો હો તો તેવા દરેક ડીગ્રી પ્રોગ્રામમાં તેણે સમાવવો)						
એકાઉન્ટન્સી						
ક્રમ	અધ્યાપકનું નામ	યુનિવર્સિટી માન્યતાના પત્રની તારીખ અને નંબર (એક-એક નકલ બીડાવી)	વર્ષ/સેમેસ્ટર દીઠ કાર્યભાર (કુલ તાસ)			કુલ તાસ (તાસના ક્લાકો) (પ્રેક્ટીકલના ૨ ક્લાકો = એક ક્લાકનો ૧ તાસ)
			એક.વાય.	એસ.વાય.	ટી.વાય.	
૧.	ડૉ. રૂચી એચ.દેસાઈ	એસ(૧)(માન્યતા)(૨૦૭)/૮૮૧ ૮/૨૦૧૩ તા.૧૨/૨૮/૨૦૧૩	૦૩	૦૮	૦૬	૧૮
૨.	ડૉ. પ્રિયંકા જે. કૂલવાલા	એસ(૧)(માન્યતા)(૨૦૮)/૪૭૪ ૪/૨૦૧૫ તા.૧૬/૦૬/૨૦૧૫	૦૬	૦૮	૦૩	૧૮
૩.	પ્રા. દિલશાદ જે. પટેલ	એસ(૧)(માન્યતા)(૨૦૮)/૮૧૪ ૮/૨૦૧૮ તા.૧૨/૦૬/૨૦૧૩	૦૮	૦૬	૦૩	૧૮
૪.	પ્રા.ભૌમિક ઉપાધ્યાય	વિજીટીંગ	-	૦૩	૦૩	૦૬
	કુલ		૧૮	૨૭	૧૫	૬૦
કોમર્સ						
ક્રમ	અધ્યાપકનું નામ	યુનિવર્સિટી માન્યતાના પત્રની તારીખ અને નંબર (એક-એક નકલ બીડાવી)	વર્ષ/સેમેસ્ટર દીઠ કાર્યભાર (કુલ તાસ)			કુલ તાસ (તાસના ક્લાકો) (પ્રેક્ટીકલના ૨ ક્લાકો = એક ક્લાકનો ૧ તાસ)
			એક.વાય.	એસ.વાય.	ટી.વાય.	
૧.	પ્રા. ચિંતન કે. મોદી	એસ(૧)(માન્યતા)(૨૦૮)/૮૧૪ ૮/૨૦૧૮ તા.૦૨/૦૬/૨૦૧૮	-	૦૬	૧૨	૧૮
૨.	પ્રા. રાજશ્રી ડી.મકવાણા	એસ(૧)(માન્યતા)(૨૦૮)/૮૧૪ ૮/૨૦૧૮ તા.૦૨/૦૬/૨૦૧૮	-	૧૨	૦૬	૧૮
૩.	પ્રા. હિરલ એન. શાહ	એસ(૧)(માન્યતા)(૨૦૮)/૧૮૩ ૮/૨૦૧૮ તા.૧૫/૧૦/૨૦૧૮	૦૬	૦૬	૦૬	૧૮
૪.	પ્રા. તૃપ્તા આર. કદમ	વિજીટીંગ	૦૬	૦૬	-	૧૨
૫.	પ્રા. નેહા જી. નારંગ	વિજીટીંગ	૦૬	-	૦૬	૧૨
૬.	પ્રા. ફોરમ એ. મોદી	વિજીટીંગ	૦૮	-	-	૦૮
	કુલ		૨૬	૩૦	૩૦	૮૬



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અર્થશાસ્ત્ર						
ક્રમ	અધ્યાપકનું નામ	યુનિવર્સિટી માન્યતાના પત્રની તારીખ અને નંબર (એક-એક નકલ બીડાવી)	વર્ષ/સેમેસ્ટર દીઠ કાર્યભાર (કુલ તાસ)			કુલ તાસ (તાસના કલાકો) (પ્રેક્ટીકલના ૨ કલાકો = એક કલાકનો ૧ તાસ)
			એક.વાય.	એસ.વાય.	ટી.વાય.	
૧.	ડો. ભૂમિ એસ. દેસાઈ	એસ(૧)(માન્યતા)(૨૦૮)/૧૦૬ ૯૭/૨૦૧૪ તા.૦૩/૦૮/૨૦૧૪	૦૬	-	૧૨	૧૮
૨.	ડો. જયશ્રી ડી. નારંગ	એસ(૧)(માન્યતા)(૨૦૮)/૧૨૭ ૭/૨૦૨૦/તા.૩૧/૦૧/૨૦૨૦	૦૬	૧૨	-	૧૮
	કુલ		૧૨	૧૨	૧૨	૩૬
આકાશવાણી						
ક્રમ	અધ્યાપકનું નામ	યુનિવર્સિટી માન્યતાના પત્રની તારીખ અને નંબર (એક-એક નકલ બીડાવી)	વર્ષ/સેમેસ્ટર દીઠ કાર્યભાર (કુલ તાસ)			કુલ તાસ (તાસના કલાકો) (પ્રેક્ટીકલના ૨ કલાકો = એક કલાકનો ૧ તાસ)
			એક.વાય.	એસ.વાય.	ટી.વાય.	
૧.	પ્રા. દેવાંશી જી. પટેલ	એસ(૧)(માન્યતા)(૨૦૮)/૨૫૩૮ /૨૦૨૦/તા.૨૫/૦૨/૨૦૨૦	૧૨	૦૬	૦૬	૧૮
	કુલ		૧૨	૦૬	૦૬	૨૪
ઈંગ્લીશ						
ક્રમ	અધ્યાપકનું નામ	યુનિવર્સિટી માન્યતાના પત્રની તારીખ અને નંબર (એક-એક નકલ બીડાવી)	વર્ષ/સેમેસ્ટર દીઠ કાર્યભાર (કુલ તાસ)			કુલ તાસ (તાસના કલાકો) (પ્રેક્ટીકલના ૨ કલાકો = એક કલાકનો ૧ તાસ)
			એક.વાય.	એસ.વાય.	ટી.વાય.	
૧.	પ્રા. દેવાંગ ઓ. ભટ્ટ	એસ(૧)(માન્યતા)(૨૦૮)/૭૫૫૪ /૨૦૧૫ તા.૧૬/૦૬/૨૦૧૫	૦૬	૦૬	૦૬	૧૮
૨.	પ્રા. ફોરમ ખરસાડીયા	એડહોક	૦૬	૦૬	૦૬	૧૮
	કુલ		૧૨	૧૨	૧૨	૩૬
બી.આર.એક. એમ. લો.						
ક્રમ	અધ્યાપકનું નામ	યુનિવર્સિટી માન્યતાના પત્રની તારીખ અને નંબર (એક-એક નકલ બીડાવી)	વર્ષ/સેમેસ્ટર દીઠ કાર્યભાર (કુલ તાસ)			કુલ તાસ (તાસના કલાકો) (પ્રેક્ટીકલના ૨ કલાકો = એક કલાકનો ૧ તાસ)
			એક.વાય.	એસ.વાય.	ટી.વાય.	
૧.	પ્રા. ભૌમિક ઉપાધ્યાય	વિઝીટીંગ	-	-	૧૨	૧૨



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Time Table

F.Y.B.COM.							
Lecture	Division	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	A	EVS(FM)	BA(HS)	Stat(DP)	BA(HS)	A/C(PF)	BA(HS)
	B	Eco(BD)	Eng(DB)	A/C(PF)	FM(RD)	Stat(DP)	Eco(BD)
	C	Eco(JN)	Eco(FM)	BA(NN)	Eco(JN)	BA(NN)	EVS(FM)
	D	A/C(DP)	EVS(FM)	A/C(DP)	Eng(FK)	EVS(FM)	Eco(JN)
2	A	Stat(DP)	Eng(DB)	Eng(DB)	EVS(FM)	FM(RD)	Eng(DB)
	B	Eng(DB)	Eco(BD)	EVS(FM)	Stat(DP)	EVS(FM)	BA(HS)
	C	A/C(PF)	EVS(FM)	Stat(DP)	BA(NN)	BKG(TK)	Stat(DP)
	D	ENG(FK)	Stat(DP)	BKG(TK)	BKG(TK)	BA(NN)	A/C(DP)
RECESS							
3	A	FM(RD)	A/C(PF)	A/C(PF)	Eco(BD)	Stat(DP)	FM(RD)
	B	BA(HS)	Stat(DP)	FM(RD)	A/C(PF)	FM(RD)	Eng(DB)
	C	Stat(DP)	BKG(TK)	BKG(TK)	A/C(DP)	Eng(FK)	Eng(FK)
	D	BA(NN)	Eco(JN)	Eng(FK)	BA(NN)	Eco(JN)	BKG(TK)
4	A	-	Eco(BD)	-	-	Eco(BD)	-
	B	-	-	BA(HS)	-	A/C(PF)	-
	C	-	-	Eng(FK)	-	-	A/C(DP)
	D	Stat(DP)	-	-	-	Stat(DP)	-

S.Y.B.COM.							
Lecture	Division	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	A	Eng(DB)	Stat(DP)	Cost(RD)	Stat(DP)	Eco(JN)	Stat(DP)
	B	Cost(RD)	Tax(DP)	Eco(JN)	Eng(DB)	BA(RM)	Eng(DB)
	C	-	SBKG.(RM)	Eng(FK)	Tax(DP)	BKG(CM)	SBKG (RM)
	D	BA(HS)	Eng(FK)	BA(HS)	-	Eng(DB)	-
2	A	Cost(RD)	Corp.(PF)	BA(RM)	Cost(DB)	BA(RM)	Corp.(PF)
	B	Corp.(PF)	Eco(JN)	T.P.(BU)	Corp.(PF)	Corp.(PF)	Cost(RD)
	C	Eco(JN)	Tax(DP)	Eco(JN)	BA(HS)	BA(HS)	-
	D	SBKG RM	SBKG RM	Tax(DP)	Tax(DP)	Eco(JN)	Eco(JN)
RECESS							
3	A	Tax(DP)	Tax(DP)	Eco(JN)	Eng(DB)	Corp.(PF)	BA(RM)
	B	T.P.(BU)	Cost(RD)	BA(RM)	BA(RM)	Tax(DP)	Eco(JN)
	C	Eng(FK)	Eng(FK)	Tax(DP)	Eco(JN)	SBKG.(RM)	BA(HS)
	D	Eco(JN)	BA(HS)	SBKG(RM)	Eng(FK)	-	Tax(DP)
4	A	-	Eng(DB)	Tax(DP)	Eco(JN)	-	-
	B	Eng(DB)	BKG/MGT	BKG/MGT	Tax(DP)	BKG/MGT	T.P.(TP)
	C	BKG.(CM)	Mgt(TK)	BKG(CM)	-	Mgt(TK)	Mgt(TK)
	D	Mgt(TK)	BKG(CM)	Mgt(TK)	Mgt(TK)	BKG(CM)	BKG(CM)



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T.Y.B.COM.							
Lecture	Division	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	A	BA(CM)	Eco(BD)	Eng-(DB)	Eco(BD)	Eng (DB)	M. A/C(RD)
	B	Audit(PF)	Audit(PF)	BRF(AD)	BRF(AD)	M. A/C(RD)	Audit(PF)
	C	BRF(AD)	-	Eco(BD)	-	Eco(BD)	Eng(FK)
	D	Eng (FK)	-	-	-	BA (HS)	BRF (AD)
2	A	BRF(AD)	M. A/C(RD)	Audit(PF)	BA(CM)	Stat(DP)	BRF(AD)
	B	BA(CM)	BA(CM)	M. A/C (RD)	Eng(DB)	Eng (DB)	Eco (BD)
	C	BA(HS)	Eng(FK)	BA(HS)	BRF(AD)	Eng(FK)	SBKG (CM)
	D	Eco(BD)	BA(HS)	Eng(FK)	Eco(BD)	BRF(AD)	Eng(FK)
RECESS							
3	A	Audit(PF)	Eng(DB)	Stat(DP)	BRF(AD)	Eco(BD)	BA(CM)
	B	Eco(BD)	Eco(BD)	Eng(DB)	M.A/C(RD)	BRF(AD)	T.P.(AD)
	C	-	SBKG(CM)	BRF(AD)	SBKG(CM)	BA(HS)	Eco(BD)
	D	-	BRF(AD)	Eco(BD)	BA(HS)	-	-
4	A	-	Stat(DP)	-	Audit(PF)	M/A/C(RD)	-
	B	T.P.(AD)	SB/MGT	Tax Proc (AD)	BA(CM)	SB/MGT (RM)/(NN)	SB/MGT (RM)/(NN)
	C	Mgt(NN)	SBKG(RM)	SBKG(RM)	BKG (Sub) (RM)	Mgt(NN)	Mgt(NN)
	D	SBKG(RM)	Mgt(NN)	Mgt(NN)	Mgt(NN)	SBKG(RM)	SBKG(RM)

આ.કી.કી. પ્રોગ્રામનો કુલ કાર્યભાર (તમામ વિષયો સાથે) અને અધ્યાપકોની નિમણૂકની માહિતી (શા.શિક્ષણના વ્યાખ્યાતા નથા ગ્રંથપાલ સહીત)					
ક્રમ	વિષયનું નામ	જરૂરી અધ્યાપકોની સંખ્યા		યુનિવર્સિટી એમ્પ્લોય	ખૂટતા શિક્ષકોની સંખ્યા
		ગણતરી (કુલ તાલ / ૧૮)	સંખ્યા		
૧.	એકાઉન્ટ-ટ-સી - કોમર્સ	$(૬૦ + ૮૬) / ૧૮ = ૮.૧૧$	૦૮	૦૭	૦૧
૨.	અર્થશાસ્ત્ર	$૩૬ / ૧૮ = ૦૨$	૦૨	૦૨	૦૦
૩.	આંકડાશાસ્ત્ર	$૧૮ / ૧૮ = ૦૧$	૦૧	૦૧	૦૦
૪.	ઈંગ્લીશ	$૩૬ / ૧૮ = ૦૨$	૦૨	૦૧	૦૧
૫.	બી.આર.એફ.	$૧૨ / ૧૮ = ૦.૬૬ = ૦૦$	૦૦	૦૦	૦૦
૬.	શા.શિક્ષણ	૦૧	૦૧	૦૦	૦૧
૭.	ગ્રંથપાલ	૦૧	૦૧	૦૦	૦૧
	કુલ		૧૫	૧૦	૦૪



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ડિગ્રી પ્રોગ્રામ માટે

૧. જરૂરી અધ્યાપકોની કુલ સંખ્યા (તમામ વિષયોની મળીને)	: ૧૩ + ૦૨ = ૧૫	
૨. યુનિવર્સિટી માન્ય અધ્યાપકોની સંખ્યા	: ૧૧	બી.નં.-૦૧
૩. નિમણૂકની ટકાવારી	: $11 \div 15 \times 100 = 73.33\%$	
૪. ઘટતા અધ્યાપકોની ટકાવારી	: ૨૬.૬૭ %	
૫. આચાર્યનું નામ	: ડૉ. આશિષ કિરીટકુમાર દેસાઈ	
૬. શૈક્ષણિક તથા વહીવટી સ્ટાફને ચૂકવાતા પગાર સંબંધિત માહિતી		બી.નં.-૦૨
૧. પગાર ધોરણ	: છઠું પગાર પંચ	
૨. મોંઘવારી ભથ્થું	: ૧૨૫ %	
૩. ઘરભાડા ભથ્થું	: ૨૦%	
૪. મોંઘવારી ભથ્થું + ઘરભાડા ભથ્થું	: ૧૪૫%	
૫. ગ્રાન્ટ ઈન એઈડ કોલેજમાં ચૂકવાતા (ડી.એ.+એચ.આર.એ.)	: ૧૬૪ + ૨૦ = ૧૮૪	
૬. રેશિયો (નંબર ૪ : નંબર ૫)	: ૧૪૫ : ૧૮૪	
૭. યુનિવર્સિટી દ્વારા આયોજિત સ્પર્ધાઓમાં ભાગ લેવાની માહિતી		
૧. કોલેજોએ ભાગ લીધેલ હોય તેવી યુનિવર્સિટી દ્વારા આયોજિત સ્પર્ધાઓની સંખ્યા (૨૫ કે તેથી વધુ)		
૨. આ પ્રોગ્રામમાં વિદ્યાર્થીઓએ ભાગ લીધો હોય તેવી સ્પર્ધાઓની સંખ્યા :		
૮. ૨૫ કે તેથી વધુ કોલેજોએ ભાગ લીધો હોય તેવી યુવક મહોત્સવની સ્પર્ધાઓમાં ભાગ લીધો હોય તેની માહિતી		
૧. યુનિવર્સિટી દ્વારા આયોજિત સ્પર્ધાઓની સંખ્યા		
૨. કોલેજોએ ભાગ લીધેલ હોય તેવી સ્પર્ધાઓની સંખ્યા		
૯. વહીવટી સ્ટાફ સંબંધિત માહિતી (પ્રયોગશાળામાં સ્ટાફ સહિત)		બી.નં.-૦૩
ક્રમ	વિગત	નિમાણેલ / જરૂરી
૧.	ઓ.એસ.	: ૦૦ / ૦૧
૨.	હેડ ક્લાર્ક સંખ્યા	: ૦૦ / ૦૧
૩.	હિસાબનીશ	: ૦૧ / ૦૧
૪.	સિનિયર ક્લાર્કની સંખ્યા	: ૦૨ / ૦૧
૫.	જુનિયર ક્લાર્કની સંખ્યા	: ૦૧ / ૦૨
૬.	સેવકો/વોચમેન/સફાઈ ની સંખ્યા	: ૧૦ / ૧૦
૭.	અન્ય (લાઈબ્રેરિયન)	: ૦૧ / ૦૧ (એડ-હોક)



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૧૦. યુનિવર્સિટીને જોડાણની ફી તથા અન્ય ફી ચૂકવ્યા અંગેની માહિતી

બી.નં.-૦૪

૧. ડિગ્રી પ્રોગ્રામની જોડાણ ફી

૧. કુલ જોડાણ અરજી ફી	:	૧,૮૪,૩૨૦
૨. રીસીપ્ટ નંબર	:	૧૧૧૯૪૦૩ અને ૧૧૪૮૬૫૮
૩. તારીખ	:	૨૦/૧૦/૨૦૨૦

૨. વિદ્યાર્થીદીક જોડાણ ફી

૧. વિદ્યાર્થીઓની સંખ્યા

૧. એફ.વાય.	:	૪૭૨
૨. એસ.વાય.	:	૪૭૩
૩. ટી.વાય.	:	૪૨૮

૨. વિદ્યાર્થીદીક રકમ	:	૩૮૬
૩. કુલ રકમ	:	૫,૪૩,૭૦૮

૩. યુનિવર્સિટી કેમ્પસ ડેવલોપમેન્ટ ફી (COVID - 19 મહામારીને કારણે રાહત આપેલ છે. (યુનિવર્સિટી પરિપત્ર ને આધારે)

૧. વિદ્યાર્થીઓની સંખ્યા	:	એન.એ.
૨. વિદ્યાર્થીદીક રકમ	:	એન.એ.
૩. કુલ રકમ	:	એન.એ.

૪. સ્પોર્ટ્સ ડેવલોપમેન્ટ ફી (COVID - 19 મહામારીને કારણે રાહત આપેલ છે. (યુનિવર્સિટી પરિપત્ર ને આધારે)

૧. વિદ્યાર્થીઓની સંખ્યા	:	એન.એ.
૨. વિદ્યાર્થીદીક રકમ	:	એન.એ.
૩. કુલ રકમ	:	એન.એ.

૫. યુનિવર્સિટી સ્પોર્ટ્સ એન્ડ ક્લબ્સ એક્ટીવીટી ફી (COVID - 19 મહામારીને કારણે રાહત આપેલ છે. (યુનિવર્સિટી પરિપત્ર ને આધારે)

૧. વિદ્યાર્થીઓની સંખ્યા	:	એન.એ.
૨. વિદ્યાર્થીદીક રકમ	:	એન.એ. એન.એ.
૩. કુલ રકમ	:	એન.એ.

૧૧. બોનસ / પેનલ્ટી પોઈન્ટ સંબંધિત

૧. સ્ટાફરૂમની સાથે વોચરૂમની વ્યવસ્થા (બાજુના રૂમમાં અલગથી વ્યવસ્થા કરેલ છે)	બી.નં.-૦૫	:	હા
૨. સ્ટાફરૂમ / કેમ્પસમાં વાઈફાઈની વ્યવસ્થા	બી.નં.-૦૬	:	હા
૩. વિદ્યાર્થીઓ માટે કોમન રૂમની વ્યવસ્થા	બી.નં.-૦૭	:	હા



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૪. ગ્રંથપાલ માં અલગ વાંચન માટેનો રૂમ	બી.નં.-૦૮	: હા
ગ્રંથાલયમાં ઉપલબ્ધ પુસ્તકોની સંખ્યા	બી.નં.-૦૯	: ૮૭૦૪
૫. સ્મૃતગમતનું મેદાન	બી.નં.-૧૦	: હા
૬. પ્રયોગશાળામાં જરૂરી સાધનોની ઉપલબ્ધી		: -
૭. કોલેજ જે મકાન/કમ્પસમાં ચાલે છે તેમાં શાળા કે આ યુનિવર્સિટી સાથે સંલગ્ન નહિ હોય તવી સંસ્થા ચાલે છે કે કેમ ?		: હા
૮. સેવાપોથીમાં નિયમિત નોંધ કરવામાં આવે છે અને ૦.૬૯ની જોગવાઈઓનું પાલન થાય છે.		: હા
૯. સેમીનાર/કોન્ફરન્સ માટે ડ્યુટી લીવ આપવામાં આવે છે.		: હા
૧૦. યુનિવર્સિટીના કામ અર્થે ડ્યુટી લીવ આપવામાં આવે છે.		: હા
૧૧. મેટરનીટી / પેટરનીટી લીવ આપવામાં આવે છે.		: હા
૧૨. એનરોલમેન્ટની કાર્યવાહી પૂર્ણ થયેથી વિદ્યાર્થીઓની ઓરીજનલ માર્કશીટ અને સર્ટિફિકેટ પરત આપવામાં આવે છે.		: હા
૧૩. એન્ટી રેજીંગ સમિતિ સ્થાયેલ છે?	બી.નં.-૧૧	: હા
૧૪. જાતીય સતામણી રોકવા માટે સેલ ની રચના કરવામાં આવે છે.	બી.નં.-૧૨	: હા
૧૫. યુનિવર્સિટીએ નિયત કર્યા સિવાયની અન્ય ફી લેવામાં આવે છે?		: ના
૧૬. વિદ્યાર્થીઓને પ્રોસ્પેક્ટસ આપવામાં આવે છે?		: ના
૧૭. પ્રોસ્પેક્ટસની (ફોર્મ) કિંમત જણાવો.		: ૫૦
૧૮. વિદ્યાર્થી સંઘ પ્રતિનિધિ (SRC) ના હિસાબો ઓડીટ થયેલ છે કે નહિ?		: હા
૧૯. ગત વર્ષે જોડાણ માટે યુનિવર્સિટી દ્વારા જણાવેલ શરતોની સંખ્યા અને આ શરતો પૈકી પરિપાલન થયેલ શરતોની સંખ્યા.	બી.નં.-૧૩	: -
૨૦. AAA નું ઓડીટ થયેલ છે?		: ના
૨૧. કન્યા છાત્રાલય છે કે નહી?		: ના
૨૨. કુમાર છાત્રાલય છે કે નહી?		: ના
૧૨. બોનસ / પેનલ્ટી પોઈન્ટ મળી શકે તેના અન્ય મુદ્દાઓ / અવલોકનો		
૧. Apparel & Fashion Design	બી.નં.-૧૪	: -
૨. CCTV કેમેરા, WIFI ની સુવિધા	બી.નં.-૧૫	: -
૩. Staff Cabin ની સુવિધા	બી.નં.-૧૬	: -
૪. Fire Extinguisher	બી.નં.-૧૭	: -



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૧૩. સાદર અભ્યાસક્રમનું રાજ્ય સરકારના શિક્ષણ વિભાગ, ગાંધીનગર તરફથી પ્રસિદ્ધ થયેલ છેલ્લામાં છેલ્લા જાહેરનામાની નકલ આપવી.
- આથી અમો પ્રમાણિત કરીએ છીએ કે ઉપર જણાવેલ માહિતી અમારી જાણ મુજબ અને ઉપલબ્ધ આધારો મુજબ સાચી અને ખરી છે.

આચાર્ય
(ડો. આશીષ કે. દેસાઈ)

સંચાલક મંડળના પ્રતિનિધિની
(શ્રી પ્રફુલ્લચંદ્ર બી. શાહ)



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અવલોકન

૧. કોલેજ માં વાઈફાઈ ની સગવડ છે.
૨. કોલેજમાં યુનિવર્સિટી માન્યતા પ્રાપ્ત કોમર્સ/એકાઉન્ટન્સી વિષયના ૨ આસી.પ્રોફેસર, યુનિવર્સિટી માન્યતા પ્રાપ્ત અંગ્રેજી વિષયના ૧ આસી.પ્રોફેસર ની ઘટ છે .
૩. કોલેજમાં યુનિવર્સિટી માન્યતા પ્રાપ્ત લાઈબ્રેરીયનની ઘટ છે.
૪. કોલેજમાં યુનિવર્સિટી માન્યતા પ્રાપ્ત ફીઝિકલ એજ્યુકેશન વિષય ના આસીસ્ટન્ટ પ્રોફેસરની ઘટ છે
૫. કોલેજમાં સ્પોર્ટ્સ માટે ઈન્ડોર અને આઉટ ડોર ગ્રેસ ની સગવડ છે.
૬. ગર્લ્સ રૂમ માટે ૨ રૂમની અને બોય્સ રૂમ ની સગવડ છે.
૭. સ્ટાફ માટે અલગ કેબીનની સગવડ છે.
૮. બુક બેંકની સગવડ છે.
૯. ફાયર – સેફ્ટીની સુવિધા છે.

થરતો

૧. યુનિવર્સિટી માન્યતા પ્રાપ્ત કોમર્સ/એકાઉન્ટન્સી વિષયના ૨ આસી.પ્રોફેસર, યુનિવર્સિટી માન્યતા પ્રાપ્ત અંગ્રેજી વિષયના ૧ આસી.પ્રોફેસર, યુનિવર્સિટી માન્યતા પ્રાપ્ત ૧ લાઈબ્રેરીયન અને યુનિવર્સિટી માન્યતા પ્રાપ્ત શારીરિક શિક્ષણના ૧ આસી.પ્રોફેસરની નિયમાનુસાર નિમણૂક કરવી.
૨. કોમર્સ , બીઝનેસ એગ્યુલેટરી ફ્રેમવર્ક તેમજ પર્પોવરલ વિષય માટે વિષયદીઠ એક વીઝીટીંગ ફેકલ્ટી/ટીચિંગ આસીસ્ટન્ટની નિમણૂક કરવી.
૩. યુનિવર્સિટી ના ordinance ૬૯(એ) અને ૬૯(બી) નું ચુસ્તપણે પાલન કરવામાં આવે.

અમો, નીચે મુજબના સમિતિના સભ્યોએ ઉપરોક્ત માહિતીની ચકાસણી કરી છે અને ઉપલબ્ધ આધારો મુજબ તે સાચી અને ખરી છે. ઉપરોક્ત માહિત અને અવલોકનોને આધારે અમો સાદર ડિગ્રી પ્રોગ્રામ માટે સંસ્થાની જોડાણ અરજી ગ્રાહ્ય રાખી નીચેના સમયગાળા માટે નવું/ચાલુ/કાયમી જોડાણ આપવા ભલામણ કરીએ છીએ.

સમયગાળો : વર્ષ: ૨૦૨૧-૨૦૨૨

મેમ્બર્સ

No.	Name	Signature
1.	Dr. Ashok Moghabhai Desai	ઓનલાઈન હાજર
2.	Dr. Falguni H. Desai	ઓનલાઈન હાજર
3.	Dr. Mehul P. Desai	ઓનલાઈન હાજર
4.	Dr. Gaurang D. Rami	ગેરહાજર



THE SURAT TECHNICAL EDUCATION & RESEARCH SOCIETY'S
SASCMA ENGLISH MEDIUM COMMERCE COLLEGE
SMT. KALAVATI BEN FULCHAND BHAI YAKHARIA EDUCATION COMPLEX
AFFILIATED TO VNSGU SURAT



Near Lalbhai Contractor Stadium, Opp. Goverdhan Temple (Haveli), Surat-Dumas Road, Vesu, Surat-395 007.
Tele Fax : 0261-2723306, E-Mail : sascma@yahoo.com, Website: www.sters-surat.org

5.	Shri. Nishant Modi	ઓનલાઈન હાજર
6.	Shri. Sharma Sanet Lalitkumar	ઓનલાઈન હાજર
7.	Mr. Divyesh M. Mehta	ઓનલાઈન હાજર

Meeting ID	Topic	Start Time	End Time	User Email	Duration (Minutes)	Participants
81489581018	Online LIC for Continue Affiliation - SASCMA English Medium Commerce College Surat	10/16/2021 01:32:56 PM	10/16/2021 03:12:38 PM	webinar4@vnsgu.ac.in	100	11
Name (Original Name)	User Email	Total Duration (Minutes)	Guest			
VNSG University	webinar4@vnsgu.ac.in	101	No			
Dr. Ashish Desai	aashish.desai@yahoo.com	99	Yes			
Chintan Modi	profchintanmodi@gmail.com	89	Yes			
Shri MR D Arts EELK Chikhli Principal Dr Falguni D		78	Yes			
Mehul		73	Yes			
Prafulchandra Shah		71	Yes			
Divyesh Mehta		71	Yes			
Sanket Sharma		71	Yes			
Ashok Desai	lionashokdesai@gmail.com	67	Yes			

વી. ન. દ. ગુ. યુનિ. સુરત

આવક નં.....૩૧૧.....

તારીખ.....૧૩-૧-૨૨.....

વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી

ઉધના-મગદલ્લા રોડ, વેસુ, સુરત- ૩૯૫૦૦૭

સ્નાતક

અભ્યાસક્રમ માટે

કોલેજોએ આપવાની અને સ્થાનિક તપાસ સમિતિએ ચકાસવાની માહિતી માટેનું નિયત પત્રક

દરેક ડિગ્રી પ્રોગ્રામ માટે અલગથી આ ફોર્મ ભરવું

(૧) કોલેજનું નામ અને સરનામું : Dr. Kiran C. Patel Medical College & Research Institute, Bharuch, New General Civil Hospital, Campus, Bharuch - 392001

(૨) ડિગ્રી-પ્રોગ્રામનું નામ : M.B.B.S

(૩) આ ડિગ્રી પ્રોગ્રામમાં વિકલ્પો : NIL

(Specialization) ના નામ

(૪) વર્ગદીઠ સંખ્યા : >100

(<60, >100)

(૫) વર્ગોની સંખ્યા : F.Y. 1 S.Y. T.Y.

(૬) કુલ વિદ્યાર્થીઓની સંખ્યા : F.Y. 150 S.Y. T.Y. Total 150

(૭) શૈક્ષણિક સ્ટાફ સંબંધિત માહિતી : (શા. શિક્ષણના વ્યાખ્યાતા અને ગ્રંથપાલ સહિત)

(A) વર્ગોની સંખ્યા તથા વિશેષર કાર્યભાર

Sr. No.	Subject	I MBBS		II MBBS		III MBBS Part -I		III MBBS Part -II	
		Class	Hours	Class	Hours	Class	Hours	Class	Hours
*	Orientation	1	30						
*	Skill Module	1	35						
*	Field Visit to Community Health Centre	1	8						
*	Professional Development & AETCOM module	1	40						
*	Sports & extracurricular activities	1	22 + 60	1	28				
*	Enhancement of language/computer skills	1	40						
1	Anatomy	1	675	-	-	-	-	-	-
2	Physiology	1	495	-	-	-	-	-	-
3	Biochemistry	1	250	-	-	-	-	-	-
*	Early clinical exposure	1	90						
*	AETCOME	1	34	1	37	1	25	1	43
*	Formative Assessment & Term examinations	1	80						
4	Community Medicine	1	52	1	60	1	105		
5	Pharmacology			1	230				

6	Pathology			1	230				
7	Microbiology			1	190				
8	Forensic Medicine			1	50	1	75		
*	Clinical Subjects			1	615				
9	Otorhinolaryngology					1	70		
10	Ophthalmology					1	100		
11	General Medicine					1	65	1	210
12	General Surgery					1	65	1	210
13	Obst. & Gynec					1	65	1	210
14	Pediatrics					1	55	1	65
15	Orthopedics					1	40	1	50
16	Dermatology					1	30		
17	Psychiatry					1	40		
18	Respiratory Medicine					1	20		
19	Radio-diagnosis & Radiotherapy					1	20		
20	Anesthesiology					1	20		
21	Clinical Postings					1	756	1	792
*	Electives							1	200

(B) વિષય (વિભાગ)વાર અધ્યાપકોની સંખ્યા તથા કાર્યભાર (જો વિષય એક થી વધુ ડિગ્રી પ્રોગ્રામમાં ભણાવવામાં આવતો હોય તો તેવા દરેક ડિગ્રી પ્રોગ્રામમાં તેને સમાવવો.

Annexure-I

Sr. No.	Name of Teacher & Type of Appointment	No. & Date of Uni. Recognition letter	Workload per year/semester				Total Teaching Hours (Practical 2 hours-)
			I	II	III - I	III - II	
	Subject: Anatomy						
1							
2							
3							
4							
5							
6							
7							
8							
	Subject: Physiology						
1							
2							
3							
4							
5							
6							
7							
8							
	Subject: Biochemistry						
1							
2							
3							
4							
5							
6							
7							
8							

(નોંધ: જરૂરિયાત અનુસાર કોષ્ટક લંબાવવું)

(C) આ ડિગ્રી પ્રોગ્રામનો કુલ કાર્યભાર (તમામ વિષયો સાથે) અને અધ્યાપકોની નિમણૂકની માહિતી (શા. શિક્ષણના વ્યાખ્યાતા તથા ગ્રંથાલય સહિત):

Sr. No.	Subject	Workload (in Hours)	Required no. faculties	Uni. Approved Teachers	Deficit
1	Anatomy	675	7		NIL
2	Physiology	495	7		NIL
3	Biochemistry	250	8		NIL
4	Community Medicine	217	9		NIL
5	Pharmacology	230	7		NIL
6	Pathology	230	12		NIL
7	Microbiology	190	8		1
9	Forensic Medicine	50	4		1
10	Otorhinolayngology	70	1		NIL
11	Ophthalmology	100	1		NIL
12	General Medicine	275	6		NIL
13	General Surgery	275	6		NIL
14	Obst. & Gynec	275	4		NIL
15	Pediatrics	120	2		NIL
16	Orthopedics	90	2		NIL
17	Dermatology	30	1		NIL
18	Psychiatry	40	1		NIL
19	Respiratory Medicine	20	1		NIL
20	Radio-diagnosis & Radiotherapy	20	2		NIL
21	Anesthesiology	20	4		1
22	Dentistry		1		NIL
23	Librarian		1		NIL
24	PT Teacher		1		NIL

આ ડિગ્રી પ્રોગ્રામ માટે

- (i) કાયમી જરૂરી અધ્યાપકોની કુલ સંખ્યા (તમામ વિષયો મળીને) : 96
- (ii) યુનિવર્સિટી માન્ય સંપૂર્ણ લાયકાત ધરાવતા (Ph.D./ NET/ SLET ની શરત પૂર્ણ થતી હોય તેવા) કુલ કાયમી અધ્યાપકોની સંખ્યા : 4
- (iii) કાયમી નિમણૂકની ટકાવારી 92 % (iv) ઘટતા કાયમી અધ્યાપકોની ટકાવારી : 3.12 %

(માહિતી અલગ સીટમાં આપવી)

સંસ્થામાં ચાલતા અભ્યાસક્રમોનું નામ (અભ્યાસક્રમ વાઈઝ અલગ-અલગ માહિતી મોકલવી)	જરૂરી કુલ અધ્યાપકોની સંખ્યા	યુનિવર્સિટી માન્યતા પ્રાપ્ત પૂરા સમયના કાયમી અધ્યાપકોની સંખ્યા	૧૧ મહિનાના કોન્ટ્રાક્ટ્યુઅલ અધ્યાપકોની સંખ્યા	વીઝીટીંગ અધ્યાપકો
M.B.B.S	96	-	-	-

(8) આચાર્ય નું નામ : Dr. Jeram P. Parmar

(યુનિવર્સિટી માન્યતા પત્રની નકલ બિડવી)

(9) શૈક્ષણિક તથા વહીવટી સ્ટાફને ચૂકવતા પગાર સંબંધિત માહિતી :

(i) પગાર ધોરણ : પાંચમું / છઠું પગાર પંચ : NA

(ii) મોંઘવારી ભથ્થું % : NA (iii) ઘરભાડું ભથ્થું % : NA

(iv) (મો.ભ + ઘર ભાડા ભથ્થું) % : NA

(v) ગ્રાન્ટ ઇન એઇડ કોલેજમાં ચૂકવાતા (DA + HRA) ની ટકાવારી (%) : NA

(vi) રેશિયો : (DA + HRA) i.e. ((IV) + (v)) : NA

(૧૦) ૨૫ કે તેથી વધુ કોલેજોએ ભાગ લીધો હોય તેવી યુનિવર્સિટી દ્વારા આયોજિત રમતગમતની હરીફાઈઓમાં ભાગ લેવાની માહિતી

(i) કોલેજોએ ભાગ લીધેલ હોઈ તેવી યુનિવર્સિટી આયોજિત રમતગમત હરીફાઈઓની સંખ્યા : NIL

(ii) આ કોલેજોના વિદ્યાર્થીઓએ ભાગ લીધો હોય તેવી હરીફાઈઓની સંખ્યા : NIL

(Please Provide on a Separate Sheet the List of events in which the college took part)

(૧૧) ૨૫ કે તેથી વધુ કોલેજોએ ભાગ લીધો હોય તેવી યુવક મહોત્સવની હરીફાઈમાં ભાગ લીધો હોય તેની માહિતી

(i) યુનિવર્સિટી દ્વારા આયોજિત હરીફાઈઓની સંખ્યા : NIL

(ii) આ કોલેજે ભાગ લીધો હોય તેવી હરીફાઈની સંખ્યા : NIL

(આ કોલેજે ભાગ લીધેલ હોય તેવી હરીફાઈની યાદી અલગથી બીડવી)

(૧૨) વહીવટી સ્ટાફ સંબંધિત માહિતી (પ્રયોગશાળાના સ્ટાફ સહિત)

નિમાવેલ/જરૂરી

(i)	હેડ ક્લાર્કની સંખ્યા :	1/2
(ii)	સિનિયર ક્લાર્કની સંખ્યા:	1/2
(iii)	જુનિયર ક્લાર્કની સંખ્યા:	1/2
(iv)	સેવકોની સંખ્યા :	12/20
(v)	અન્ય (સ્પષ્ટતા કરવી) :	00/00
	કુલ :	38/46
	ટકાવારી :	93.45/100

(૧૩) યુનિવર્સિટીને જોડાણની ફી તથા અન્ય ફી ચુકવ્યા અંગેની માહિતી

- (i) આ ડિગ્રી પ્રોગ્રામની કુલ જોડાણ અરજી ફી
રિસીપ્ટ નંબર: 20844 તથા તારીખ : 29/09/2021
(તમામ રિસીપ્ટની એક એક નકલ બીડવી)
- (ii) વિદ્યાર્થીદીઠ જોડાણ ફી :
(a) વિદ્યાર્થીઓની સંખ્યા: NIL (b) વિદ્યાર્થીદીઠ રકમ : NIL
કુલ રકમ : NIL
(તમામ રિસીપ્ટની એક એક નકલ બીડવી)
- (iii) યુનિવર્સિટી કેમ્પસ ડેવેલોપમેન્ટ ફી :
(a) વિદ્યાર્થીઓની સંખ્યા: 150 (b) વિદ્યાર્થીદીઠ રકમ : 2904/-
કુલ રકમ : 4,35,600/-
(તમામ રિસીપ્ટની એક એક નકલ બીડવી)
- (iv) સ્પોર્ટ્સ ડેવેલોપમેન્ટ ફી :
(a) વિદ્યાર્થીઓની સંખ્યા: NIL (b) વિદ્યાર્થીદીઠ રકમ : NIL
કુલ રકમ : NIL
(તમામ રિસીપ્ટની એક એક નકલ બીડવી)
- (v) યુનિવર્સિટી સ્પોર્ટ્સ એન્ડ કલ્ચરલ એક્ટિવિટી ફી :
(a) વિદ્યાર્થીઓની સંખ્યા: NIL (b) વિદ્યાર્થીદીઠ રકમ : NIL
કુલ રકમ : NIL
(તમામ રિસીપ્ટની એક એક નકલ બીડવી)

(૧૪) બોનસ/પેનલ્ટી પોઇન્ટ્સ સંબંધિત માહિતી :

(i)	સ્ટાફરૂમની સાથે વોશરૂમ ની વ્યવસ્થા :	છે/નથી _____ છે
(ii)	સ્ટાફરૂમ/કેમ્પસમાં વાઇફાઇની વ્યવસ્થા :	છે/નથી _____ છે
(iii)	વિદ્યાર્થીનીઓ માટે કોમનરૂમની વ્યવસ્થા :	છે/નથી _____ છે
(iv)	ગ્રંથાલયમાં અલગ વાંચન માટેનો રૂમ :	છે/નથી _____ છે
(v)	રમત ગમતનું મેદાન :	છે/નથી _____ છે
(vi)	પ્રયોગશાળામાં જરૂર મુજબના સાધનોની ઉપલબ્ધિ :	છે/નથી _____ છે
(vii)	(ઉપલબ્ધ સાધનોની યાદી પ્રયોગશાળા માટે બીડવી)	
(viii)	કોલેજ જે મકાન/કેમ્પસમાં ચાલે છે. તેમ શાળા કે આ યુનિ.સાથે સંલગ્ન નહીં હોય તેવી સંસ્થા ચાલે છે કે કેમ? (જો જવાબ 'હા' હોય તો પેરા-૧૫ માં અન્ય અવલોકનોમાં વિગતો આપવી)	હા/ના _____ ના
(ix)	સેવાપોથીમાં નિયમિત નોંધ કરવામાં આવે છે. અને 0.69 (A & B) ની જોગવાઈઓનું પાલન થાય છે.	હા/ના _____ હા
(x)	સેમિનાર/કોન્ફરન્સ માટે ડ્યુટી લીવ આપવામાં આવે છે.?	હા/ના _____ હા
(xi)	યુનિવર્સિટીના કામ અર્થે ડ્યુટી લીવ આપવામાં આવે છે.?	હા/ના _____ હા
(xii)	મેનરટીનીટી/પેટરનીટી લીવ આપવામાં આવે છે.?	હા/ના _____ હા
(xiii)	એનરોલમેન્ટની કાર્યવાહી પૂર્ણ થયેલી વિદ્યાર્થીઓની ઓરિજિનલ માર્કશીટ તથા સર્ટિફિકેટ પરત આપવામાં આવે છે.	હા/ના _____ હા
(xiv)	એન્ટી રેગીંગ સમિતિ રચાયેલ છે.	હા/ના _____ હા
(xv)	જાતીય સત્તામણી રોકવા માટે સેલની રચના કરવામાં આવી છે.	હા/ના _____ ના
(xvi)	યુનિવર્સિટીએ નિયત કર્યા સિવાયની અન્ય ફી લેવામાં આવે છે.?	હા/ના _____ હા
(xvii)	વિદ્યાર્થીઓને પ્રોસ્પેક્ટસ આપવામાં આવે છે. ?	હા/ના _____ હા
(xviii)	પ્રોસપેક્ટસની કિંમત જણાવો.	રૂ. _____ 00/-
(xix)	વિદ્યાર્થી સંઘ પ્રતિનિધિ (SARC) ના હિસાબો ઓડિટ થયેલ છે કે નહીં.	હા/ના _____ ના
(xx)	ગત વર્ષે જોડાણ માટે યુનિવર્સિટી દ્વારા જણાવેલ શરતોની સંખ્યા અને આ શરતો પૈકી પરિપાલન થયેલ શરતોની સંખ્યા (પુરાવાનું બિડાણ જોડવું)	લાગુ પડતું નથી
(xxi)	AAA નું ઓડિટ થયેલ છે. ?	હા/ના _____ હા
(xxii)	કન્યા છાત્રાલય છે કે નહીં. ?	હા/ના _____ હા
(xxiii)	કુમાર છાત્રાલય છે કે નહીં. ?	હા/ના _____ હા

(xxiv) ફાયર સેફ્ટી માટે જરૂરી માત્રામાં સાધનસામગ્રી,

હા/ના _____ હા

ચંત્રસામગ્રી અને ઉપકરણો ઉપલબ્ધ છે કે નહીં. ?

(૧૫) બોનસ/પેનલ્ટી પોઈન્ટ મળી શકે તેના અન્ય મુદ્દાઓ/અવલોકન :

(ઉ.દા. તરીકે (૧) કોલેજ જે મકાન/કેમ્પસમાં ચાલે છે તેમાં શાળા કે યુનિ. સાથે સંલગ્ન નહીં હોય તેવી સંસ્થા ચાલે છે કે કેમ તેની માહિતી (૨) વિદ્યાર્થી/સ્ટાફ માટે ગ્રંથાલય/પ્રયોગશાળા/કેમ્પસ/પી.એફ. વગેરેમાં વિદ્યાર્થીઓને મળવી જોઈતી સુવિધાનો અભાવ અથવા વધારાની સુવિધા વગેરે)

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(કોઈ પણ ખાનું ખાલી રાખવું નહીં)
(આપની યુનિવર્સિટી આપનું ગૌરવ)

Meeting ID	Topic	Start Time	End Time	User Email	Duration (Minutes)	Participants
84465916945	Online LIC for Continue Affiliation - Dr.Kiran C. Patel Medical College & Research Institute Bharuch	01-06-2022 12:30	01-06-2022 14:17	webinar6@vnsgu.ac.in	107	14
Name (Original Name)	User Email	Total Duration (Minutes)	Guest			
VNSGU UNIVERSITY	webinar6@vnsgu.ac.in	108	No			
Dr. Namrata N. Khatri (Placement Cell)		82	Yes			
Dharmen Shah		81	Yes			
Jeram Parmar	dr.jeram@gmail.com	71	Yes			
Dr.mahendrasinhchauh an@gmail.com		70	Yes			
Dr.Vipul Chaudhari		66	Yes			
kiran patel	faculty@kmori.in	64	Yes			
VNSGU		55	Yes			
acer		53	Yes			
Narendra Pathak	nmndrpathak12@gmail.com	6	Yes			

Last Four Years Intake and Registration Data of PG Programs										
Name of Programme/ Subject	P.G. Centre/ Uni. Deptt.		2018-19		2019-20		2020-21		2021-22	
	No. of Centres	Name of Centre/ Uni. Deptt.	Total Intake	Total Registration	Total Intake	Total Registration	Total Intake	Total Registration	Total Intake	Total Registration
M.A. (English)	1	J.Z.Shah Arts & Commerce College, Amroli (Girls)	75	12	94	34	94	38	94	0
	2	Z.F. Wadia Women's College, Surat (Girls)	75	56	94	53	94	84	114	38
	3	Yanraj Arts & Commerce College, Dhorampur	70	68	88	58	88	88	88	77
	4	Government Arts, Science and Commerce College, Nani Daman	0	4	75	23	88	21	88	6
	5	Smt. Kusumben Kadakia Arts & Commerce College, Ankleshwar	70	7	88	14	88	27	88	15
	6	Department of English, VNSGU, Surat	60	54	86	63	86	76	76	67
	7	Shri M.R. Desai Arts & Commerce College, Buhari, Dist:	0	0	0	0	0	0	88	59
	8	Government Arts & Commerce College, Ahwa	0	0	0	0	0	0	88	28
	TOTAL		350	201	525	245	538	334	724	290
M.A. (Gujarati)	1	Jayendrapuri Arts & Science College, Bharuch	70	63	88	54	90	78	88	60
	2	J.P. Shroff Arts College, Valsad	70	62	88	66	88	86	88	65
	3	Arts & Commerce College, Vyara	70	66	88	56	88	54	88	64
	4	Navyug Arts College, Surat	70	47	88	43	88	50	88	33
	5	Arts, Science & Commerce College, Kholwad, Surat	70	24	88	44	88	28	88	50
	6	J.M. Shah Arts & Commerce College, Jambusar	70	24	88	34	88	40	88	37
	7	S.B. Gorda Arts & Commerce College, Navsari	70	58	88	53	88	40	88	41
	8	Yanraj Arts & Commerce College, Dhorampur	70	66	88	82	88	88	88	85
	9	M.D. Arts & Commerce College, Buhari	70	66	88	66	88	79	88	80
	10	J.Z. Shah Arts & Commerce College, Amroli (Girls)	70	16	88	15	88	17	88	0
	11	Arts & Commerce College, Dlpad, Surat.	70	20	88	31	88	43	88	22
	12	J.P.Pardiwala Mahila Arts & Com. College, Killapardi	70	63	88	57	88	58	88	27
	13	J.B. Dharukawala Arts College, Varachha, Surat (Girls)	70	24	88	22	88	16	88	20
	14	M.T.B. Arts College, Surat.	70	30	88	56	88	78	88	48
	15	Smt. Kusumben Kadakia Arts & Commerce College, Ankleshwar	70	8	88	8	88	11	88	19
	16	Department of Gujarati, VNSGU, SURAT	70	64	88	53	88	80	88	65
	17	Government Arts & Commerce College, Ahwa	0	0	0	0	0	0	88	42
	TOTAL		1120	701	1408	740	1410	846	1496	758
M.A. (Hindi)	1	M.T.B. Arts College, Surat.	70	8	88	26	88	23	88	30
	2	Arts & Commerce College, Chikhli	70	18	88	16	88	27	88	0
	3	J.P. Shroff Arts College, Valsad	70	46	88	23	88	13	88	32
	4	Arts & Commerce Collge, Mandvi	70	47	88	34	88	25	88	26
	5	V.S.Patel Arts & Science College, Billimora	70	10	88	0	88	0	88	3
	6	Yanraj Arts & Commerce College, Dhorampur	70	54	88	37	89	51	88	42
	7	M.R. Arts & Science College, Rajpipla	70	25	88	20	88	17	88	12
	8	Jayendrapuri Arts & Science College, Bharuth	70	14	88	10	88	18	88	14
	9	M.D. Arts & Commerce College, Buhari	70	60	88	49	88	42	88	57
	10	Shree Rang Navchetan Mahila Arts College, Valia	70	18	88	20	88	24	88	26
	11	Department of Comparative Literature, VNSGU, Surat	70	45	88	39	88	30	163	50
	TOTAL		770	346	968	274	969	270	1043	292
M.A. (Sociology)	1	Yanraj Arts & Commerce College, Dhorampur	70	41	88	41	88	86	88	49
	2	Department of Sociology, VNSGU, Surat	70	71	88	63	88	92	88	60
	3	Smt. R. P. Chaudan Arts & Smt. J.K. Shah and Shri K.D. Shah Commerce College, Vyara "	0	0	0	0	0	0	88	66
	4	Government Arts & Commerce College, Ahwa	0	0	0	0	0	0	88	63
	TOTAL		140	112	176	104	176	178	352	238

Last Four Years Intake and Registration Data of PG Programs										
Name of Programme/ Subject	P.G. Centre/ Uni. Deptt.		2018-19		2019-20		2020-21		2021-22	
	No. of Centres	Name of Centre/ Uni. Deptt.	Total Intake	Total Registration	Total Intake	Total Registration	Total Intake	Total Registration	Total Intake	Total Registration
M.A. (Sanskrit)	1	Department of Comparative Literature, VNSGU, Surat	0	0	0	0	0	0	75	0
	2	Jayendrapuri Arts & Science College, Bharuch	70	19	88	13	88	28	88	50
	3	J.P. Shroff Arts College, Valsad	70	25	88	17	88	23	88	21
	4	M.R.D. Arts & Commerce College, Chikhli	70	24	88	14	88	24	88	0
	5	Varaj Arts & Commerce College, Dharampur	70	54	88	37	88	60	88	63
	6	Shree Rang Navchetan Mahila Arts College, Valia	70	17	88	28	88	16	88	16
	7	M.T.B. Arts College, Surat.	70	22	88	30	88	36	88	33
	8	Government Arts & Commerce College, Ahwa	0	0	0	0	0	0	88	7
		TOTAL	420	161	528	139	528	187	691	190
M.A. (Comparative Literature)	1	Department of Comparative Literature, VNSGU, Surat	40	28	51	27	51	20	51	35
		TOTAL	40	28	51	27	51	20	51	35
M.A. (Economics)	1	Varaj Arts & Commerce College, Dharampur	70	70	88	75	88	87	88	85
	2	Rafel Arts & Commerce College, Vapi	70	45	88	41	88	70	88	32
	3	J.Z. Shah Arts & Commerce College, Amroli (Girls)	70	45	88	43	88	60	88	53
	4	J.B. Dharokawala Mahila Arts College, Varachha, Surat (Girls)	70	53	88	43	88	69	88	57
	5	Shree Rang Navchetan Mahila Arts College, Valia	70	66	88	66	88	85	88	88
	6	Government Arts, Science and Commerce College, Nani Daman (Government)	70	10	75	8	88	23	88	10
	7	Smt. Kusumben Kadakia Arts & Commerce College, Ankleshwar	70	30	88	35	88	48	88	41
	8	Department of Economics, VNSGU, Surat	70	70	88	79	88	92	91	90
	9	AGRAWAL VIDYA VIHAR ENGLISH MEDIUM COLLEGE, VESU, SURAT	0	0	0	0	0	0	92	17
		TOTAL	660	389	691	390	704	534	799	473
M.A. (History)	1	J.P. Pardiwala Arts & Commerce College, Killapardi	70	35	88	43	88	55	88	44
	2	S.B. Garda Arts & Commerce College, Navsari	70	51	88	40	88	57	88	43
	3	Arts & Commerce College, Olpad, Surat	70	18	88	8	88	35	88	27
	4	M.T.B. Arts College, Surat.	70	68	88	57	88	79	88	82
		TOTAL	280	172	352	148	352	226	352	196
M.A. (Psychology)	1	Jayendrapuri Arts & Science College, Bharuch	44	28	56	29	56	39	56	36
	2	M.T.B. Arts College, Surat.	44	43	56	39	58	56	56	51
		TOTAL	88	71	112	68	114	95	112	87
M.A. (Home Science)	1	Smt. J.P. Shroff Arts College, Valsad	35	15	44	10	50	19	44	3
		TOTAL	35	15	44	10	50	19	44	3
M.A. (Public Administration)	1	Department of Public Administration, VNSGU, Surat	30	21	38	14	38	15	38	15
		TOTAL	30	21	38	14	38	15	38	15
P.G.Dip. Journalism	1	Department of Journalism and Mass Communication, VNSGU, Surat	35	14	44	12	44	9	44	11
		TOTAL	35	14	44	12	44	9	44	11
M.Com. (Statistics)	1	Shah N.H. Commerce College, Valsad	70	14	44	6	44	8	44	15
	2	Sir K.P. College of Commerce, Surat.	80	28	44	43	44	32	44	25
		TOTAL	150	42	88	49	88	40	88	40
M.Com. (Marketing Mgt)	1	Narmada Science & Commerce College, Zadeshwar (Eng. Med.)	70	7	88	10	88	0	88	14
	2	R.K. DESAI COLLEGE OF COMMERCE & MANAGEMENT, VAPI	0	0	0	0	0	0	75	0
		TOTAL	70	7	88	10	88	0	163	14

Last Four Years Intake and Registration Data of PG Programs										
Name of Programme/ Subject	No. of Centres	P.G. Centre/ Uni. Deptt.	2018-19		2019-20		2020-21		2021-22	
		Name of Centre/ Uni. Deptt.	Total Intake	Total Registration	Total Intake	Total Registration	Total Intake	Total Registration	Total Intake	Total Registration
M.Com. Financial & Management Accounting	1	Navyug Commerce College, Surat	70	69	88	79	88	80	88	84
	2	Z.F. Wadia Women's Commerce College, Surat (Girls)	70	63	88	86	89	84	88	68
	3	J.Z. Shah Arts & Commerce College, Amroli, (Girls)	70	66	88	74	90	89	89	85
	4	C.D. Barfiwala College of Commerce, Surat	70	56	88	76	88	88	88	75
	5	S.B. Garda Arts & Commerce College, Navsari	70	70	88	81	88	83	88	79
	6	Shah N.H. Commerce College, Valsad	70	70	88	82	88	83	88	73
	7	M.W. College of Commerce, Bharuch	70	70	88	79	88	88	88	88
	8	Rafel Arts & Commerce College, Vapi	70	70	88	56	88	87	88	77
	9	Arts & Commerce College, Olpad	70	58	88	42	88	75	88	69
	10	Arts, Science & Commerce College, Kholwad	70	40	88	54	88	77	88	75
	11	M.R.D. Arts & Commerce College, Chikhli	70	70	88	72	88	84	88	65
	12	Normada Sci. & Comm. College, Zadeshwar (English Medium)	70	48	88	51	88	54	88	42
	13	J.Z. Shah Arts & Commerce College, Amroli, (English Medium) (Girls)	70	61	88	60	88	56	88	52
	14	Rafel Arts & Commerce College, Vapi, (English Medium)	70	23	88	14	88	15	88	7
	15	Government Arts, Science and Commerce College, Hani Daman	70	25	88	19	88	34	88	51
	16	Sir K.P. College of Commerce, Surat.	70	66	88	80	91	90	88	85
	17	S.P.B. English Medium College of Commerce, Surat. (Eng. Med.)	70	69	88	68	91	89	88	78
	18	P.R.B. Arts & P.G.R. Commerce College, Bardoli	70	72	88	76	88	88	88	87
	19	Smt. Kusumben Kadakia Arts & Commerce College, Ankleshwar	70	49	88	63	88	75	98	92
	20	Akhond Anand Arts & Commerce College, Surat	0	0	0	0	0	0	0	0
	21	Shah N. H. Commerce College, Valsad (English Medium)	0	0	0	0	0	0	88	38
	22	AMBABA COMMERCE COLLEGE, MANIBA INSTITUTE OF BUSINESS MANAGEMENT & DEVIBA INSTITUTE OF COMPUTER APPLICATION, SABARGAM, SURAT	0	0	0	0	0	0	75	24
	23	D.R. PATEL & R.B. PATEL COMMERCE COLLEGE & BHANIBEN CHHIMKABHAI PATEL B.B.A. COLLEGE, BHARTHANA, SURAT (Guj)	60	38	75	48	75	45	75	68
	24	D.R. PATEL & R.B. PATEL COMMERCE COLLEGE & BHANIBEN CHHIMKABHAI PATEL B.B.A. COLLEGE, BHARTHANA, SURAT (Eng.)	0	0	75	48	75	67	75	37
	25	DEPARTMENT OF COMMERCE, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT (Eng)	70	38	88	49	88	59	88	50
	26	DEPARTMENT OF COMMERCE, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT (GIRLS ONLY) (Guj Med.)	0	0	0	0	0	0	70	25
	27	DEPARTMENT OF COMMERCE, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT (GIRLS ONLY) (Eng Med.)	0	0	0	0	0	0	70	34
	28	K. B. SUMERIA COMMERCE & NATARAJ PROFESSIONAL SCIENCE COLLEGE, VAPI	60	0	75	21	75	34	75	32
	29	R.K. DESAI COLLEGE OF COMMERCE & MANAGEMENT, VAPI	0	0	0	0	0	0	75	18
	30	S.S. AGRAWAL COLLEGE OF COMMERCE & MANAGEMENT, NAVSARI	0	0	75	4	75	29	75	20
	31	SMT. R.P. CHAUHAN ARTS & SMT. J.K. SHAH & SHRI K.D. SHAH COMMERCE COLLEGE, VYARA	0	0	0	0	0	0	95	95
	TOTAL		1520	1191	2060	1382	2069	1653	2544	1773

Last Four Years Intake and Registration Data of PG Programs										
Name of Programme/ Subject	P.G. Centre/ Uni. Deptt.		2018-19		2019-20		2020-21		2021-22	
	No. of Centres	Name of Centre/ Uni. Deptt.	Total Intake	Total Registration	Total Intake	Total Registration	Total Intake	Total Registration	Total Intake	Total Registration
M.Sc. (Botany)	1	B.K.M. Science College, Valsad	15	20	25	25	19	19	20	19
	2	Government Science College, Chikhli.	15	19	32	33	19	19	19	19
	3	GOVERNMENT SCIENCE COLLEGE, VANKAL	0	0	0	0	0	0	20	17
	4	Government Arts, Science & Commerce College, Nani Daman.	0	0	21	21	19	17	19	19
	5	Department of Bioscience, VNSGU, Surat	0	0	0	0	0	0	58	57
	6	Sir P.T. Saravajanik Science College, Surat.	20	24	32	28	26	25	25	16
		TOTAL	50	63	110	107	83	80	161	147
M.Sc. (Mathematics)	1	Department of Mathematics, VNSGU, Surat	180	210	264	236	228	227	226	194
	2	B. K. M. SCIENCE COLLEGE, VALSAD	30	43	63	58	38	38	66	33
	3	THE MANDVI EDUCATION SOCIETY BBA, BCA AND SCIENCE COLLEGE, MANDVI	0	0	38	13	38	38	38	18
	4	V.S. PATEL COLLEGE OF ARTS & SCIENCE, BILIMORA	0	0	0	0	0	0	38	28
	5	C.B. PATEL COMPUTER COLLEGE & JAMANABEN NAROTTAMBHAI MOTIRAM PATEL SCIENCE COLLEGE, BHARTHANA, VESU, SURAT.	0	0	0	0	0	0	38	0
	6	Government Arts, Science & Commerce College, Nani	30	26	63	31	76	63	76	44
		TOTAL	240	279	428	338	380	366	482	317
M.Sc.(Statistics)	1	Department of Statistics, VNSGU, Surat.	30	23	38	20	38	15	38	7
		TOTAL	30	23	38	20	38	15	38	7
M.Sc.(Applied Statistics)	1	Department of Statistics, VNSGU, Surat.	40	23	50	15	50	22	50	28
		TOTAL	40	23	50	15	50	22	50	28
M.Sc. (Physics)	1	Department of Physics, VNSGU, Surat. (Materials Science/ Theoretical/ Electronics)	54	52	67	61	67	68	67	63
	2	Sir P.T. Saravajanik Science College, Surat. (Nuclear Physics)	15	27	32	33	33	33	32	28
		TOTAL	69	79	99	94	100	101	99	91
M.Sc. (Electronics)	1	Department of Physics, VNSGU, Surat.	16	0	21	0	21	0	21	0
	2	Narmada College of Science & Commerce, Zadeshwar *	6	6	8	4	8	0	8	0
		TOTAL	22	6	29	4	29	0	29	0
M.Sc.(Zoology)	1	Government Arts, Science & Commerce College, Nani Daman.	10	15	26	10	26	25	26	20
	2	B.P. Baria Science College, Navsari	0	0	0	0	0	0	26	24
	3	GOVERNMENT SCIENCE COLLEGE, VANKAL	0	0	0	0	0	0	26	10
	4	Department of Bioscience, VNSGU, Surat	0	0	0	0	0	0	50	28
		TOTAL	10	15	26	10	26	25	128	82
M.Sc. (Microbiology)	1	Department of Biosciences, VNSGU, Surat	0	0	0	0	0	0	58	57
	2	Naranala College of Professional & Applied Science, Navsari	30	35	44	43	38	38	100	80
	3	K.B.S. College of Professional Science & Commerce, Vapi	30	32	44	41	38	38	100	38
	4	Dolat Usha Institute of Applied Science, Valsad	30	35	44	43	38	38	50	50
	5	Arts, Science & Commerce College, Kholwad	30	34	44	35	39	38	50	28
	6	Shrimad Rajchandra Vidyapeeth, Dharampur, Valsad	30	20	44	29	38	38	50	21
	7	The Mandvi Education Society BBA, BCA & Science College, Mandvi	0	0	38	12	38	38	100	50
	8	S.S. Agrawal College of Commerce and Management, Navsari	0	0	0	0	0	0	50	15
		TOTAL	160	156	258	203	229	228	558	339
M.Sc.(Aquatic Biology)	1	Department of Aquatic Biology, VNSGU, Surat	30	15	38	25	38	23	38	17
		TOTAL	30	15	38	25	38	23	38	17

Last Four Years Intake and Registration Data of PG Programs										
Name of Programme/ Subject	P.G. Centre/ Uni. Deptt.		2018-19		2019-20		2020-21		2021-22	
	No. of Centres	Name of Centre/ Uni. Deptt.	Total Intake	Total Registration	Total Intake	Total Registration	Total Intake	Total Registration	Total Intake	Total Registration
M.Sc. Chemistry (Organic/ Inorganic/ Analytical/Physical/ Environmental/ Pharmaceutical)	1	Department of Chemistry, VNSGU, Surat	160	159	201	176	203	200	249	239
		TOTAL	160	159	201	176	203	200	249	239
M.Sc. (Organic/ Inorganic/ Analytical/Physical)	1	Sir P.T. Saravajanik Science College, Surat.	33	35	41	39	43	43	41	40
	2	Navvyug Science College, Surat.	33	38	41	42	42	42	102	102
	3	Jayendrapuri Arts & Science College, Bharuch	33	41	42	42	41	41	54	54
	4	B.K.M. Science College, Valsad	33	41	41	40	42	41	53	52
	5	Arts, Science & Commerce College, Kholwad	33	38	41	37	41	41	50	34
	6	V.S. Patel Arts & Science College, Biliimora	63	78	79	83	80	79	171	171
	7	M.R. Arts & Science College, Rajpipla	33	40	48	33	43	43	50	50
	8	Narmada College of Science & Commerce, Zadeshwar	33	40	41	48	41	41	50	50
	9	Government Arts, Science & Commerce College, Nani Daman.	33	30	48	39	42	42	50	50
	10	GOVERNMENT SCIENCE COLLEGE, VANKAL	10	0	41	35	41	41	50	50
	11	Dolat Usha Institute of Applied Science, Valsad.	30	40	38	43	39	39	161	160
	12	C.B. Patel Computer College & Jamanaben Harottambhai Motiram Patel Science College, Surat.	30	40	38	34	38	38	140	140
	13	The Mandvi Education Soc. BBA, BCA & Science College, Mandvi.	30	40	38	28	38	38	120	111
	14	Vidhyadeep Institute of Science, Anita (Kim), Surat.	30	40	38	31	38	38	150	44
	15	Shrimad Rajchandra Vidyapeeth, Dhorampur.	30	40	38	34	39	39	50	50
	16	Naranala College of Professional & Applied Science, Navsari	30	40	38	37	38	38	110	110
	17	AEPS Institute of Science, Ankleshwar.	30	40	38	37	39	38	50	50
	18	K. B. Sumeria Comm. & Natara[Professional Sci. College, Vapi.	0	0	38	35	38	38	110	107
	19	Adarsh Kelvani Mandal, Sosamba Sanchalit Science and Commerce College, Tarsadi, Ta. Mangrol, Dist. Surat	0	0	0	0	0	0	70	63
	20	S.S. Agrawal College of Commerce and Management, Navsari	0	0	0	0	0	0	70	70
	21	Dr. R.K. Desai College of Science, Vapi	0	0	0	0	0	0	100	100
		TOTAL	547	661	767	717	763	760	1802	1658
M.Sc. Organic Chemistry (Evening)	1	Department of Chemistry, VNSGU, Surat.	30	50	38	24	38	38	25	23
	2	AEPS Institute of Science, Ankleshwar.	0	0	0	0	0	0	38	16
		TOTAL	30	50	38	24	38	38	63	39
M.Ed.	1	Department of Education, VNSGU, Surat	48	48	55	47	55	55	110	63
		TOTAL	48	48	55	47	55	55	110	63
MASTER OF RURAL STUDIES	1	Mahatma Gandhi Department of Rural Studies VNSGU, Surat	44	34	55	42	55	43	55	27
		TOTAL	44	34	55	42	55	43	55	27
M.A. (H.R.D.)	1	DEPARTMENT OF HUMAN RESOURCE DEVELOPMENT, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT	60	58	75	45	75	34	75	31
		TOTAL	60	58	75	45	75	34	75	31
M.A. (HUMAN RESOURCE MANAGEMENT & LABOUR RELATIONS)	1	DEPARTMENT OF HUMAN RESOURCE DEVELOPMENT, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT	30	19	38	30	38	16	38	20
		TOTAL	30	19	38	30	38	16	38	20
MASTER OF LABOUR WELFARE	1	DEPARTMENT OF HUMAN RESOURCE DEVELOPMENT, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT	30	6	38	5	38	11	38	6
		TOTAL	30	6	38	5	38	11	38	6

Last Four Years Intake and Registration Data of PG Programs										
Name of Programme/ Subject	P.G. Centre/ Uni. Deptt.		2018-19		2019-20		2020-21		2021-22	
	No. of Centres	Name of Centre/ Uni. Deptt.	Total Intake	Total Registration	Total Intake	Total Registration	Total Intake	Total Registration	Total Intake	Total Registration
P.G. Diploma in Computer	1	Department of Computer Science, VNSGU, Surat	30	14	38	15	38	8	38	12
		TOTAL	30	14	38	15	38	8	38	12
LL.B.	1	Siddharth Law College, Kamarej, Surat	300	294	300	292	375	374	375	373
	2	Dinshaw Daboo Law College, Navsari	300	300	300	251	375	372	375	385
	3	Mahamandeshwar Shri Krishnandji Law College, Bharuch	300	211	300	152	375	193	375	170
	4	Shah K. M. Law College, Valsad	300	229	300	217	375	314	375	298
	5	Naranolala Law College, Navsari	120	20	120	25	150	51	150	52
	6	V.T. Choksi Sarvajonik Law College, Surat.	300	303	300	300	375	374	375	374
		TOTAL	1620	1357	1620	1237	2025	1678	2025	1650
LL.M. (Criminal Law/Human Rights/ Business Law Group)	1	Department of Law, VNSGU, Surat (HRG)	40	40	50	65	65	65	63	149
	2	Department of Law, VNSGU, Surat (Criminal)	0	0	0	0	0	0	63	
	3	Department of Law, VNSGU, Surat (Business Law)	0	0	0	0	0	0	63	
	4	M.S.K. Law College, Bharuch (Business Law)	0	0	0	0	70	70	55	42
	5	Shah K. M. Law College, Valsad (Business Law)	44	44	55	46	0	0	81	76
	6	V.T. Choksi Sarvajonik Law College, Surat. (Criminal Law)	55	45	55	57	72	72	55	55
		TOTAL	139	129	160	168	207	207	380	322
BACHELOR OF LIBRARY & INFORMATION SCIENCE	1	DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT	40	15	50	17	50	17	50	13
		TOTAL	40	15	50	17	50	17	50	13
MASTER OF LIBRARY & INFORMATION SCIENCE	1	DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT	35	23	44	20	44	24	44	15
		TOTAL	35	23	44	20	44	24	44	15
M.Sc. (INFORMATION & COMMUNICATION TECHNOLOGY)	1	DEPARTMENT OF INFORMATION & COMMUNICATION TECHNOLOGY, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT	60	60	75	63	75	62	75	50
		TOTAL	60	60	75	63	75	62	75	50
MASTER OF SOCIAL WORK	1	DEPARTMENT OF SOCIOLOGY, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT	50	25	63	30	63	48	63	60
	2	SHREE NARMADA M.S.W. COLLEGE, MANGROL	50	50	63	44	63	18	63	58
	3	SHREE SARASWATI MSW COLLEGE, BHARUCH	50	45	63	61	63	63	63	63
	4	BAIHANS COLLEGE OF SOCIAL WORK, THAVA	0	0	0	0	0	0	63	42
	5	SWAMI VIVEKANAND M.S.W. COLLEGE, ROANVEL	0	0	0	0	0	0	63	29
		TOTAL	150	120	189	135	189	129	315	252
P.G. Diploma in Research Methodology	1	DEPARTMENT OF HUMAN RESOURCE DEVELOPMENT, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT	30	13	38	13	38	6	38	18
		TOTAL	30	13	38	13	38	6	38	18
P.G. Diploma in Human Resource Management	1	DEPARTMENT OF HUMAN RESOURCE DEVELOPMENT, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT	30	16	38	10	38	10	38	5
		TOTAL	30	16	38	10	38	10	38	5
P.G. Diploma in Corporate Social Responsibility	1	DEPARTMENT OF HUMAN RESOURCE DEVELOPMENT, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT	30	0	38	0	38	0	38	0
		TOTAL	30	0	38	0	38	0	38	0
P.G. Diploma in Toxicology	1	Department of Biosciences, VNSGU, Surat	0	0	50	0	50	0	50	0
		TOTAL	0	0	50	0	50	0	50	0
P.G. Diploma in Molecular & Biotechnology	1	Department of Biotechnology, VNSGU, Surat	20	3	25	4	25	5	25	5
		TOTAL	20	3	25	4	25	5	25	5

Last Four Years Intake and Registration Data of PG Programs										
Name of Programme/ Subject	P.G. Centre/ Uni. Deptt.		2018-19		2019-20		2020-21		2021-22	
	No. of Centres	Name of Centre/ Uni. Deptt.	Total Intake	Total Registration	Total Intake	Total Registration	Total Intake	Total Registration	Total Intake	Total Registration
P.G. Diploma in Rural Development	1	MAHATMA GANDHI DEPARTMENT OF RURAL STUDIES, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT	0	0	38	0	38	0	38	0
		TOTAL	0	0	38	0	38	0	38	0
P.G. Diploma in Natural Resource Management	1	MAHATMA GANDHI DEPARTMENT OF RURAL STUDIES, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT	0	0	38	0	38	0	38	0
		TOTAL	0	0	38	0	38	0	38	0
P.G. Diploma in Climate Change and Rural Society	1	MAHATMA GANDHI DEPARTMENT OF RURAL STUDIES, VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT	0	0	38	0	38	0	38	0
		TOTAL	0	0	38	0	38	0	38	0
P.G. Diploma in Medical Laboratory Technology	1	DEPARTMENT OF BIOSCIENCE, VNSGU, SURAT.	30	0	38	0	38	0	50	46
	2	DOLAT USHA INSTITUTE OF APPLIED SCIENCES & DHIRUSARLA INSTITUTE OF MANAGEMENT & COMMERCE, VALSAD	30	40	38	43	38	38	50	50
	3	DR JAYA AND DR HARIYADAN SHAH INSTITUTE OF APPLIED SCIENCE, SURAT	30	40	38	41	38	38	100	100
	4	NARANI LALA COLLEGE OF PROFESSIONAL & APPLIED SCIENCES, NAVSARI	30	40	38	36	38	38	100	68
	5	SHRI J. S. BHAKTA & SHRI K. M. BHAKTA ARTS SHRI A. H. SHAH SCIENCE & SHRI M. F. SHAH COMMERCE COLLEGE, KHOWAD	30	38	38	43	38	38	53	53
	6	SHRIMAD RAJCHANDRAVIDHYAPEETH, DHARAMPUR	0	0	0	0	0	0	50	29
	7	SOUTH GUJARAT INSTITUTE OF MEDICAL SCIENCES, NAVSARI	30	15	0	0	0	0	50	0
		TOTAL	180	173	190	163	190	152	453	346

Master of Aquatic Biology

Name of Program	Master of Aquatic Biology
Abbreviation	AQB
Duration	2 Years (Four Semester)
Eligibility Criteria	A candidate who has obtained his/her bachelor's degree in science except maths and physics.
Objective of Program	The main objective of the programme is to prepare the students for productive career in Aquatic resources management and sustainable utilization of aquatic resources by providing an outstanding environment of teaching and research in the specific aspects of the designed program. This structured course will facilitate a career in various institutions such as research and development centers of private limited, public companies, Aquaculture sectors, farms, fisheries department etc.
Program Outcome	PO1 : Basic Knowledge Enhancement The designed Program enhances students with the basic knowledge of the subject matter in order to capable students develop research skills which include laboratory techniques, aqua farm field techniques, disease management in aquaculture sector, feed technology, biochemistry, microbiological assessment, fish genetics, biotechnology and bioinformatics, aquarium setup, ornamental fisheries, marine and freshwater fisheries and Planktonology. PO2 : Skill Development The program develops the skills of managing aquatic resources and use of techniques and instruments to develop remedies to manage aquatic resources. PO3 : Familiar with Advanced Emerging Technologies The program trains students with the latest technologies that is being used in the aquaculture sectors and aquatic pollution management. The designed syllabi enrich students with the technical aspects to identify aquatic problems in the natural environment. PO4 : Skill in analysis technique with Extension Education The program capable students for analysis, conceptualizing the real-world problems. It also enables students understand the Regulation and Development in managing aquatic sources. PO5 : Research and Project Development Development of factual project provides the learner's exposure to work in the demanding environment of the industry. The research and project development skill prepares students for employable and industry ready environment. PO6 : Group discussion, field visits, presentation and confidence Development The designed syllabi enable students be capable of group discussion, sharing ideas and views. This enables to develop confidence among the students. Healthy discussion in recent technology and legislations, pollution amendments and fisheries Technology enables acquaintances of the students with the practical aspects.
Program Specific Outcomes	PSO1 : Develop and strengthen the basic knowledge and concepts that are required to manage aquatic resources.

	PSO2 : Develop the professional and entrepreneurship skills to be confident in the practical aspects. PSO3 :Raising the students capable for handling instruments and use of latest technology to find remedial measures with respect to fisheries and pollution. PSO4 : Develop students for self-learning and challenging situation in aquaculture sectorsand extension education. PSO5 :Enable students to use recent technologies for analyzing the research and practical concepts. PSO6 :Development for continuous learning and research for successful academic and industrial career.						
Mapping between POs and PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	PO1						
	PO2						
	PO3						
	PO4						
	PO5						
	PO6						
Medium of Instruction	English						
Programme structure	Semester-I						
Theory Paper /Practical	Teaching schedule Hrs /week	Exam Schedule			Total marks	Credit	
		Duration (hrs)	Internal marks	External marks			
Theory papers :							
AQB:101 : Aquatic resources and their management	4	3	30	70	100	4	
AQB:102 : Instrumentation	4	3	30	70	100	4	
AQB:103 : Aquatic Microbiology & Fish Etiology	4	3	30	70	100	4	
AQB:104 : Planktonology	4	3	30	70	100	4	
Practicals :							
AQB:105: Water & sediment analysis and Instrumentation	4	5	30	70	100	4	
AQB:106: Planktonology and Microbiology	4	5	30	70	100	4	
		Total	180	420	600		
Programme structure	Semester-II						
Theory Paper /Practical	Teaching schedule Hrs/week	Exam Schedule			Total marks	Credit	
		Duration (hrs)	Internal marks	External marks			
Theory papers :							
AQB: 201 : Fish Nutrition, Biochemistry and Feed Technology	4	3	30	70	100	4	
AQB: 202 : Fish Genetics and Biotechnology	4	3	30	70	100	4	
AQB: 203 : Aquatic	4	3	30	70	100	4	

Pollution and Toxicology						
AQB: 204 : Biostatistics, Extension Education and Fisheries legislation	4	3	30	70	100	4
Practical:						
AQB: 205 : Biochemistry, Genetics and Biotechnology	4	5	30	70	100	4
AQB: 206 : Aquatic Pollution & Biostastics	4	5	30	70	100	4
		Total	180	420	600	
Programme structure	Semester-III					
Theory Paper /Practical	Teaching schedule Hrs/week	Exam Schedule			Total marks	Credit
		Duration (Hrs.)	Internal marks	External marks		
Theory papers :						
AQB:301 – Fish Physiology, Endocrinology & Disease Management	4	3	30	70	100	4
AQB:302 – Fisheries Technology	4	3	30	70	100	4
AQB: 303 – Freshwater Aquaculture	4	3	30	70	100	4
AQB: 304 – Marine water Aquaculture	4	3	30	70	100	4
Practicals :						
AQB: 305 – Fish Physiology, Etiology and Fisheries Technology	4	5	30	70	100	4
AQB: 306 –Aquaculture management	4	5	30	70	100	4
		Total	180	420	600	
Programme structure	Semester-IV					
Theory Paper /Practical	Exam Schedule			Total marks	Credit	
	Internal marks		External marks			
AQB: 401- Dissertation (Research Work)	45	105		150	6	
AQB: 402 - Seminar	45	105		150	6	
AQB: 403 - Project formulation for aquaculture Certification and licensing for aquaculture	45	105		150	6	
AQB: 404 - Study Tour / Project Work	45	105		150	6	
Total	180	420		600	24	

Semester I

Course Code	101						
Course Title	Aquatic Resources and their Management						
Credit	4						
Teaching per Week	4 Hrs						
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)						
Effective From	June 2020						
Purpose of Course	The main purpose of the course is to make students acquainted with concepts of different types of aquatic resources and the way to manage them.						
Course Objective	The objective of the course is to make the student capable of understanding the types of aquatic ecosystems and aquatic resources along with the measures for their management.						
Course Outcomes	CO1: Explain about Inland Ecosystems and Marine ecosystem to strengthen and develop the basic concepts to handle challenging situations in aquaculture sectors CO2: Explain the types of important Aquatic resources found in the water bodies so as to develop theoretical aspect to be applied in practical situations CO3: Explain status of Ornamental fish trading in India, their transportation and management CO4: Explain the setting, design and construction of Aquaria to develop professional skill as well as ways to improve the condition of aquaria and fishes.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
	CO4						
Pre-requisite	Basics of biology and chemistry						
Course Content	Unit – I ➤ Inland Ecosystem and their management: Origin, classification and distribution of rivers, lakes and ponds, Major river system of India, management of pond, Lake, River. Thermal stratification & thermal exchange in lakes. Classification and distribution of reservoir, transitional phases of reservoir. Management of Reservoirs, Classification, morphology and distribution of estuaries, Lagoons and Coastal inlets, Management of Estuaries Unit - II ➤ Marine ecosystem: Origin of ocean floor, classification of marine ecosystem, seas bottom topography: Abyssal, canyons, trenches, main physical (density, viscosity, surface tension, temperature) and chemical (major and minor constituents) properties of sea water Tides, currents and waves, their effects in estuaries and coastal area						

	Unit - III ➤ Aquatic resources: Shell fishes: Prawn, shrimp and molluscs Fin fishes: major carps, catfishes, hilsa, mullet, sardine, mackerel, sport fishes. Aquatic plants: freshwater higher vascular plants, sea weeds, sea grasses and mangroves Unit – IV ➤ Ornamental fish: Status of Ornamental fish trading in India, Design and construction of Aquaria, setting up and management of aquarium Equipment used in aquaria (Biological filters, aerators, heaters etc.), Transportation of ornamental fishes
Reference Books	1. Bames R.S.K. (1999). Introduction to Marine Ecology, Blackwell Science. 2. Edmondson, W.T. (1976). Freshwater Biology 2nd Ed. John Wiley (Ed) and Sons Inc. 3. Golterman, H.L., Clyno, R.S. and Ohnstad, M.A.M. (1978). Methods for physical and chemical analysis of freshwater. 2nd Ed. IBP Handbook no.8 Blackwell scientific publication. 4. Grasshoff, K. Enhardt, M. and Kreenling, K. (1983). Methods of seawater analysis. 2nd Ed. Verlag Chemical 5. Hutchinson, G.E. (1976). A Treatise on limnology. Vol. I & II John Wiley & sons. 6. effery S. Levinton (2000). Marine Ecology, Biodiversity and Function. Oxford. 7. Jhingaran, V.G. (1985). Fish and Fisheries of India. Hindustan publication Corp., New Delhi. 8. Lecren, E.D. and Lowe-Mac Connel, R.H. (1980). The functioning of freshwater ecosystem. Cambridge University Press. 9. Nair, B. N. and Thampy D.M. (1980). A text Book of Marine Ecology. 10. Nybakaken, J.W. (2001). Marine Biology an Ecological Approach 4th edition. 11. Perkins, E.J. (1980). The Biology of Estuaries and coastal water. Academic Press, London.
Teaching Methodology	Classwork, Discussion, Self-Study, models and Assignment
Evaluation Method	30% Internal assessment based on class attendance, assignments, internal examination, etc. 70% External based on University examination
Course Code	AQB:102
Course Title	Instrumentation
Credit	4
Teaching per week	4
Minimum weeks per semester	16
Effective from	June 2020
Purpose of course	The purpose of the course is to develop the operation skill of the

	instrument that help to analysis of the different physical, chemical and biological parameters.						
Course Objective	To create the awareness and apprise the instrument operation among the students.						
Course Outcome	CO1. Aware and trained the students for safe work procedure and handling of the instruments in the laboratory. CO2. Elucidate principle of instruments that help to students to understand the instrument and analysis process. CO3. The students are proficient to use the advances technology and instruments to speed up the analysis process and error free results. CO4. The working procedure of instruments are elaborated in details that would be able to learn about the application of different instruments in the field of Aquatic Biology. CO5. Care and maintenance of the laboratory instruments explained in the class help to longer uses of the instruments.						
Mapping of COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
	CO4						
	CO5						
Course prerequisite	Microscopes, Centrifuge machine, Electrophoretic and water analyser unit						
	Unit I (Hrs. 10) Microscopy: Principle and construction of Microscopes, Types of microscopes- Simple microscope, compound microscope (Student's microscope, Stereoscopic microscope, Phase contrast microscope, fluorescence microscope and interference microscope) and Electron microscope Unit II (Hrs. 10) Photometry: Principle and application of turbidometer. Introduction, Principle and application of Colorometer, Spectrophotometer, (Single beam & double beam), infrared spectroscope, NMR and Mass spectrometer Unit III(Hrs. 08) Centrifugation and density gradients: Separation method. Centrifuge: Introduction,construction components and types of centrifuge, Introduction, principle and types of centrifugation(Differential centrifugation and Density gradient centrifugation) Unit IV (Hrs 17) (A) Chromatography & Electrophoretic techniques: Principle of chromatography, Types of chromatography Protein electrophoresis: SDS, PAGE, Western blotting (B) Water quality analysers: Conductivity meter , pH meter,Salino meter, DO meter,COD reflaxor (close and open) and BOD analyser						
References	1. Brown, S.B (1980). An introduction to spectroscopy for Biochemists, Academicpress, London, New York.						

	2. E.D.P. Robertis and E.M.F. Robertis (2001). Cell and Molecular Biology, Lippincott Williams & Wilkins, London 3. Hawcroft, D.M. (1996). Electrophoresis. The Basics IRL press, Oxford. 4. Jennings, W.G. (1993). Analytical Gas chromatography. Academic Press. New York. 5. Skoogs, H, P.andNieman, M (2006). Principle of Instrumental analysis. Thomson Inc. Ltd.						
Teaching methods	Chalk and talk, Discussion, Videos, Self-study, Seminars and Assignments						
Evaluation methods	Internal assessment (30%) based on the internal exam, attendance and assignments. External assessment (70%) based on the university examination at the end of the semester.						
Course Code	103						
Course Title	Aquatic Microbiology and Fish Etiology						
Credit	4						
Teaching per Week	4 Hrs						
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)						
Effective From	June 2020						
Purpose of Course	The purpose of the course is to make the student able of implementing the concepts and techniques of Aquatic microbiology and develop the skill to identify fish diseasesand its associated organisms as well as to find out its remedies.						
Course Objective	To make students familiar aboutmicroorganisms associated with aquatic environment and its role in biogeochemical cycle, different methods of studying microorganisms, etiology and therapy of fish diseases and quality control of fish.						
Course Outcomes	CO1 :Students will able to gain knowledge about type of microorganisms with biogeochemical cycle to understand their role in aquatic environment. CO2 :The counting and identification techniques like SPC, MPN and Qualitative methodshelp to determine the importance and safety level of microorganismsin concern toaquatic production and environment. CO3 :This paper gives idea regarding physical, chemical and physiological defence mechanisms in fishes, diagnostic tools like histopathological methods, PCR, ELISA and therapy of fish diseases which helps students to recognize the causes of diseases as well as prophylactic and therapeutic treatment. CO4 : Explain and train students to deal with post mortem changes of fish, fish pathogens and their prevention and control, microbial quality control of fishery products and HACCP to reduce contamination in fish as well as improving safety of fishery products.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						

	9. Surendran, P.K., Thampuran, N., Nambiar, N.V. and Laliha, K.V. (2009). Microbiological examination of seafood. Central Institute of Fisheries Technology, Cochin. 10. Whitman, K.A. (2004). Finfish & shellfish bacteriology, CBS publishers, New Delhi. 11. Willey, M.J., Sherwood, L.M. and Woowerton, C.J. (2008). Prescott, Harley and Klein's microbiology, McGraw hill company, New Delhi. 12. Schaperclaus, W. (2001) : Fish diseases Vol I & Vol II, Oxonian Press Pvt. Ltd., New Delhi. 13. Mitra, A. & K. Banerjee. (2004). Marine Microbiology, Narendra Publishing House, Delhi. 14. Peleazar, M.J., E.C.S. Cahn & H.R. Krieg (1981). Elements of Microbiology. McGraw Hill Book Co., NY. 15. Rosenberg, E.B. & I.R. Cohen (1983). Microbial Biology. CBS College Publ., NY.						
Teaching Methodology	Classwork, Discussion, Self-Study, Assignment, ICT						
Evaluation Method	30% Internal assessment based on class attendance, assignment and internal examination, 70% External based on University examination.						
Course Code	104						
Course Title	Planktonology						
Credit	4						
Teaching per Week	4 Hrs						
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)						
Effective From	June 2020						
Purpose of Course	The purpose of the course is to develop concepts of planktonology and learn their implementation in aquaculture sectors, commercial sector and aquatic resource management.						
Course Objective	To acquire skill in students to identify plankton and their implementation as bioindicators. To measure productivity and its application in aquaculture sectors, commercial sector and aquatic resource management.						
Course Outcomes	CO1 : Develop concept among the students for the importance of plankton and Productivity. Different adaptations found in plankton and its application in science. Ecological and Commercial Importance of primary producers and secondary producers. CO2 : After learning this course, students will be able to develop skill to identify plankton and measure productivity and its application in aquaculture sectors and aquatic resource management as well as extracted material from plankton has importance in commercial sector. CO3 : Students will also be able to learn about the importance of plankton as one of the bioindicators of the environmental condition and their use as one of the biomarkers.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						

	internal examination, etc. 70% External based on University examination						
Course Code	105						
Course Title	Water & Sediment analysis and Instrumentation						
Credit	4						
Teaching per Week	4 Hrs						
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)						
Effective From	June 2020						
Purpose of Course	The main purpose of the course is to make students acquainted with the practical concepts. The student will gain the knowledge for analysis of water and sediment and the use of different types of instruments used for specific analysis.						
Course Objective	The objective of the course is to make the student capable of analysing different physico chemical parameters in water and sediment. Students will be capable of handling instruments used for analysis of water and sediment parameters.						
Course Outcomes	CO1: Students will be capable of estimating different physico-chemical parameters such as light penetration, TS, TSS and TDS, Dissolved oxygen, Alkalinity (PA & TA), Hardness (total, Ca & Mg) Chloride, in water and Silicate, Ammonia and Ammoniacal nitrogen in both water and sediments. CO2: Develop skill for standardization and measurement of water quality by using instruments like Turbidometer, pH meter, Colorimeter, Conductivity meter and Salinometer. CO3: Gain practical knowledge by field visits to different Aquafarms and processing plants in respect to fish and fisheries. CO4: Acquire skill to check water and sediment quality with reference to physico-Chemical parameters for the management of fisheries CO5: The acquired practical skill will help in further research works						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
	CO4						
	CO5						
Pre-requisite	Basics of biology and chemistry						
Course Content	• Titrimetric estimation of ➤ Dissolved oxygen, ➤ Alkalinity(PA & TA), ➤ Hardness (total, Ca & Mg)						

	➤ Chloride • Colorimetric estimation of water and sediments ➤ Silicate ➤ Ammonia ➤ Ammonical nitrogen • Light penetration, TS, TSS and TDS estimation • Instrumentation: Standardization and measurement of water quality by following instruments ➤ Turbidometer ➤ pH meter ➤ Colorimeter ➤ Conductivity meter ➤ Salinometer • Field and Institutes visits
Reference Books	1. APHA (2005). Standard method for the examination of water and wastewater, American Public Health Association, E.G. Arnold, S.C. Lenore, A.E. Eaton (Eds.), Washington. 2. Trivedy, R.K. and Goel, P.K (1986). Chemical and biological methods for water pollution studies, Environmental publication, Karad. 3. Skoogs, H, P. and Nieman, M (2006). Principle of Instrumental analysis. Thomson Inc Ltd. 4. Brown, S.B (1980). An introduction to spectroscopy for Biochemists, Academic press, London, New York.
Teaching Methodology	Demonstration, Explanation, Practical, Discussion, Journal preparation
Evaluation Method	30% Internal assessment based on class attendance, internal examination, etc. 70% External based on University examination
Course Code	106
Course Title	Planktonology and Microbiology
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)
Effective From	June 2020
Purpose of Course	The purpose of the course is to make the student able of implementing the methods of planktonology and microbiology as well as develop the skill to count and identify plankton and microorganisms in the field of Aquatic Biology.
Course Objective	To make students familiar about plankton and microorganisms associated with aquatic environment with its importance.
Course Outcomes	CO1 :Quantitative and chlorophyll estimation of plankton help to measure the productivity and aquatic resources. CO2 :Students will able to perform qualitative estimation of plankton for aquatic resource management. CO3: The counting and identification of microorganisms through SPC, MPN, Gram's staining and hanging drop and membrane filter

	techniqueaids to determine the importance and safety level of microorganisms in concern toaquatic production and environment. CO4: Explore students through field and institutes’ visitswhich make themto understand the interaction between their chosen fields of study to the rest of the world. It also provides an exposure to students about practical working environment.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
	CO4						
Pre-requisite	Basics of Planktonology and Microbiology						
Course Content	1. Collection, fixation and preservation of plankton (freshwater and marine water). 2. Quantitative estimation of plankton (counting method) & chlorophyll estimation. 3. Identification of Phytoplankton(freshwater and marine water). 4. Identification of Zooplankton(freshwater and marine water). 5. Examination of bacteria by Gram’s staining technique and hanging drop technique. 6. Isolation Methods for bacteria. 7. Estimation of <i>Vibrio sp.</i> and <i>Streptococcus faecalis</i> by membrane filter technique. 8. Assessment of microbiological quality of water bodies using SPC and MPN techniques. 9. Quantitative assessment of microbiological quality of sediments and fish products using SPC. 10. Field and Institutes visits.						
Reference Books	1. Patel, R.J. and Patel, K.R. (2000). Experimental microbiology, Aditya, Ahmedabad, India. 2. Surendran, P.K., Thampuran, N., Nambiar, N.V. and Laliha, K.V. (2009). Microbiological examination of seafood. Central Institute of Fisheries Technology, Cochin. 3. Willey,M.J., Sherwood, L.M. and Woowerton, C.J. (2008). Prescott, Harley and Klein’s microbiology, McGraw hill company, New Delhi. 4. Pelezar, M.J., E.C.S. Cahn & H.R. Krieg (1981). Elements of Microbiology. McGraw Hill Book Co., NY. 5. APHA, (1995). Standard method for examination of water						

	and waste water (19th ed.), American public health association, New York. 6. M. Cheesbrough, (2002). District laboratory practice in tropical countries, Cambridge University press, USA. 7. J. G. Cappuccino and N. Sherman, (2005). Microbiology (6th ed.), Pearson education Pvt. Ltd., Indian branch, Delhi, India. 8. R. Ananthanarayan and J. Paniker, J. (2009). Textbook of microbiology. Universities press Pvt. Ltd. 9. Battish, S.K. (1992). Freshwater zooplankton of India. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi. 10. Desikacharya, T.V. (1987-1991). Atlas of Diatoms Fasc.1-6. Madras Science foundation. 11. Nybakken, J.W. (1988). Marine Biology: An ecological approach (2nd ed.). Harper Collins Publisher. 12. Pillai, N.K. (1986). Introduction to Planktology. Himalaya Publishing House, Bombay. 13. Sarode, P.T. and Kamant, N.D., (1984). Freshwater diatoms of Maharastra. SaikrupaPrakasan, Aurangabad.
Teaching Methodology	Practical performance and demonstration, Discussion, Self-Study, ICT, Field visit
Evaluation Method	30% Internal assessment based on class attendance, assignment and internal examination, 70% External based on University examination.

AQB 2nd Semester

Course Code	201
Course Title	Fish Nutrition, Biochemistry and Feed Technology
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)
Effective From	June 2020
Purpose of Course	The main purpose of the course is to make students acquainted with concepts of Fish Nutrition, fish Biochemistry and Feed Technology
Course Objective	The objectives of the course is to make the student capable of understanding the general fish nutrition, biochemistry, Chemical and Biological analysis and different methods used in fish feed Technology.
Course Outcomes	CO1: The course explains the general fish nutrition so as to manage the fishery resources CO2: Biochemistry, Chemical and Biological analysis of feed and muscles of fish. CO3: Explain the skills required in feed Technology. CO4: Explain the skill to measure Gastro-somatic Index (GaSI), Feed Conversion Ratio (FCR), Food Conversion Efficiency (FCE), Protein Efficiency Ratio (PER), Productive Protein Value (PPV), Net Protein

	Utilization (NPU) in order to manage fish resources in natural resources and farms CO5:Explain the process of feed formulation, feed processing and feed manufacture						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
	CO4						
	CO5						
Pre-requisite	Basics of biology and chemistry						
Course Content	Unit - I ➤ General fish nutrition: Principles of nutrition. Types of aqua feed. Nutritional requirements of fish and prawn at various developmental stages Unit - II ➤ Biochemistry: Importance Carbohydrates, Protein, Lipid (energy food), Minerals and Vitamins (non energy food), Proximate composition of fish and feeds Unit - III ➤ Chemical and Biological analysis: Gastro-somatic Index (GaSI), Feed Conversion Ratio (FCR), Food Conversion Efficiency (FCE), Protein Efficiency Ratio (PER), Productive Protein Value (PPV), Net Protein Utilization (NPU) Unit – IV ➤ Feed Technology: Feed processing and manufacture machineries, Sources of feed ingredients, eco-friendly and Economic feed formulation. Role of feed attractants, binders, growth promoters (antibiotics, probiotics), coloring and flavoring agents, Antinutritional factors, method of feed formulation (mixing, grinding, pulverizing, cooking, extruding, pelleting, drying packing)						
Reference Books	1. ADCP (Aquaculture Development and Co-ordination Programme) (1980). Fish Feed Technology, ADCP/REP/80/11.FAO, Rome. 2. D’ Abramo, LR., Conklin, D.E and Aklyama. D.M, (1977). Crustacean Nutrition: Advances in Aquaculture Vol. 6. World Aquaculture Society, Baton Rouge, L.A. 3. Evans, D.H. and Claiborne, J.B. (2006). The Physiology of fishes. CRC press. 4. Guillame, J., Kaushik, S., Berqot P., and Metallier, R., (2001). Nutrition and feeding of fish and crustaceans, Springer Praxis Publishing, Chichester, UK. 5. Halver J.E. (1989). Fish Nutrition, Academic Press, San Diego, CA. 6. Halver, J and Hardy, R.W. (2002). Fish nutrition. Academic press, London. 7. Halver, J.E, and Tlews, K.T. (1979). Finfish nutrition and fish feed technology Vol. I and II Heenemann, Berlin						

	8. Hepper, B. (1988). Nutrition of pond fishes. Cambridge Univ. Press, Cambridge, UK. 9. Houlihan, D., Boujard, T and Jobling, M. (2001). Food intake in fish. Blackwell science Ltd, London. 10. Joachim W. Hertrampf and Felicitas Piedad-Pascual. (2000). Handbook on ingredients for aquaculture feeds. Kluwer Academic Publishers, London. 11. Jobling, M. (1994). Fish Bioenergetics. Chapman & Hall. London. 12. Keith Wilson and John Walker. (1995). Principles and Techniques of Practical Biochemistry. Cambridge University Press. 13. Lovell, R.T. (1998). Nutrition and Feeding of Fishes, Chapman & Hall, New York. 14. New, M.B. (1987). Feed and feeding of fish and shrimp. A manual on the preparation and preservation of compound feeds for shrimp and fish in aquaculture. F.A.O. Rome – ADCP/REP/87/26. 15. Rechcigl, M. (1977). CRC Handbook series in nutrition and food. CRC press. 16. Rechcigl, M. (1981). Handbook of nutritional supplements in a functional context. CRC press. 17. Sena S. De Silva, Trevor A. Anderson. (1995). Fish Nutrition in Aquaculture, Chapman & Hall Aquaculture Series, London
Teaching Methodology	Classwork, Discussion, Self-Study and Assignment
Evaluation Method	30% Internal assessment based on class attendance, assignments and internal examination. 70% External based on University examination
Course Code	202
Course Title	Fish Genetics and Biotechnology
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)
Effective From	June 2020
Purpose of Course	The purpose of the course is to develop the skill about executing the different scientific methods of Fish genetics and biotechnology in field of Aquatic Biology with reference to improving aquaculture production and quality.
Course Objective	To make the students acquainted regarding fundamentals of molecular biology, principle of fish genetics, fish biotechnology, bioinformatics, nanotechnology and its applications.
Course Outcomes	CO1 :Inculcate students about fundamentals of Molecular biology like structure of DNA and RNA, DNA replication, mutation, transcription and translation to understand formations, actions, and regulations of various parts of cells which can be used to efficiently target new drugs, diagnose disease and understand the physiology of the cell. CO2: Explain students about structure of chromosome with help of banding techniques, fish as a cytogenetic model, application of molecular biology techniques like sex-reversion, chromosomal manipulation and transgenic fish for increasing aquaculture production by genetically modifying

	aquatic organisms and fish population management. CO3: This paper describes scope and application of fish biotechnology with the help of different techniques like PCR, cryopreservation and vaccination which helps in molecular and genetic diagnostics as well as genetic upgradation of cultivable species with minimum risk of infection. CO4: Train students to deal with bioinformatics and nanotechnology in the field of Aquatic Biology. It provides the skillful digital database information which certainly required for aquatic resource management.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
	CO4						
Pre-requisite	Basics of Genetics and Biotechnology						
course Content	Unit - I Fundamentals of Molecular Biology DNA as a genetic material, DNA replication and Mutations, Structure and Types of RNA, Transcription, protein synthesis. Recombinant DNA technology, DNA barcoding. Unit - II Principle of fish genetics Chromosome study: Fish chromosome preparation method, Banding techniques, Fish as a cytogenetic model. Genetic manipulation: Sex-reversion and sex control, Chromosomal manipulation. Transgenic fish Unit - III Fish Biotechnology Scope and application PCR technique, Cryopreservation, Vaccination in fish biotechnology. Hybridization: Significance of hybridization, modification in genomic structure of hybrid offspring, characteristics of hybrids, natural and artificial hybridization. Unit - IV Bioinformatics: Use of computers in Bioinformatics, Search engines and Databases, Application of Bioinformatics in Aquatic Biology. Nanotechnology: Introduction, History, Applications in aquatic biology.						
Reference Books	1. Arthur M. Lesk (2003). Introduction to Bioinformatics, Oxford Uni.Press. 2. Falcon, D.S. (2000). An Introduction to quantitative genetics ELBS publisher, England. 3. Lakra W.S. (2000). Fish Genetics and Biotechnology CIFE, Mumbai. 4. Lewin Benjamin (2008). GENES- IX London; Jones & Bartler Publ. 5. Michel & Notre C.D. (2003). Bioinformatics, A Beginners Guide Wiley Publ.Inc. 6. Murthy C.V.S. (2004). Bioinformatics Himalaya publishing House.						

	7. Rashidi H. H., and L.K. Buehler (2003). Bioinformatics Basics: Applications in Biological sciences and Medicine. 8. Sinnit E.W., Dunn L.C. and Dobzhansky, T. (1998). Principle of Genetics, Macgrodo hillpublishing company Ltd. 9. Krebs & Jocelyn. (2013). Lewin's Essential Genes. Jones &Barlett Learning. 10. Lakra, W.S., S.A.H. Abidi, S.C. Mukherjee and S. Ayyappan (2004). Fisheries Biotechnology. Narendra Publ. House. 11. Lewin & Benjamin. (2008). Genes IX. Jones &Barlett publishers, Massachusetts. 12. Lodish, H., A. Berk, P. Matsudaira, C.A. Kaiser, M. Krieger, M.P. Scott and C.G. Lutz (2003). Practical Genetics for Aquaculture, Wiley-Blackwell. 13. Lehninger, A.L. (2004). Principles of Biochemistry, 4th edition, W.H Freeman and Company. 14. Muralidharan, V.S. & A. Subramania. (2009). Nanosciences& technology, Ane Books Pvt. Ltd., New Delhi.						
Teaching Methodology	Classwork, Discussion, Self-Study, Assignment, ICT						
Evaluation Method	30% Internal assessment based on class attendance, assignment and internal examination, 70% External based on University examination.						
Course Code	203						
Course Title	Aquatic Pollution and Toxicology						
Credit	4						
Teaching per Week	4 Hrs						
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)						
Effective From	June 2020						
Purpose of Course	The purpose of the course is to develop concepts of water pollution and toxicological studies. Also to learn how to manage aquatic resources.						
Course Objective	To develop skill in students to identify pollution load, biomarkers in aquatic resource and how to develop bioassays. To acquire knowledge to monitor aquatic resources and conduct toxicity test.						
Course Outcomes	CO1 : To know about the sources of water pollution, fate of pollutants in Aquatic ecosystems, Effluents and their treatment and concept of Toxicology. CO2 : Acquire knowledge to monitor pollution load, control and prevention of pollution by various methods. CO3: Develop the skill to conduct Toxicity test i.e. Bioassay, Biostimulation and Bioinhibition CO4: Acquire skill to identify Biomarkers as water quality monitoring tool.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
	CO4						

Pre-requisite	Basics of Biology and chemistry
Course Content	Unit – I General Introduction: Water pollution: sources, Fate of pollutants in Aquatic system, their monitoring and control in water bodies. Interaction of pollutants and factors affecting toxicity Unit - II Effluents and their treatment: Sewage, industrial and agricultural discharges. Characteristics of effluent, Biological concern: Eutrophication, Bioaccumulation and Biomagnification, waste water treatment methods. water quality standards (Stream and effluent standards) and water quality indices. Unit - III Pollution: Thermal pollution, Oil pollution, Radioactive pollution, Detergent pollution- Their sources, fate, biological effects and management. Acid rain and its effects in aquatic system Role of Central Pollution Control Board (CPCB) and Gujarat Pollution Control Board (GPCB) in management of pollution. Unit - IV Toxicology: Basic toxicological concepts and principles, classification of toxicants-metals, pesticides, teratogens, xenobiotics, toxin of animal and plant origin, Toxicity test procedures: Bioassay, Biostimulation and Bioinhibition, Biomarkers as water quality monitors.
Reference Books	1. Agarwal, S.K. (2008). Water pollution, ABH publishing corporation, New Delhi 2. Albert, A. (1951). Selective toxicity, John Wiley and Sons, Chichester 3. Cremllyn, R. (1978). Pesticides, John Wiley and Sons, Chichester 4. Ghosh, G.K. (2002). Water of India, A.P.H. publishing corporation, New Delhi 5. Goel, P.K. (2006). Water pollution, New age international publishers, New Delhi. 6. Kukal S.S. and Dhaliwal, G.S. (2005). Essential of environmental science, Kalyani Publishers, Ludhiyana 7. Prabhakar, V.K. (2001). Marine ecology & pollution, Anmol publications New Delhi. 8. Rand, G.M. (1995). Fundamentals of Aquatic toxicology, Taylor and Francis, Washington, D.C. 9. Rao, M.K. (2007). Environmental pollution & Toxicology, Manglam publishers, Delhi. 10. Salpekar, A.C. (2008). Marine pollution, JnanadaPrackashan, New Delhi 11. Schmitz, R.J. (1995). Introduction to water pollution Biology, Gulf publishing company, Texas

	12. Sinha, P.C. (1998). Marine pollution, Anmol Publications, New Delhi 13. Trivedi, R.K. and Goel, P.K.(1984). Chemical & Biological methods for water pollution studies, Environmental publications, Karad 14. Trivedi, R.K. (2001). Aquatic Pollution & Toxicology, ABD publishers, Jaipur.						
Teaching Methodology	Classwork, Discussion, Self-Study, Assignment, ICT						
Evaluation Method	30% Internal assessment based on class attendance, assignment, internal examination, etc. 70% External based on University examination						
CourseCode	AQB 204						
Course Title	Biostatistics, Extension Education and Fisheries Legislation						
Credit	4						
Teaching per week	4						
Minimum weeks per semester	16						
Effective from	June 2020						
Purpose of course	The purpose of the course is to develop the analysis methodology, dissemination methods of the innovations and regulations of the fisheries resources which would be helpful for the formation of the database and resources management.						
Course objective	To acquaint the students about the biostatistical methods, innovation dissemination and fisheries resources regulations.						
Course Outcome	CO1. Theapplication of bio-statistical analysis in the field of aquatic biology help for resource management. CO2. The innovations are not essential but its application at needful field are also useful and it would be possible to teach the students about fisheries extension education. CO3. The fisheries extension education essential to develop the communication skill, training strategies, contact methods etc. certainly help to disseminate the innovation and technologies to beneficiaries. CO4. The inland fisheries policies implemented by the state and central government are elaborated to students to improve the knowledge and technical skill. CO5. The explanation regarding the marine fisheries regulation andinternational law of the sea develop the knowledge and awareness for fisheries management.						
Mapping of COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
	CO4						
	CO5						
Course prerequisite	Biological data of fish, communication and contact tools and basic equipments for aquaculture.						
	Unit I (Hrs. 12)Fundamental of Biostatistics: Biostatistics Introduction, Sampling techniques, Standard deviation,						

	Standard error, co-efficient of Variation, Correlation and regression, Hypothesis testing (Student test, 't' test, X^2 test and 'f' test), Analysis of variance (ANOVA) Unit II (Hrs. 14) Fisheries Extension Education: Fisheries extension education: Introduction, principle, functionaries, Extension methods, Diffusion of innovation, communication, training strategies in transfer of technologies, role of farmers-extension and research linkages. Entrepreneurship development process. Cooperatives Principles, role, structure and organisations. Unit III (Hrs.12) Inland and Marine Fisheries Regulation and Development: Inland fisheries Act, Leasing policies for water bodies, Biodiversity Act, Aquaculture Authority Act, Maritime Zones of India Act 1981. Coastal Regulation Zone (CRZ) and Integrated Coastal Zone Management (ICZM) in the context of aquaculture sustainability. Unit IV (Hrs. 07) International Law of the Sea: Historical perspectives, Exclusive Economic Zone, Regulatory and developmental issues concerning deep sea fishing – Guidelines for operation Indian deep sea fishing vessels in Indian EEZ.
References	1. Branson, E.J. (2008). Fish welfare. Pub. Blackwell Publication, Oxford. 2. Malhotra, S.P. & Sinha, V.R.P. (2007). Indian Fisheries and Aquaculture in A Globalizing Economy, 2 Vols. Narendra publishing house New Delhi. 3. Coupes, A., and Edgar, H. (1987). The marine environment and sustainable development; law, policy and science law of the sea institute, Honolulu. 4. G.W. (2009). Towards Sustainable Fisheries Law: A Comparative Analysis. IUCN Environmental Policy and Law Paper No. 74. IUCN publication Service, Switzerland 5. O'Connell, D.P. (1982). The international law the sea. Clarendon press. 6. William E, David F, and Elly G. (2001). Legislating for Sustainable Fisheries : A Guide to Implementing the 1993 FAO Compliance Agreement and 1995 UN Fish Stocks Agreement Published by World Bank. 7. Biradar, R.S. (1986): Course manual on fisheries statistics, Central Institute of Fisheries Education, Mumbai 8. Dahama, O.P. (1983): Extension and rural welfare. Ramprasad and Son's, Agra 9. Dhote, A.K. (1989): Fisheries Management and Extension: Inland fisheries, instructional cum practical manual (VI) NCERT, New Delhi 10. Lynton P.R. and Pareek, U. (1978): Training for development, Kumarian Press, 29 Bishop Road, West Hartford, Connecticut 06119 11. Panse, V. G. and Sukhatme, P.V. (1978): Statistical methods for agricultural workers, ICAR, New Delhi. 12. Raghava Rao, D. (1983): Statistical techniques in agricultural and biological research, Oxford and IBH Publishing Co., Mumbai 13. Ray, G.I. (1991): Extension communication and management, Naya

	Prakash, Kolkatta						
Teaching methods	Chalk and talk, Discussion, Videos, Self-study, Seminars and Assignments						
Evaluation methods	Internal assessment (30%) based on the internal exam, attendance and assignments. External assessment (70%) based on the university examination at the end of the semester.						
Course Code	205						
Course Title	Biochemistry, Genetics and Biotechnology						
Credit	4						
Teaching per Week	4 Hrs						
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)						
Effective From	June 2020						
Purpose of Course	The purpose of the course is to develop the skill about executing the different scientific methods of Biochemistry, Genetics and biotechnology in field of Aquatic Biology with reference to improving aquaculture production and quality.						
Course Objective	To make the students acquaint aboutbiochemical quantification of fish and feed, Quantitative estimation of DNA, staining of DNA and RNA, banding techniques, Demonstration of PCR, COMAT ASSAY and Electrophoresis, Information retrieval from sequence databases and sequence alignment using BLAST.						
Course Outcomes	CO1 :Biochemical quantification of fish and feed is essential for consumption purposeto make legitimate comparisons of best suitable feeds and fish on the basis of nutritional requirements of human being. CO2: Quantitative estimation of DNA, staining of DNA and RNA as well as study of banding techniques helps in aquatic resource management. CO3: Demonstration of PCR, COMAT ASSAY and Electrophoresis helps in molecular and genetic diagnostics. CO4: Information retrieval from sequence databases and sequence alignment using BLASTprovides the skillful digital database informationfor aquatic resource management. CO5: Explore students through field and institutes visits which make them to understand the interaction between their chosen fields of study to the rest of the world. It also provides an exposure to students about practical working environment.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
	CO4						
	CO5						
Pre-requisite	Basics of Biochemistry, Genetics and Biotechnology						
Course Content	1. Biochemical quantification of (Protein, Lipid, Sugar and Ash) in fish.						

	- Biochemical quantification of (Protein, Lipid, Sugar and Ash) in feed. - Feed formulation by Pearson square formula. - Demonstration: Isolation of DNA from aquatic organism. - DNA Staining using Schiff's reagent in aquatic plants. - RNA staining by Pyronine-Y and toluidine blue in aquatic plants. - Study of banding techniques with the help of images. - Demonstration : PCR, COMAT ASSAY, Electrophoresis. - Information retrieval from sequence databases. - Sequence alignment using BLAST. - Field and Institutes visit
Reference Books	- Biology Genetics Molecular Biology (2009) by Dipak Kumar Kar and Soma Halder, New Central Book Agency, Kolkata. - Cell Biology (2008) by Satyesh Chandra Roy and Kalyan Kumar De, New Central Book Agency, Kolkata. - Arthur M. Lesk (2003). Introduction to Bioinformatics, Oxford Uni.Press. - Lakra W.S. (2000). Fish Genetics and Biotechnology CIFE, Mumbai. - Murthy C.V.S. (2004). Bioinformatics Himalaya publishing House. - Sinnit E.W., Dunn L.C. and Dobzhansky, T. (1998). Principle of Genetics, Macgrodo hillpublishing company Ltd. - Lodish, H., A. Berk, P. Matsudaira, C.A. Kaiser, M. Krieger, M.P. Scott and C.G. Lutz (2003). Practical Genetics for Aquaculture, Wiley-Blackwell.
Teaching Methodology	Practicalperformance and demonstration, Discussion, Self-Study, ICT, Field visit
Evaluation Method	30% Internal assessment based on class attendance, assignment and internal examination, 70% External based on University examination.

Course AQB-206 Aquatic Pollution and Biostatistics

Course Code	206
Course Title	Aquatic Pollution and Biostatistics
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)
Effective From	June 2020
Purpose of Course	The purpose of the course is to develop skill for water pollution monitoring, toxicity test and biostatistics to manage aquatic resources.
Course Objective	To develop skill to manage water pollution monitoring.

	To develop skill to find impact of pollution on aquatic organisms. To implement the statistical analysis at different levels.						
Course Outcomes	CO 1: Students will be able to develop basic concept of pollution and biostatistics to manage aquatic resources. CO 2: Develop the skill to estimate amount of pollutant from water and sediment to check its quality for water resource management. CO 3: Capable to find impact of pollution on fish and their remedies. CO 4: Develop skill to prepare permanent histological and histopathological slide of fish organs and their observations. CO 5: Conduct Bioassay test for toxicity. CO 6: Carry out statistical analysis such as Standard deviation, CV, SE, Independent t-test, Paired t-test, Chi square test, co-relation, regression, ANOVA and apply in the field of Aquatic Biology. CO 7: Apply developed skill for prevention and control of water pollution.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
	CO4						
	CO5						
	CO6						
	CO7						
Pre-requisite	Basics of Biology and chemistry						
Course Content	• Estimation of BOD and COD • Colorimetric estimation of inorganic phosphate, nitrate, nitrite from water and sediment • Preparations and observations of slides for micronuclei test in fish blood • Histology : Fixation, embedding sectioning and staining of fish tissues • Histological and histopathological observations of fish tissue • Demonstration: Observation of behavioral changes and determination of LC₅₀ • Standard deviation, CV, SE, Independent t-test, Paired t-test, Chi square test, co-relation, regression, ANOVA. • Field and Institutes visit						
Teaching Methodology	Classwork, Discussion, Self-Study, Practical, Demonstration, Field Visit, Institute visit						
Evaluation Method	30% Internal assessment based on class attendance, internal examination, etc. 70% External based on University examination						

AQB 3rd Semester

Course Code	301

Course Title	Fish Physiology, Endocrinology & Disease Management						
Credit	4						
Teaching per Week	4 Hrs						
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)						
Effective From	June 2020						
Purpose of Course	The main purpose of the course is to make students acquainted with concepts of fish physiology, endocrinology and disease management in fishes.						
Course Objective	The objective of the course is to make the student capable of understanding the general physiological functions like respiration, digestion, excretion, circulation, osmoregulation, reproduction and development and endocrinology in fishes. The course also make student capable of managing fish diseases.						
Course Outcomes	CO1: To understand the concept of fish physiological processes (digestion, respiration, circulation, excretion, osmoregulation, reproduction and development), endocrinology, fish diseases and health management). CO2: Helps student develop the skill for health and disease management in fish farming sector CO3: Trains student for applying hormonal knowledge for sex reversal in fishes CO4: Explain students about recent technologies used for managing and handling diseases fish CO5: Trains students to develop career in fish management.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
	CO4						
	CO5						
Pre-requisite	Basics of biology and chemistry						
Course Content	Unit - I ➤ Digestion: Digestive system of fish and associated digestive glands (liver, pancreas and gall bladder), Mechanism of digestion ➤ Respiration: Structure and function of gills, Mechanism of respiration, Hemoglobin – Oxygen Uptake and Dissociation, accessory respiratory organs Unit - II ➤ Circulation: Blood and its components. Structure of heart and function ➤ Excretion : Structure and function of kidney, nitrogenous end products and pattern of their excretion ➤ Osmoregulation : Introduction, Osmoregulation in fresh water, brackish water and marine water fish						

	Unit - III ➤ Reproduction & Development: Reproductive system of fish, Structure and function of gonads, Fecundity, Fertilization, Incubation, Hatching, Larvae and Metamorphosis ➤ Endocrinology: Hormonal control of pineal, thyroid, pituitary gland in fishes, pancreatic hormone in fishes, Endocrinology of ecdysis in crustacean. Role of hormones in sex reversal in fish. Unit – IV ➤ Fish Diseases & Health Management ➤ Pathogenic diseases: symptoms and control Bacterial, Fungal, Viral diseases in fin fishes & shell fishes ➤ Parasitic diseases: symptoms and control ➤ Protozoan, Crustacean, and Worm diseases in fin fishes & shell fishes ➤ Non-pathogenic diseases: symptoms and control ➤ Algal, Environmental, Nutritional and Hereditary disease
Reference Books	1. Evans, Devid H. (1998): Physiology of Fishes. R.R. Bowker Company, book trade association of Philadelphia. 2. Hoar, W. S. and Randal, D. J. (1993): Fish endocrinology Vol. I to VII. Academic press, INC (London) Ltd. 3. Hoar, W. S., Randal, D. J. and Farrell, A. P. (1992): Cardiovascular system, Vol. 12, Part 2 of Fish Physiology, Academic Press. INC London Ltd. 4. Khanna S.S. (1989): An Introduction to Fishes. Central Book Depot, Allahabad. 5. Khanna S.S. and Singh, H.R. (2003): A text book of fish biology and fisheries. Narendra publishing house, New Delhi – 110 006. 6. Nikolsky, G.Y. (1989): The ecology of fishes. Academic Press, London. 7. Pandey A.K. and Sandhu G.S. (1992): Encyclopedia of fishes and fisheries of India Vol. I & IV, Amol publication, New Delhi. 8. Prosser, C. L. (1973): Comparative Animal Physiology, W. B Saunders Co., Philadelphia 9. Smith, L.S. (1982): Introduction of fish physiology. Narendra publishing house, New Delhi. 10. Yadav, B. N. (2006): Fish & Fisheries, Daya Publishing House, New Delhi. 11. Yadav, B.N. (1995): Fish endocrinology. Daya Publishing House, New Delhi. 12. Anderson, D.P. (2003): Text book of fish Immunology, Narendra publishing house, Delhi 13. Austin, B. (1999): Bacterial fish pathogen-Disease of farmed and wild fish, Paraxispublishing Ltd., U.K 14. Conroy, D.A. (1997): Textbook pf fish diseases, Narendra publishing house, Delhi 15. Cornell, J.J. (1995): Control of fish quality, Fishing new books

	16. Duijn, C.V. (2000): Diseases of fishes, Narendra publishing house, Delhi 17. Inglis, V. (1993): Bacterial diseases of fish, Blackwell science Ltd., Oxford, U.K. 18. Roberts, R.J. (1982): Microbial diseases of fish, Society for general microbiology academic press, New York, USA 19. Roberts, R.J. (1978): Fish pathology, Baillere Tindall, Landon 20. Sharma, O.P. (2009): Handbook of fisheries and aquaculture, Agrotech publishing academy, Udaipur 21. Wedemeyer, G.K. (1999): Environmental stress and fish diseases, Narendra publishing house, Delhi 22. Woo, P.T.K. and Leatheland, F. (1998) : Fish diseases and disorders, CABI publishers, Wallingford						
Teaching Methodology	Classwork, Discussion, Self-Study, and Assignment						
Evaluation Method	30% Internal assessment based on class attendance, assignments, and internal examination. 70% External based on University examination						
Course Code	302						
Course Title	Fisheries Technology						
Credit	4						
Teaching per Week	4 Hrs						
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)						
Effective From	June 2020						
Purpose of Course	The purpose of the course is to introduce different fisheries technologies and its applications which would help and develop the skill among students for development of fisheries sector in scientific way.						
Course Objective	To introduce different fisheries technologies which would be helpful in finding, harvesting, handling, processing and distribution of aquatic resources and their products.						
Course Outcomes	CO1 :Explain students about hatcheries and induced breeding which gives idea about fisheries management in concern to get pure and desired spawn of certain species of fishes and habitat conservation. CO2:Students will be aware regarding transportation as well as age and growth of fishes which are essential for sustainable fish farming and population studies. CO3: The students will be able to acquire the knowledge about fishing techniques to catch fishes in large scale from waterbodies efficiently for fishery research and management. CO4: This paper deals with post harvest technology which helps to maintain quality (appearance, texture, flavor and nutritive value) to protect food safety, and to reduce losses between harvest and consumption.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						

	Ichthyology (Fish and fisheries), S. Chand and company, New Delhi. 7. Harrison, P.J. and Parsons, T. R. (2000). Fisheries oceanography, Blackwell science. 8. Jhingran, V.G. (1991). Fish and fisheries of India, Hindustan Publishing Corporation, Delhi. 9. Joseph, J. (2009). Post harvest technology of freshwater fish, Central Institute of fisheries technology, Cochin. 10. Khana, S.S. and Singh, H.R. (2003). A text book of fish biology & fisheries, Narendra publishing house, Delhi. 11. Krjstjonsson, H. (1959). Modern fishing gear of the world Vol. I, II & Vol. III, Fishing news (books).Ltd., England. 12. Malvi, S. (2008). Fish genetics, SBS publishers and distributors Pvt. Ltd., New Delhi. 13. Meenakumari, B. (2009). Handbook of fishing technology, Central Institute of fisheries technology, Cochin. 14. Moyle, P.B. (2002). Fishes-An Introduction to Ichthyology, prentice hall Inc NJ 07458. 15. Nikolsky, G.V. (1999). Ecology of fishes, Allied scientific publishers. 16. Rao, D.P. (1995). Remote sensing for earth resources, Association of exploration geophysicists, Hyderabad. 17. Rath, R. K. (2000). Freshwater aquaculture, Scientific publishers, Jodhpur. 18. Regenstein, J.M. and Regenstein, C.E. (1997). Introduction to fish technology, CBS publishers and distributors, New Delhi. 19. Sabins, F.F. (1997). Remote sensing, Principles and interpretation, W.H. Freeman & Co., New Delhi. 20. Sharma, O.P. (2009). Handbook of fisheries and aquaculture, Agrotech publishing academy, Udaipur. 21. Sreekrishna, Y. and Shenoy, L. (2001). Fishing gear and craft technology, Indian Council of Agricultural Research, New Delhi. 22. Welcomme, R.L. (2007). Inland fisheries, Discovery publishing house, New Delhi. 23. Yadav, B.N. (1997). Fish and fisheries, Daya publishing house, Delhi. 24. Yadav, N.K. (2009). Management practices in fish farming, Manglam publications, Delhi.
Teaching Methodology	Classwork, Discussion, Self-Study, Assignment, ICT, Field visit
Evaluation Method	30% Internal assessment based on class attendance, assignment and internal examination, 70% External based on University examination.
Course Code	303
Course Title	Freshwater Aquaculture
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)

Effective From	June 2020						
Purpose of Course	The purpose of the course is to gain knowledge about culture techniques for freshwater organism for commercial purpose and farm construction.						
Course Objective	To gain knowledge for aquafarm design and construction. To acquire knowledge for culturing freshwater organisms for commercial purposes.						
Course Outcomes	CO1: Students will be familiar about advancement in aquaculture, pond farm preparation, criteria for selection of species for aquaculture, culture techniques for freshwater aquatic organisms, equipment used in aquafarm. CO2 : Student will develop skill for freshwater culture techniques for freshwater animal, microalgae and vascular plants. CO3 :Students will be aware regarding best aquaculture management practices, improvement in fish quality and about more revenue generation. CO4 : Student will be able to apply use of microalgae and higher vascular plants for waste water treatment.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
	CO4						
Pre-requisite	Basics of Biology and chemistry						
Course Content	Unit – I: Introduction and Pond farm Preparation: Definition, scope of aquaculture, Recent Advances in aquaculture, Criteria for species selection for aquaculture Selection of site for fish farm, component pond for fish farm, designing of farm: design , size, shape and layout of farm, construction of farms: method of construction, construction material, dike design and construction, water supply and drainage systems, aerator, feeders and other equipment used in farm Unit – II: Culture Techniques: Carp culture (IMC) with reference to Composite fish culture, Integrated fish farming and Sewage fed fisheries Culture of catfishes: Rearing of grow outs, harvesting Culture of freshwater prawns: culture systems, rearing of grow outs and harvesting Fresh water pearl culture: Biomineralization, Implantation Methods, Collection of mussels, Pre-operative conditioning, Mussel surgery, Post-operative care, Pond culture, Food and Feeding, Pearl harvest Unit-III: Microalgae: Taxonomy of economically important micro algae. Distribution, morphology, reproduction, life cycle, growth physiology and Culture techniques and Importance of <i>Spirulina</i> & <i>chlorella</i> . Application of						

	microalgae in waste water treatment as bioremediation Unit-IV: Freshwater Vascular plants: Taxonomy of economically important freshwater higher vascular plants. Distribution, morphology, reproduction, life cycle, growth physiology and Culture techniques of freshwater higher vascular plants (<i>Trapa</i>, <i>Typha</i>), Products of higher vascular plants, Reed bed technology in waste water treatment
Reference Books	1. Bardach, E.J. Rhyther, J.H. & W.O. Mc. Larney. (1972): Aquaculture. The Farming and Husbandry of freshwater and Marine Organisms. John Wiley and Sons. New York 2. FAO, (1992): Manual of seed production of carps 3. James, P McVey, (1983): Handbook of Mariculture, CRC press, Florida 4. Jhingran, V. G. (1991) Fish and Fisheries of India, Hindustan Publishers 5. Klontz, G.W., Downey, P.C. and Focht, R.L. (1979): A Manual for Trout and Salmon Production - The Sterling Cup Manual, University of Idaho, Moscow, ID. 6. Landau, M. (1992): Introduction to Aquaculture, John Wiley and Sons, New York. 7. Leitritz, E. and Lewis, R.C. (1984): Trout and Salmon Culture, State of California, Department of Fish and Game. 8. Mathew, L. (1992): Introduction to Aquaculture, John Wiley and Sons, INC, New York 9. Pillay, T.V.R. and Kutty, M.N. (2005): Aquaculture – Principles and Practices, Black Well Sciences, U.K. 10. Rath, R. K. (2000): Freshwater Aquaculture, Scientific Publishers, Jodhpur 11. Lewis Hansard Tiffany (1968): Algae the Grass of many waters. Blackwell scientific publications Ltd., Oxford. 12. Pixon, P.S. (1982): The Biology of Rhodophyta. Oliver and Boyd, Edinburgh. 13. Round, F.E. (1981): The Ecology of the Algae, Cambridge University Press.
Teaching Methodology	Classwork, Discussion, Self-Study, Assignment, ICT, Field visit

Evaluation Method	30% Internal assessment based on class attendance, assignment, internal examination, etc. 70% External based on University examination						
Course Code	AQB: 304						
Course Title	Marine Water Aquaculture						
Credit	4						
Teaching per week	4						
Minimum weeks per semester	16						
Effective from	June 2020						
Purpose of course	The purpose of the course is to introduce to the students about different aquaculture technologies and methods of finfishes, shellfishes and many other aquatic organism farming in the brackish water and marine water. The farming methods deal under this course certainly helpful to develop the entrepreneurship and employability among the participants.						
Course objective	To introduce different technologies and farming methods of aquatic organism to harvest the aquatic resources.						
Course outcome	CO1. The course regarding the brackish water aquaculture open the window of entrepreneurship for the students. CO2. This paper deals with the detail culture practices of the finfishes and shell fishes provide the detail idea about the culture and management of the coastal and marine resources. CO3. The shrimp aquaculture provide the better opportunity to use the existing resources and increase the employment and national income CO4. The marine aquaculture enhance the job opportunities, supports resilient working waterfronts and provide the opportunity in new national and international trading.						
Mapping of COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
	CO4						
Course prerequisite	Specimens of fin fish, shell fish and sea weeds, models of fish farming systems						
	Unit I (Hrs. 10) Brackish water finfish culture: Introduction, culture methods, harvesting and marketing of important Brackish water finfish (Mullet, Milk fish, Sea bass and peal spot) Unit II (Hrs. 15) Shrimp culture: Types of shrimps, Preparation and management of shrimp farm (pond preparation, seed selection and stocking, water quality, feeding, diseases, bio-security, harvesting and marketing). Effluent treatment plant in shrimp farming, Recent advances in shrimp farming (Two phase, Three phase, Race way culture, biofloc and RAS). Unit III (Hrs. 12) Mari culture: Introductions, types and advances in Mari culture. Edible oyster culture, Pearl oyster culture, techniques of pearl production,						

	Lobster and Clam culture Unit-IV (Hrs. 08) Marine water plants –Seaweeds: Biodiversity of Seaweeds along the coast of India and Gujarat, Taxonomy of economically important seaweeds. Distribution, morphology, reproduction, life cycle, growth physiology and Culture techniques of sea weeds (<i>Gracilaria, Caulerpa</i>), Products from seaweeds.
References	1. Bardach, E.J. Rhyther, J.H. and W.O. McLarney (1972): Aquaculture. The Farming and Husbandry of freshwater and Marine Organisms. John Wiley and Sons. New York 2. Brown, E.E., Gratzek, J.B. (1980): Fish Farming Hand Book. AVI Publishing Company, West port USA 3. Fast, A.W. and Lester, L.J. (1992): Marine Shrimp culture – Principles and Practices. Elsevier Science Publishers, Amsterdams 4. James, P. McVey (1983): Handbook of Mariculture Vol. I. Crustacean Aquaculture. CRC Press. Inc. Florida; 442 pp. 5. Korring, P. (1976): Farming of marine fishes and shrimp. Elsevier Science Publishers, NY 6. Landau, M. (1992): Introduction to Aquaculture, John Wiley and Sons, New York. 7. Oren, O.H. (1981): Aquaculture of Grey Mulletts. Cambridge University Press, London 8. Pillay, T.V.R. and Kutty, M.N. (2005): Aquaculture – Principles and Practices, Black Well Sciences, U.K. 9. Takeo, I. (1978): Aquaculture in shallow seas. Progress in shallow. Sea culture, Amerind Publishing Co. Pvt. Ltd. New Delhi. 613 pp. 10. Chapman, V.J. and Chapman, P.J. (1980): Seaweeds and their uses. Chapman and Hall with Methuen Inc., New York. 11. Dawson, R.Y (1966): Marine Botany. An Introduction Holt, Reinhart and Winston Inc., U.S.A. 12. Desikachary, T.V. (1975): Marine Plants. C.S.I.R., New Delhi. 13. Dring, M.J. (1982): The Biology of Marine Plants. Edward Arnold Publishers, London. 14. Kapraun, D.F. (1980): An illustrated guide to the benthic marine algae of coastal North Carolina- Rhodophyta. University North Carolina Press.
Teaching methods	Chalk and talk, Discussion, Videos, Self-study, Seminars and Assignments
Evaluation methods	Internal assessment (30%) based on the internal exam, attendance and assignments. External assessment (70%) based on the university examination at the end of the semester.
Course Code	305
Course Title	Fish physiology, Etiology and Fisheries technology
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per	15 (Including Classwork, examination, preparation, holidays etc.)

Semester							
Effective From	June 2020						
Purpose of Course	The purpose of the course is to develop concept and skill regarding fisheries technology and etiology used in aquaculture sector to manage aquatic resources.						
Course Objective	To develop skill to find feeding, breeding, growth aspects of fishes. To develop skill to identify diseases among fishes. To develop concept about uses of technology for capture and culture fisheries as well as use of products and byproducts of fishery at commercial level.						
Course Outcomes	CO 1: Aware about new emerging technologies for the development of fisheries and its application in the fisheries. CO 2: Students will be able to develop skill to find feeding pattern of fish by dissecting buccal cavity and associate structures (Gill rakers, Buccopharynx), Gut content analysis and GaSI. CO 3: Students will be able to develop skill to measure fecundity, egg diameter and gonadosomatic index, Age and Growth of fin fishes and shell fishes by using of scales and shells, biometry of fish. CO 4: Students will be able to develop skill to estimate quantitative bacterial load in fish and isolate and identify pathogenic bacteria from fish with media preparation. CO 5: Students will be able to identify diseases in fish. CO 6: Gain knowledge of Remote sensing techniques, handling of gears and crafts and its application in fisheries. CO 7: Analyze hematological parameters (RBC, WBC, Hemoglobin content, Hematocrit value) to know the health of the fishes. CO 8: Gain knowledge of fishery products and byproducts and its application in commercial field. CO 9: Gain practical experience through visit to fisheries Organizations / fish markets						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
	CO4						
	CO5						
	CO6						
	CO7						
	CO8						
	CO9						
Pre-requisite	Basics of Biology						
Course Content	- Study of buccal cavity and associate structures (Gill rakers, Buccopharynx) - Gut content analysis and GaSI - Measurement of fecundity, egg diameter and gonadosomatic index - Preparation of media - Quantitative estimation of bacterial load in fish						

	- Isolation and identification of pathogenic bacteria from fish - Study of diseased specimens - Determination of Age and Growth of fin fishes and shell fishes by means of scales and shells. - Biometry of fish - Study of Remote sensing techniques with the help of images. - Study of different gears and crafts(models/ drawing) - Study of hematological parameters (RBC, WBC, Hemoglobin content, Hematocrit value) - Study of fishery products and byproducts - Visit to fisheries Organizations / fish markets						
Teaching Methodology	Classwork, Discussion, Self-Study, Practical, Demonstration, Field Visit, Institute visit						
Evaluation Method	30% Internal assessment based on class attendance, internal examination, etc. 70% External based on University examination						
Course Code	306						
Course Title	Fisheries Technology and Aquaculture Management						
Credit	4						
Teaching per Week	4 Hrs						
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)						
Effective From	June 2020						
Purpose of Course	The purpose of the course is to make students capable of identifying and culture of aquatic organisms. The course will provide onsite experience of processing plants.						
Course Objective	The objective of the course is to make the student capable to identify Sea weeds, fresh water higher vascular plants, aquatic insects, prawn larvae, seed stages, fin fishes, shell fishes, predatory and weed fishes. Students will learn about induced breeding and processing plants.						
Course Outcomes	CO1: Students will be able to Identify Sea weeds, fresh water higher vascular plants, aquatic insects and prawn larvae, seed stages (eggs, spawns, fry and fingerlings), cultivable fin fishes, shell fishes, predatory and weed fishes. CO2: Gain insight on culture of Artemia, Rotifers and Cladocerans CO3: Acquire knowledge on seeds production through Induced Breeding of Ornamental fish/ Catfishes CO4: Acquire skill for production of live feeds, seeds and microalgae in the field of Aquatic biology which can be helpful for entrepreneur and business development CO5: Gain onsite knowledge on processing plants/ hatcheries						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						

academic writing, data collation and analysis skills. CO3: Dissertation helps in paper publications which make students an expert in their field of knowledge.																										
Mapping between COs with PSOs	<table><tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td><td>PSO6</td></tr><tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	CO1						CO2						CO3					
		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6																			
	CO1																									
	CO2																									
CO3																										
Pre-requisite	Basics of biology and chemistry																									
Course Content	-----																									
Reference Books	-----																									
Teaching Methodology	Demonstration, Explanation, Discussion, Self-Study																									
Evaluation Method	30% Internal assessment based on class attendance, internal examination, etc. 70% External based on university examination																									

Course Code	402																									
Course Title	Seminar																									
Credit	6																									
Teaching per Week	6 Hrs																									
Minimum weeks per Semester	16 (Including Seminar, preparation, holidays etc.)																									
Effective From	June 2020																									
Purpose of Course	The purpose of the course is to create an effective learning environment and develop confidence in students.																									
Course Objective	The objective of the course is to bring students together in groups and focusing on some particular subject with active participation.																									
Course Outcomes	CO1: Seminar provides an opportunity for students to discuss and analyse a range of new material, ideas and concepts. CO2: This course is a great chance for the students to improve their language, interaction with experts from the specific field, learn about latest information and new skills related to the concerned topic. CO3: Students will be able to develop English speaking through fluency and conversational skill.																									
Mapping between COs with PSOs	<table><tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td><td>PSO6</td></tr><tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	CO1						CO2						CO3					
		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6																			
	CO1																									
	CO2																									
CO3																										
Pre-requisite	Basics of biology and chemistry																									
Course Content	-----																									
Reference Books	-----																									
Teaching Methodology	Explanation, Discussion, Self-Study																									
Evaluation Method	30% Internal assessment based on class attendance, internal examination, etc. 70% External based on university examination																									
Course Code	403																									

Course Title	Project formulation for Aquaculture Certification and Licensing for Aquaculture							
Credit	6							
Teaching per Week	6 Hrs							
Minimum weeks per Semester	16(Including Project formulation, Certification and Licensing for Aquaculture,examination, preparation, holidays etc.)							
Effective From	June 2020							
Purpose of Course	- The purpose of introducing project formulationfor Aquaculture is to make students capable of examining the project idea from the stand point of its objectives, social impacts as well as financial and technical viability. - The purpose of certification system in Aquaculture is to create awareness among students for ensuring the sustainability of aquaculture products. - The purpose of introducing licensing in Aquaculture is to know about legislative act and detail legal conditions which surround the setting up of an aquaculture farm.							
Course Objective	- The objective of the project formulationfor aquaculture is to get benefit from the desired outcomes and impact. - Certification programs in Aquaculture is to promote sustainable practices it is worthwhile to consider what sustainable aquaculture development, actually implies and how it might be objectively assessed. - The objective of licensing in Aquaculture is to aware students about this important tool in ensuring an orderly development of an aquaculture industry and providing rights.							
Course Outcomes	CO1:Students will be capable of identifying and documenting specific project goals, outcomes, milestones, tasks, costs, and timeline dates specific to the project objectives. CO2:Certification programs creates awareness about environmental, social, food safety, animal health and welfare— each step of the aquaculture production chain. CO3: Aquaculture Licence and the consenting process helps to regulate the aquaculture sector.							
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	
	CO1							
	CO2							
	CO3							
Pre-requisite	Basics of biology and chemistry							
Course Content	-----							
Reference Books	-----							
Teaching Methodology	Demonstration, Explanation, Discussion, Self-Study							
Evaluation Method	30% Internal assessment based on class attendance, internal examination, etc. 70% External based on university examination							

Course Code	404							
Course Title	Study Tour/Project Work							
Credit	6							
Teaching per Week	6 Hrs							
Minimum weeks per Semester	16 (Including Study Tour/Project work, preparation, holidays etc.)							
Effective From	June 2020							
Purpose of Course	The purpose of the course (study tour) is to help students open themselves to many possibilities that are not just contained in one geographical location or culture. Other purpose (project work) is to make students understand about specifies tasks and how goals will be achieved, identifies, what resources will be needed, associated budgets and timelines for completion.							
Course Objective	The objective of the course (study tour) is to visit new places and new environment which are good ways to awaken students' interest and learn by actually doing a hands-on experience. Other objective (project work) is to provide a learning experience in which students have the opportunity to synthesise knowledge from various areas of learning and apply it critically and creatively in research.							
Course Outcomes	CO1: Study tour will give exposure to students to visit different Fisheries Institutes, processing plants, landing centres and Aquaculture farms. CO2: Study tour helps them better to realize the interaction between their chosen fields of study to the rest of the world. CO3: Project work based learning not only provides opportunities for students to collaborate their own learning, but it also teaches them skills such as problem solving and helps to develop additional skills integral to their future, such as critical thinking and time management.							
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	
	CO1							
	CO2							
	CO3							
Pre-requisite	Basics of biology and chemistry							
Course Content	-----							
Reference Books	-----							
Teaching Methodology	Explanation, Discussion, Self-Study							
Evaluation Method	30% Internal assessment based on class attendance, internal examination, etc. 70% External based on university examination							

Name of Program	Master of Science - PHYSICS
Abbreviation	M.Sc.-Physics
Duration	2 Years
Eligibility Criteria	Passed B.Sc.-Physics
Objective of Program	The core objective of the MSc.-Physics programme is to prepare the students for teaching and research in the core and emerging areas of the discipline.
Program Outcome	PO1 : Fundamental Knowledge Enrichment The Students will obtain basic theoretical and Practical knowledge in Physics Sciences. They will be trained to complete tests like UGC-CSIR, NET, GSET, GATE etc.. Successfully. It also makes students capable of using core concepts of physics in conceptualization of domain specific viz Theoretical Physics, Material Science and Electronics. PO2 : Critical Thinking Development The examination pattern for M.Sc. program Physics having the 30% weightage for problem and applications and 70% weightage given to theory. This concept develops the skills of critical thinking, program solving, evaluative learning of various techniques, and understanding the essence of the problem. PO3 : Advanced Emerging Technology Awareness The Syllabus of this program consist of Advanced QM, Advance Materials science, Microelectronics and Microprocessor. So, the students avail the advance knowledge in their resign. Which enrich them through this knowledge of latest technologies that is being used in Industry as well as Research Institute. The continuous syllabi review adds value to the program for the outgoing students and make them ready to face challenging demands of the Industry. PO4 : Advanced Tools Usage Computer laboratory are compulsory for all specification, so their soft skill are developed by programming. LCD project smart class room, PPT and Videos are used for regular teaching. This teaching helps them to apply the advanced tools to solve real world problems. PO5 : Nurturing Project Planning and Management Capabilities The program trains students for designing and conceptualizing the software architecture, planning and managing the product development process of complex and live software projects. It also makes students understand the decision making for selection of appropriate project management capabilities. PO6 : Real World Problem / Project Development Real world project provides the candidates exposure to work in the challenging and demanding environment of the industry. The project development training makes students employable and industry ready. PO7 : Team Work and Leadership Development Trains students to work in a team and also to take leadership of the project management team.

Name of Program	Master of Science - PHYSICS							
Abbreviation	M.Sc.-Physics							
Duration	2 Years							
Eligibility Criteria	Passed B.Sc.-Physics							
Objective of Program	The core objective of the MSc.-Physics programme is to prepare the students for teaching and research in the core and emerging areas of the discipline.							
Program Specific Outcomes	Learning Outcomes: PSO1 : Develop and strengthen the fundamental core concepts that are required to solve complex problems. PSO2 : Develop the professional and entrepreneurship skills that needs independent logical and analytical thinking, teamwork and leadership. PSO3 : Nurture the students to investigate for the design and development of a workable solution for a real world problem through computer program. PSO4 : The Students would be able to realize various applications with proper understanding of linear vector space and matrices, differential equations, special functions, series expansion and integral transforms. The students are enabled to understand the motion of a mechanical system using Lagrange and Hamilton formalisms. The Students would be able to understand the concepts of Quantum Mechanics and capable to solve their problems. The students would be able to explain basic physics and application of different types of electronic devices, familiarization with microelectronics and microprocessor of circuits and to seek career in electronics Industry. The Students would be able to apply ensemble theory to complex problems, analyze the peculiar Gas behavior and explore the in applications using different approximations. Their soft skills may develop by programming laboratory works. PSO5 : Develop students for self-learning and practicing challenging problem solution through Design built and Test experiments. PSO6 : Train students to use advanced knowledge in their design of specifications for science and application domain specific knowledge.							
Mapping between POs and PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
	PO1							
	PO2							
	PO3							
	PO4							
	PO5							
	PO6							
	PO7							
Medium of Instruction	English							

Master of Science – PHYSICS, SEM-I

Course:	PH-411: Mathematical Methods of Physics						
Course Outcomes	CO1 : At the end of the course, the students will be able to use different mathematical methods to study problems in non-linear sciences. CO2 : Understand the methods to ordinary differential equations. understand the methods to solve Nonlinear Schrodinger type equations CO3 : Understand the concepts and application of solutions.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						

Course:	PH-412: Classical Mechanics						
Course Outcomes	CO1 : The end of the course, the students will be able to understand. CO2 : The basic concepts on Classical Mechanics CO3 : The theorems relating to the nonlinear bodies. CO4: The various aspects of dynamics and oscillations of bodies.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
	CO4						

Course:	PH-413: Measurement, Instrumentation and Experimental Planning						
Course Outcomes	CO1 : At the end of the course, the students will be able to acquire the knowledge about the different errors occurring during measurement. CO2 : Understand the principle behind the instrumentation for measurement. CO3 : Identify the various transducers involved in measurement .						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						

Course:	PH-414: General Electronics						
Course Outcomes	CO1 : At the end of the course, the students will be able to understand the fundamentals of working of semiconductor and special devices CO2 : Applications of electronic devices						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						

	materials are briefly explain.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						

Course:	PH(M)-535 Practical's						
Course Outcomes	CO1 : At the end of Performing material Practical's students have ability to measurement conductivity crystal growth characterization like hardness etching etc. CO2 : Magnetic Proportion at material and aware of the non destructive technique of liquid Penetration method.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						

Course:	PH(T)-533: Non-linear Dynamics and High-Performance-Computing						
Course Outcomes	CO1 : Most advanced packages and languages are learnt for simulation of Physics problem with theoretical aspects. This course also contains the parallel programming. CO2 : It is essential for all students of computing to understand the architecture and programming of parallel computing.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						

Course:	PH(T)-534: Computational and Simulation methods in Physics						
Course Outcomes	CO1 : More advanced numerical techniques for solving physics problems are learnt and applied in computer simulation of physics problems to learn theoretical aspects and predictabilities. CO2 : students to handle larger simulation problems in physics.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						

Course:	PH(T)-535 Practical's						
Course Outcomes	CO1 : Some of the numerical techniques and simulation techniques learnt in the theory course PH(T)-534 are practiced in this lab course. CO2 : A good hand on experience in FORTRAN and C programming is gained.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						

Master of Science – PHYSICS, SEM-IV

Course:	PH- 541: Physics of Lasers and Lasers Applications						
Course Outcomes	CO1 : At the end of the course work, the student has to knowledge of the basic theory behind Laser Operation and Its properties throughout. CO2 :the treatment has been kept as simple as possible with some familiarity of electromagnetic theory and non-linear optics.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						

Course:	PH-542 : Atomic and Molecular Physics						
Course Outcomes	CO1 : The course presents unifies account of physics of atoms and molecules from a modern viewpoint. CO2 : At the end of the course, the students deal with of material on basic atomic physics, including atomic structure, the optical and X-ray spectra of atoms, the interaction of atom with electric and magnetic fields.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						

Course:	PH(E)-543: MICRO ELECTRONICS						
Course Outcomes	CO1 : The course contains the advance topics of Microelectronics like, NMOS, CMOS, BIFET-BIMOS-BICMOS, ECL and CCD technology. CO2 : Syllabus also giving emphasis on architecture of memory devices likes PROM, EPROM, EEPROM. CO3 : Current sources multi loop feedback Amplifier, and Theory of High Frequency response of Amplifiers are briefly discuss.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						

Course:	PH(E)- 544: Electronic Communication						
Course Outcomes	CO1 : The course provides excitement of the electronic communication field as well as background essential for advanced study in communication systems. CO2 : The practicing students will find it of service to update their knowledge in the field.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						

	CO2						

Course:	PH(E) - 545 Practical						
Course Outcomes	CO1 : As part of this lab course, a full semester project is carried out on some Electronics related problem which is an electronic circuit. CO2: The project in this lab. Includes system designing, PCB designing, using, construction and testing of the circuit. CO3: Good training in planning and executing an Electronic project and technical skill development is the outcome.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						

Course:	PH(M)-543: Properties of Materials						
Course Outcomes	CO1 : At the end of the course, the students will be able to understand the various methods involved in material characterization CO2 : At the end of the course, the students will be able to understand the importance of use of different instruments for material study.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						

Course:	PH(M)-544: Techniques of Material Science						
Course Outcomes	CO1 : After the study of this paper students have capable to fundamental understanding of vacuum Technology and perspective of current vacuum application. CO2 : Also syllabus focused operation and selection of equipment for process Used in semiconductor devices, optical and related thin film technologies.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						

Course:	PH(M) - 545 Practical						
Course Outcomes	CO1 : After Competition of Project Work student have knowledge scientific technique to work on advance and now growth. CO2: Crystallization material and how to synthesis crystalline material and learn to skill about report writing.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						

Course:	PH(T)-543: ADVANCED QUANTUM MECHANICS						
Course Outcomes	CO1 : At the end of the course the students will be able to understand the negativistic equations in central potential, symmentulos and application to many body systems.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						

Course:	PH (T)-544: Group Theory and Quantum Field Theory						
Course Outcomes	CO1 : Discrete and continuous Symmetries In physics are learnt through group theoretical aspects and their applications in solving physics problems. CO2 : Fundamental aspects of quantum field theory and its application in understanding of fundamental interactions are also learnt in this course.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						

Course:	PH(T)-545 Practical						
Course Outcomes	CO1 : As part of this lab course, a full semester project is carried out on some Electronics related problem which is am electronic circuit. CO2:The project in this lab. Includes system designing, PCB designing, using, construction and testing of the circuit. CO3: Good training in planning and executing an Electronic project and technical skill development is the outcome.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						

2

Course:	PH-411: Mathematical Methods of Physics								
Course Outcomes	CO1 : At the end of the course, the students will be able to use different mathematical methods to study problems in non-linear sciences. CO2 : Understand the methods to ordinary differential equations. understand the methods to solve Nonlinear Schrodinger type equations CO3 : Uunderstand the concepts and application of solutions.								
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
	CO1								
	CO2								
	CO3								
	CO4								
	CO5								
	CO6								
Pre-requisite									
Course Content	Unit 1: Linear spaces Vector spaces and subspaces, Linear dependence and independence, Basis and Dimensions, linear operators, linear transformations Unit 2: Matrices and Eigen values: Review of algebraic operations on Matrices, matrix representation, Similarity transformations, Inner product, Orthogonality, Unitary transformations, Eigen values and eigenvectors, Diagonalization using Jacobi method Unit 3: Ordinary Differential Equations Solution in closed form: First order differential equations, Linear equations, Bernoulli's equation, Exact equation, Clearout's equation Second order differential equation: Homogeneous and inhomogeneous forms, variation of parameters method, changes of variable. Power series solution: General consideration, Legendre' equations, Bessel's equation, miscellaneous approximation methods, the W K B method. Unit 4: Special functions Legendre functions,: Rodriguez's formula, Integral representation, Generating function, recursion relations, orthogonality of Legendre's polynomial, Associated Legendre's polynomial ,it's recursion relations and orthogonality. Bessel functions: Generating function, recursion relations and orthogonality of Bessel's function, Hermite functions, spherical harmonics, Lagaurre's functions. Unit 5: Integral transforms Fourier transform, Parseval's theorem, Laplace transforms, Properties of Fourier and Laplace's transforms ,Convolution theorem, other transform pairs, applications of integral transforms. Complex integration: Residue and residue theorem, contour integration. Unit 6: Probability distributions Binomial, poison and Gaussian distribution, properties of distributions Group theory :an introduction, Subgroup and classes, Group representation, Applications:								

	angular momentum; kinetic energy; moment of Inertia tensor; principal axis transformation; Euler's and Lagrangian treatment of rigid body motion; force free motion of a symmetrical top; motion of a heavy symmetrical top with one point fixed. Unit 5: Small Oscillations: Eigen-value equation and principal axis transformation; normal modes and normal coordinates for small oscillations; examples: Free vibrations of a linear tri-atomic molecule, coupled pendulums, double pendulum. Hamilton's Equations of Motion: Legendre transformation and Hamiltonian function; canonical equations of motion; examples; ignorable coordinates and conservation theorems; Cyclic coordinates and Routh's procedure; modified Hamilton's Principle. Unit 6: Canonical Transformations: I Generators of Canonical transformations, Equations of canonical transformations; examples; the Harmonic oscillator; The integral invariance of Poincare and Lagrange and Poisson Brackets; Equation of Motion in Poisson bracket; Infinitesimal canonical transformation; constant of motion and symmetry properties; angular momentum Poisson brackets. Hamilton-Jacobi Theory: Hamilton-Jacobi equation; Hamilton's principal and characteristic function; examples; separation of variables in Hamilton-Jacobi equation; orbit equation for central force problem; periodicity and action angle variables, frequencies of periodic motion.
Reference Books	1. H. Goldstein, Classical Mechanics, 3rd ed., Pearson education, 2nd ed., Addison Wesley, (2002). 2. J.B. Marion and S.T. Thornton, Classical Dynamics of Particles and Systems, 4th ed., Saunders College Publishing, (1995) 3. N.C. Rana and P.S. Joag, Classical Mechanics, TMH, (1991). 4. Y. R. Waghmare, Classical Mechanics, PHI, (1990). 5. V. B. Bhatia, Classical Mechanics, Narosa Pub. House, (1997). 6. R. G. Takwale and P. S. Puranik, Introduction to Classical Mechanics, Tata McGrawHill, (1990). 7. M. R. Spiegel, Theory and Problems of Theoretical Mechanics, Schaum's Outline Series. (2006)
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Course:	PH-413: Measurement, Instrumentation and Experimental Planning								
Course Outcomes	CO1 : At the end of the course, the students will be able to acquire the knowledge about the different errors occurring during measurement. CO2 : Understand the principle behind the instrumentation for measurement. CO3 : Identify the various transducers involved in measurement .								
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
	CO1								
	CO2								
	CO3								

	9. Transducers-I 10. Michelson's Interferometer 11. Measurement of Electrical Conductivity of Graphite. 12. Measurement of Energy Band Gap of a Semiconductor. Group-B 13. Characteristics of DIAC, TRIAC 14. Study of Inter conversion of 'π' and 'T' Network 15. To design, build & Test relaxation Oscillator using UJT. 16. To design, build & Test Inverting and non-inverting Amplifier using Operational Amplifiers. 17. To design, build & Test combinational Logic circuit using only NAND/ NOR Gates. 18. To design, build & Test 04- bit Up/Down counter using IC 7493.
Reference Books	
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Master of Science – PHYSICS, SEM-II

Course:	PH-421: QUANTUM MECHANICS - I								
Course Outcomes	CO1 : At the end of the course, the students will be able to understand the basics of quantum mechanics. CO2 : various physics concepts in the light of quantum mechanics. CO3 :								
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
	CO1								
	CO2								
	CO3								
	CO4								
	CO5								
	CO6								
Pre-requisite									
Course Content	Unit 1: Origin of Quantum Physics: Particle aspect of radiation, wave aspect of particles, wave-particle duality, wave packets, wave packets and uncertainty relations, motion of wave packets. Mathematical Tools of Quantum Mechanics: The Hilbert space and Wave functions, Dimension and basis of vector space, Dirac notation, Operators, Hermitian adjoint, projection operators, parity operator, commutator algebra, uncertainty relations between two operators, Eigen values and Eigen vectors, unitary transformations, Matrix representation of kets, bras and operators, Change of basis and unitary transformations, wave functions in position and momentum space, Matrix representation of Eigen value problem, Dirac delta function. Unit 2: Postulates of Quantum Mechanics: The basic postulates of Quantum Mechanics, Representation of state, representation of dynamical variables, Observables and operators, measurement in Quantum Mechanics, time evolution, stationary state, Schrodinger equation and wave packets, conservation of probability, expectation value, Ehrenfest theorem, symmetries and conservation laws Unit 3: One-dimensional and three-dimensional Problems The free particle, the particle in a box, The potential step, infinite square well, finite square well, The Harmonic oscillator by analytic and operator method, Hermite polynomials, harmonic oscillator wave functions, correspondence with classical theory, Spherically symmetric potentials in three dimensions, the spherical square well potential, the hydrogen atom, energy quantization, quantum numbers Unit 4: Angular Momentum Orbital angular momentum, general formalism of angular momentum, raising and lowering operators, matrix representation of angular momentum, Eigen functions and Eigen values of L^2 and L_z using operator method, spherical harmonics, experimental evidence of spin, general theory of spin, spin $\frac{1}{2}$ and Pauli spin matrices. Unit 5: Addition of Angular Momenta Rotations in Classical Physics, rotations in								

	Quantum Mechanics, Addition of two angular momenta, Clebsch-Gordon coefficients, coupling of orbital and spin angular momenta, tensor operators, spherical tensors, Wigner-Eckert theorem. Unit 6: The principle of indistinguishability; Symmetric and anti-symmetric wave functions; Spin and statistics of identical particles; The Slater determinant; The Pauli exclusion principle; Spin states of a two electron system; States of the helium atom; Collision of identical particles.
Reference Books	1. Quantum Mechanics by Nouredine Zettili (Wiley) 2nd Ed., (2004) 2. Quantum Mechanics by Franz Schawbl Springer 4th Ed. (2007) 3. Introductory Quantum Mechanics by Liboff, Pearson Education India, 4th Ed. (2003) 4. Quantum Mechanics by Claude Cohen-Tannoudji, Bernard Diu, Franck Laloe Vol. I & II, Wiley-CH, (1997) 5. Quantum Mechanics, by L. I. Schiff, McGraw-Hill Inc.,US, 3rd Revised Ed.(1968) 6. Introduction to Quantum Mechanics by David Griffiths, Pearson Education; 2nd Ed. (2015) 7. Quantum Mechanics, by A. K. Ghatak and S. Lokanathan (Macmillan - India), 5th Ed. (2004) 8. Quantum Mechanics by Mathews and Venkatesan, 2nd Ed. (2010)
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Course:	PH-422: Solid State Physics								
Course Outcomes	CO1 : At the end of the course, the students will be able to understand the basic concepts on properties of materials in solid state physics. CO2 : phenomenon of superconductivity and its properties. CO3 : different techniques used for synthesis and fabrication of nano-materials.								
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
	CO1								
	CO2								
	CO3								
	CO4								
	CO5								
	CO6								
Pre-requisite									
Course Content	Unit 1: Crystal Physics Crystal classes and Systems, Lattice, Lattice Points and space lattice, unit cells and lattice parameters, 2D and 3D lattices, Symmetry and Symmetry operations, Directions, Planes, and Miller Indices, Reciprocal lattices, Brillion Zones, Ideal and real crystal, Temperature dependence of reflection lines. Elastic scattering from Surfaces; Elastic scattering from amorphous solids. Unit 2: Crystal Defects Different type of imperfections, Schottky and Frenkel								

	defects, edge and screw dislocations, Grain boundaries and stacking fault. X-Ray diffraction, Powder Crystal method, Rotating Crystal method, Laue methods, other probes for Crystal Structure determination. Unit 3: Lattice vibrations and thermal properties Vibrations of Monoatomic Lattice, normal mode frequencies, dispersion relation. Lattice with two atoms per unit cell, normal mode frequencies, dispersion relation., Quantization of lattice vibrations, phonon momentum, Inelastic scattering of neutrons by phonons, Surface vibrations, Inelastic Neutron scattering. Enharmonic Crystal Interaction. Thermal conductivity - Lattice Thermal Resistivity. Unit 4: Diamagnetism and Para magnetism Langevin diamagnetic equation, diamagnetic response, Quantum mechanical formulation, core diamagnetism. Quantum Theory of Para magnetism, Rare Earth Ions, Hund's Rule, Iron Group Ions, Crystal Field Splitting and Quenching of orbital angular momentum; Adiabatic Demagnetisation of a paramagnetic Salt, Paramagnetic susceptibility of conduction electrons. Unit 5: Magnetic ordering Ferromagnetic order- Exchange Integral, Saturation magnetisation, Magnons, neutron magnetic scattering; Ferrimagnetic order, spinals, Yttrium Iron Granets, Anti Ferromagnetic order. Ferromagnetic Domains - Anisotropy energy, origin of domains, transition region between domains, Bloch wall, Coercive force and hysteresis. Unit 6: Superconductivity Historical Introduction, Superconducting Materials, Josephson effect, The London Equation, Ginsburg-Landau theory, The BCS theory, HTSC cuprate Material Characterizations properties of HTSC Oxides, Potential Applications of Super Conductivity.
Reference Books	1. Introduction to Solid State Physics by Kittel, John Wiley & sons, 8th ed. (2004) 2. Fundamentals of Solid State Physics by J.Richard Chistman John Wiley & sons (1987). 3. Solid State Physics - Structure and properties of Materials by M.A. Wahab, Narosa Publications (1999). 4. Elementary Solid State Physics by M. Ali Omar, Addison Wesley (LPE), (1994). 5. Solid State Physics- S.O. Pillai (3rd edition), New Age International Ltd. (2015).
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

[illegible]

	4. Elementary Solid State Physics by M. Ali Omar, Addison Wesley (LPE), (1994). 5. Solid State Physics- S.O. Pillai (3rd edition), New Age International Ltd. (2015).
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Name of Program	Master of Science - ELECTRONICS
Abbreviation	M.Sc.- ELECTRONICS
Duration	2 Years
Eligibility Criteria	Passed B.Sc.- ELECTRONICS
Objective of Program	The core objective of the MSc.- ELECTRONICS programme is to prepare the students for teaching and research in the core and emerging areas of the discipline.
Program Outcome	PO1 : Fundamental Knowledge Enrichment The Students will obtain basic theoretical and Practical knowledge in ELECTRONICS Sciences. They will be trained to complete tests like UGC-CSIR, NET, GSET, GATE etc.. Successfully. It also makes students capable of using core concepts of ELECTRONICS. PO2 : Critical Thinking Development The examination pattern for M.Sc. program ELECTRONICS having the 30% weight age for problem and applications and 70% weightage given to theory. This concept develops the skills of critical thinking, program solving, evaluative learning of various techniques, and understanding the essence of the problem. PO3 : Advanced Emerging Technology Awareness The Syllabus of this program consist of Advanced QM, Advance, Microelectronics and Microprocessor. So, the students avail the advance knowledge in their resign. Which enrich them through this knowledge of latest technologies that is being used in Industry as well as Research Institute. The continuous syllabi review adds value to the program for the outgoing students and make them ready to face challenging demands of the Industry. PO4 : Advanced Tools Usage Computer laboratory are compulsory for all specification, so their soft skill are developed by programming. LCD project smart class room, PPT and Videos are used for regular teaching. This teaching helps them to apply the advanced tools to solve real world problems. PO5 : Nurturing Project Planning and Management Capabilities The program trains students for designing and conceptualizing the software architecture, planning and managing the product development process of complex and live software projects. It also makes students understand the decision making for selection of appropriate project management capabilities. PO6 : Real World Problem / Project Development Real world project provides the candidates exposure to work in the challenging and demanding environment of the industry. The project development training makes students employable and Industry ready. PO7 : Team Work and Leadership Development Trains students to work in a team and also to take leadership of the project management team.

Name of Program	Master of Science - ELECTRONICS							
Abbreviation	M.Sc.- ELECTRONICS							
Duration	2 Years							
Eligibility Criteria	Passed B.Sc.- ELECTRONICS							
Objective of Program	The core objective of the MSc.- ELECTRONICS programme is to prepare the students for teaching and research in the core and emerging areas of the discipline.							
Program Specific Outcomes	Learning Outcomes: PSO1 : Develop and strengthen the fundamental core concepts that are required to solve complex problems. PSO2 : Develop the professional and entrepreneurship skills that needs independent logical and analytical thinking, teamwork and leadership. PSO3 : Nurture the students to investigate for the design and development of a workable solution for a real world problem through computer program. PSO4 : The Students would be able to realize various applications with proper understanding of linear vector space and matrices, differential equations, special functions, series expansion and integral transforms. The students are enabled to understand the motion of a mechanical system using Lagrange and Hamilton formalisms. The Students would be able to understand the concepts of Quantum Mechanics and capable to solve their problems. The students would be able to explain basic physics and application of different types of electronic devices, familiarization with microelectronics and microprocessor of circuits and to seek career in electronics Industry. The Students would be able to apply ensemble theory to complex problems, analyze the peculiar Gas behavior and explore the in applications using different approximations. Their soft skills may develop by programming laboratory works. PSO5 : Develop students for self-learning and practicing challenging problem solution through Design built and Test experiments. PSO6 : Train students to use advanced knowledge in their resign of specifications for science and application domain specific knowledge.							
Mapping between POs and PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
	PO1							
	PO2							
	PO3							
	PO4							
	PO5							
	PO6							
	PO7							
Medium of Instruction	English							

Master of Science – (Electronics), SEM-I

Course:	EL-411: Mathematical Methods						
Course Outcomes	CO1 : At the end of the course, the students will be able to use different mathematical methods to study problems in non-linear sciences. CO2 : Understand the methods to ordinary differential equations. understand the methods to solve Nonlinear Schrodinger type equations CO3 : Uunderstand the concepts and application of solutions.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						

Course:	EL- 412: Microcontroller and Applications						
Course Outcomes	CO1 : Being Advance subject, Microcontroller and its application is introduced in the curriculum. CO2: In the field of electronics & Instrumentation the micro controller base circuits play important roll. CO3: Therefore the employability of the student's in the Industry increases.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1							
CO2							
CO3							

Course:	EL-413: Measurement, Instrumentation and Experimental Planning						
Course Outcomes	CO1 : At the end of the course, the students will be able to acquire the knowledge about the different errors occurring during measurement. CO2 : Understand the principle behind the instrumentation for measurement. CO3 : Identify the various transducers involved in measurement .						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						

Course:	EL- 414: C and CAD for Electronics
Course Outcomes	CO1 : At the end of the course, the students will learn higher level language programming and their basic. CO2 : The skill to write the programming using IF, FOR, WHILE and DO statement and there are aware global automatic static variables. CO3 : Student's do best exercise for simulation for electronics circuit using simulation program per Integrated Circuit Enchases (Spice)

	for ADC & DAC Circuit.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
	CO4						

Course:	EL-423:- Electromagnetic Fields and Waves						
Course Outcomes	CO1 : At the end of the course, the students will be able to understand the basic concepts nucleus and its properties. CO2 : To gain the knowledge on elementary particles.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1							
CO2							

Course:	EL- 424: Electronic Communication-I						
Course Outcomes	CO1 : The course provides excitement of the electronic communication field as well as background essential for advanced study in communication systems. CO2 : The practicing students will find it of service to update their knowledge in the field.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1							
CO2							
CO3							

Course:	EL-425: Practical's						
Course Outcomes	CO1 : At the end of the Course work, the students are familiar about the design and analysis of all the Basic semiconductor Circuit Apart from discrete Component. CO2 : Circuits, the design procedure for using IC operational amplifiers in various circuits is discussed. CO3 : Students are aware of operation of transducers.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1							
CO2							
CO3							

Master of Science – PHYSICS, SEM-III

Course:	EL - 531: Microwave					
Course Outcomes	CO1 : The students will learn about basic devices used for production and applications of Microwave frequencies.					

	CO2 : The Devices like Tunnel Diode, MIS diode, IMPATT diode, TRAPATT diode, BARITT diode. CO3: Students will learn about Microwave transmission lines, Smith chart, Impedance matching, Couplers and Isolators. CO4: The students may aware with basics of Reflex klystrons, and Helix travelling wave tubes and Agile coaxial magnetrons.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						
	CO4						

Course:	EL- 532 : Optoelectronics						
Course Outcomes	CO1: At the end of the Course work, it Provides the Students with a general understanding of the Characteristics of Optical Fibers and how they are used in a telecommunication system courses in Communication theory would be helpful for gaining a full understanding of the material. CO2: The course Progresses Systematically from descriptions & the individual elements of System designs and ends with discussion of measurement techniques for evaluating components & systems						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						

Course:	EL-533:- Solid State Devices						
Course Outcomes	CO1 : The syllabus provide an introduction to theory of Semiconductor Device. CO2 : The emphasis on vital understanding of both the operation of present day devices will be benefited of present day device will be benefited to further development of new Semiconductor device in the field.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						

Course:	EL- 534: Instrumentation						
Course Outcomes	CO1 : At the end & the course , Students are upload in the area of measurement and indirectly allied to that of laboratory teaching. CO2 :The primary empress is on the measurement of Physical & mechanical variables encountered in experimental investigations & indusial processes. CO3: The Students also need to Put into action concepts of accuracy and Precision when diagnosing Problems and maintaining medical and laboratory equipment						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6

	technology. CO2 : Syllabus also giving emphasis on architecture of memory devices likes PROM, EPROM, EEPROM. CO3 : Current sources multi loop feedback Amplifier, and Theory of High Frequency response of Amplifiers are briefly discuss.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						

Course:	EL- 544: Electronic Communication – II						
Course Outcomes	CO1 :At the end of the course work, it is to extend & Update of the Knowledge of the students to more modern Digital Communication Systems, terrestrial and microwave radio communication systems and satellite communication systems. CO2 :An attempt is made to know the fundamental of telephone Switching traffic load & service grade.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						

Course:	EL- 545: Practicals						
Course Outcomes	CO1 : As part of this lab course, a full semester project is carried out on some Electronics related problem which is an electronic circuit. CO2:The project in this lab. Includes system designing, PCB designing, using, construction and testing of the circuit. CO3: Good training in planning and executing an Electronic project and technical skill development is the outcome.						
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1						
	CO2						
	CO3						

M.A .Mass Communication

Name of Program	Master of Arts in Mass Communication
Abbreviation	M.A
Duration	2 Years
Eligibility Criteria	Passed Bachelor Degree in any stream or equivalent Degree Programme from recognised university with 35% marks in SC and ST and 40% marks for Open and SEBC category
Objective of Program	The core objective of the MA Mass Communication programme is to prepare the students for productive career in mass media by providing an outstanding environment of teaching and research in the core and emerging areas of the discipline.
Program Outcome	PO1 : Fundamental Knowledge Enrichment Program trains students with the core knowledge in the theories and concepts in the discipline of Journalism, Mass Communication and all the allied areas like Cinema, Advertising, Public Relations, specialized areas like Development Communication, International Communication. This will not only develop the theoretical base needed for the NET Exam but also makes students capable of using core concepts in the application in the media world. PO2 : Critical Thinking Development The program develops the critical thinking skills of the student about the issues and events of our society. It gives him an in-depth understanding of societal issues and solutions to them. PO3 : Advanced Writing and Translation Skills. The program trains students in writing and translation skills so as to enable them to write news reports, opinion pieces, and features and press notes. They are also taught to translate articles, press notes, and features. PO4 : Editing and Translation Skills: The program trains students in editing of news reports, writing headline, making layout and choosing photos and graphics. They independently produce a publication for themselves using computer software. PO5 : Writing for Radio and Radio Production Skills: The program trains students to write for radio: scripts for jock talk, radio features, news reports, interviews and so on and also to do audio editing, and sound production and design on the latest software. PO6 : Audio Visual Writing and Production Skills for Television and Short Films The program teaches students to write scripts for audio visual programmes: short films, news programmes, interviews and so on. Students are taught to shoot both outdoors and indoors and

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	edit programmes on software. PO7: Dubbing Skills: The program teaches students to do dubbing for television and film programmes. PO8 : Project Report on any Media topic Working on a project provides the candidates exposure of handling a real world issue in the media and gives them an insight into the demanding environment of the industry. PO9 : Team Work and Leadership Development Trains students to work in a team and also to take leadership of a short film production team. PO10: Research Skills: The programme trains students to work at research topic in the dissertation training him for a career in research in media studies. PO11 : Verbal Communication: The programme hones the verbal communication skills of students PO12: Computer Skills: The program trains students in all editing and production software on computers.
Program Specific Outcomes	PSO1 :Providing an in depth understanding of the mass media (print, television, radio, film and online media) in India. PSO2: Developing a critical understanding of mass media: theory, functions, principles, history, ethics and legal aspects. PSO3. Developing a deep insight into the current events and India's polity, economy, society, culture, sports, science and lifestyle issues. PSO4. Facilitating understanding of advertising and public relations. PSO5. Helping students develop writing skills: news reports, features, editorials, content for radio, television and digital media and translation skills. PSO6. Honing the verbal communication skills of students. PSO7. Developing enhanced production skills of students in radio and television programmes and knowledge of advanced dubbing and editing software. PSO8. Developing ability to independently make short films. PSO9. Creating a strong base for giving NET and JRF exam and for PhD Studies.

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Mapping between POs and PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
	PO1									
	PO2									
	PO3									
	PO4									
	PO5									
	PO6									
	PO7									
	PO8									
	PO9									
	PO10									
	PO11									
	PO12									

Medium of Instruction English

Program Structure Semester 1

Course Code	Title	Teaching per week		Course Credits	University Examination		Internal Marks	Total Marks
		Theory	Practical		Duration	Marks		
190113120 1010002	Introduction to Societal Issues	4	0	4	2 Hrs	70	30	100
190113120 1020002	Fundamentals of Mass Communication and Print Media	4	0	4	2 Hrs	70	30	100
190113120 1030002	Principles of Journalism and News Writing	4	0	4	2 Hrs	70	30	100
190113120 1040003	Computers Skills and Verbal Communication Skills(Practical)	4	0	4	2 Hrs	70	30	100
200113120 3020001	Cinema Studies Or Development Communication		4	4	2 Hrs	70	30	100
190113120 1060002	Term Paper	02		2		70	30	100
	Total	18	4	22				
Program Structure	Semester 2							
Course Code	Title	Teaching per week	Course Credit	University	Internal Marks	Total Marks		

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			s	Exa min atio n				
		Theory	Practi cal		Duration	Marks		
200113120 2010001	Constitution of India, Media Law and Ethics	4	0	2	3 Hrs	70	30	100
200113120 2040001	Print Media Skills (Practical)	4	0	2	3 Hrs	70	30	100
190113120 1050002	Reporting and Translation Skills (Practical)	4	0	2	3 Hrs	70	30	100
200113120 4050001	Fundamentals of Advertising and Public Relations	4	0	2	3 Hrs	70	30	100
210113120 4010002	Women and Media Or International Communication	0	4	2	3 Hrs	70	30	100
200113120 2060001	Term Paper	2			2 Hrs	70	30	100
	Total	18	4					
Progra m Structur e	Semester 3							
2001131 2030100 01	Communication Research	4	0	4	3 Hrs	70	30	100
2001131 2020300 01	Fundamentals of Radio Medium	4	0	4	3 Hrs	70	30	100
2001131 2030300 01	Fundamentals of Television Medium	4	0	4	3 Hrs	70	30	100
2001131 2030400 01	Radio Writing and Production Skills (Practical)	4	0	4	3 Hrs	70	30	100
2001131 2030500 01 2101131 2040500 03	Art of Anchoring and Dubbing(Practical) Or Skills in Public Relations (Practical)	4	0	4	3 Hrs	70	30	100
	Internship Project	0	3	3	2 Hrs	70	30	100
	Tota	20	10	30				

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	1							
Program Structure	Semester 4							
	Fundamentals of News Media	4	0	4	3 Hrs	70	30	100
2101131 2040500 03	Skills in New Media (Practical)	4	0	4	3 Hrs	70	30	100
2101131 2040400 02	Television Writing and Production Skills(Practical)	4	0	4	3 Hrs	70	30	100
2101131 2040500 02	Short Film Production(Practical)	4	0	4	3 Hrs	70	30	100
2001131 2030500 02	Photography and Photojournalism (Practical) Or Skills in Advertising(Practical)	4	0	4	3 Hrs	70	30	100
2101131 2040500 03								
2101131 2040600 02	Dissertation	0	3	3	2 Hrs	70	30	100
	Total	20	10	30				

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M.A. Mass Communication 1st Semester

Course: 1901131201010002 Introduction to Societal Issues

Course Code	1901131201010002									
Course Title	Introduction to Societal Issues									
Credit	4									
Teaching per Week	4 Hrs									
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)									
Effective From	June 2021									
Purpose of Course	To give students an insight into general knowledge relevant in the Indian context.									
Course Objective	To give students knowledge of political science, public administration, sociology, and economics									
Course Outcomes	CO1 Students will understand the basic framework of political science, public administration, economics and sociology that is needed for them to understand the society around them. CO2 With this framework they will be able to understand the context of the news and current happenings in the world around.									
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
	CO1									
	CO2									
Pre-requisite	Basic school level social studies knowledge.									

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Course Content	Unit 1 Concept of nation and state, theories of the state: liberal, neoliberal, marxist, pluralist, post-colonial and feminist; concepts: justice, equality, freedom, affirmative action, power, hegemony, legitimacy, rights, human rights, democracy: types, ideologies: liberalism, socialism, marxism, fascism, gandhism, indian and western political thought, india's freedom struggle: satyagraha, non-cooperation, civil disobedience, political system in india: salient features: democracy, election system, party system, legislature, executive, judiciary. Unit 2 Union government administration: structure, functions, work processes, cabinet secretariat, PMO, central secretariat, ministries, departments, civil services, statutory institutions/ commissions: nitiayog, EC, CAG, FC, UPSC, NCSC, NCST, NCW, NHRC, NCM, NBCC, CVC, CBI, NPC, Lokpal; PSU; state government administration, district administration; collector, local self-government: panchayati raj, municipal government. Unit 3 Indian society: characteristics, salient features, impact of colonial rule, social background of Indian nationalism, protests and movements during the colonial period, concepts: social stratification, equality, feudalism, hierarchy, exclusion, poverty, deprivation, social movements, collective action: revolution, protest, religion, science, secularism, revivalism, fundamentalism, kinship: family, household, marriage, patriarchy; social change: agents of social change, social reforms, land reforms, caste system: features, problems, untouchability, dalits, tribals, class india; agrarian, middle class, working class. Unit 4 Impact of British rule, Indian economy; features, economic development, green revolution, land reforms, agrarian relations, planning; models nehruvian, gandhian, public sector; finance ministry, reserve bank, union budget, subsidies, revenue, taxes, GST, RBI, treasury, concepts like poverty, growth, development, national income, GDP, per capita income, inflation, stagnation, price rise, unemployment, FDI, fiscal deficit, demonetisation, decentralized planning: 73rd and 74th constitutional amendments, structural reforms in 1990s: impact on indian economy, poverty alleviation schemes, NREGS.
Reference Books	1. Indian Polity, Governance and National Movement --- N D Arora 2. Indian Polity --- M Laxmikant 3. Magbook Indian Polity and Governance by Aribant Publication 4. Sociology of Indian Society -- Rao C. N. Shankar 5. Sociology: Basic Concepts--- H. K. Rawat 6. Indian EconomyBook--- Ramesh Singh 7. The Indian Economy Book ---Sanjiv Verma

Melpanapras

Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

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Course: 1901131201020002 Fundamentals of Mass Communication and Print Media

Course Code	1901131201020002																																																		
Course Title	Fundamentals of Mass Communication and Print Media																																																		
Credit	4																																																		
Teaching per Week	4 Hrs																																																		
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)																																																		
Effective From	June 2021																																																		
Purpose of Course	To give students an insight in the fundamentals of mass communication and print media																																																		
Course Objective	To make the students knowledgeable about the basic concepts of communication, mass communication and the print media.																																																		
Course Outcomes	CO1The student will get a fundamental understanding of the communication and mass communication concept. CO2The student will understand the various model, hypothesis, theories of mass communication and news that developed over the years. CO3Students will gain an understanding of the history of journalism in India. CO4Students will understand the various government media units of the government, the various committees, commissions, and professional bodies pertaining to print media.																																																		
Mapping between COs with PSOs	<table><tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td><td>PSO6</td><td>PSO7</td><td>PSO8</td><td>PSO9</td></tr><tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	CO1										CO2										CO3										CO4									
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CO1																																																			
CO2																																																			
CO3																																																			
CO4																																																			
Pre-requisite	Any basic degree and awareness of the media world																																																		

Rajpaul

Course Content	Unit 1 Communication: concept, objectives, characteristics, process, types, barriers, 7Cs sadharanikaran concept; mass communication: concept, characteristics, functions, impact; types of mass media: press, radio, television, cinema, traditional, new and social media, communication models: advantages, disadvantages, BerloSmcr, Aristotle, Schramm, Lasswell, Osgood & Schramm, Shannon & Weaver, Gerbener, Westley & Maclean, Lazarsfeld, Newcomb, Defleur, Riley & Riley, Barnlund. Unit 2 News flow models: McNelly, theories of communication: hypodermic needle, limited effects, dependency, cultivation, agenda setting, uses and gratification, spiral of silence, interactive, psychological, individual differences and normative theories, media impact studies: impact on women, children, etc. Unit 3 Ministry of I&B, media units at centre and states, (DAVP, PIB, RNI, etc), media policy pertaining to press, press commissions, wage boards 1956 and 1963, committees: Palekar, Bachawat, Manisana, Majithia, Maisuma, media ownership, management, control (corporate and political interests), media monopoly, changing role of editorial department, FDI in media, professional bodies; EGI,INS, ABC, AINEC, IJU, NUJ. Unit 4 Development of newspapers and printing in India, phases in development of print media, 1780-1857, 1857-1900, 1900-1947, print media role in social reform and freedom movement, print media post 1947, press during emergency, profile of important journalists, brief history of Gujarati journalism: different phases, contribution of important journalists and newspapers.
Reference Books	1. Mass communication theory - Denis McQuail 2. Mass communication in India - Keval J. Kumar 3. Communication and media : studies in ideas, initiatives and institution - Angela Wadia 4. Introduction to journalism and mass communication - J.C. Chaudhary 5. Mass communication - Jitendra Singh 6. Fundamentals of mass media and communication - Meena Devi 7. Mass communication - theory and practices in the 21st century - Diwakar Sharma 8. Communication theories and models - Dr. N. Andale
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Kalpana Rao

Course: 1901131201030002 Principles of Journalism and News Writing

Course Code	1901131201030002									
Course Title	Principal of Journalism and News Writing									
Credit	4									
Teaching per Week	4 Hrs									
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)									
Effective From	June 2020									
Purpose of Course	To give the student an insight into journalism and all its aspects.									
Course Objective	To give the student an insight into the world of journalism and its various facets: reporting, feature writing, editorial writing and editing.									
Course Outcomes	CO1 The student will have an indepth understanding of the concept of journalism and its various types. CO2 The student will know the working of a newspaper office and all aspects of news and its reporting. CO3 The student will know about a feature and the process of writing it. CO4 The student will have a good understanding of the concept and importance of editing and its importance in a newspaper									
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
	CO1									
	CO2									
	CO3									
	CO4									
Pre-requisite	Daily exposure to the news media									

Kalpana Rao

Course Content	Unit 1 Journalism: concept, principles, role, democracy and fourth estate, journalist: qualities, responsibility, types of journalism: yellow, citizen, alternative, development, tabloid, investigative, interpretive, etc., types based on beats, sports, life style, travel, fashion etc, newspaper office: departments, hierarchy, duties, coordination between departments, news: concept, news values, sources, types: hard, soft, predictable, unpredictable, page 3. Unit 2 Reporting and interviewing for news, structure and styles of news writing; inverted pyramid, sand clock, feature, diamond, lead writing, types of lead, organising news story: selection of information, attribution, quote, background, context, kinds of reporting: crime, politics, civic, court, police, types of news stories: beat stories, feature stories, curtain raiser, hidden story, spot news, follow ups, sources: characteristics, importance, developing, press releases, conference, briefing; news agencies in India, reporting in news agency. Unit 3 Features; concept, types: news, photo, travelogues, lifestyle, interviews, personality sketch, review, agony aunt, vox populi, timely, timeless, etc., process of feature writing: idea, data collection, processing, writing, structure of feature: headlines, lead and its types, use of pictures and graphics, editorials: concept, objective, language, types, edit and op-ed page: content, layout, letters to the editor. Unit 4 Editing: concept, importance, objective, elements, editorial department: hierarchy, duties of editorial staff, news editor, chief subeditor, sub editor, proof reader, translator, desk, distribution of work, editing jargon, news copy: types, sources, news flow, news coordination, rewriting, integrating copy, proof reading: concept, symbols, newspaper design, layout: concept, elements, types, use of graphics, charts, pictures, editing of special pages, headlines: purpose, types, techniques, style.
Reference Books	1. Key concepts in Journalism Studies - Bob Franklin, Martin Hamer 2. Modern Journalism: Report and Writing - Diwakar Sharma 3. Modern student journalism - Barun Roy 4. News writing - B.S. Goyal 5. Media management and development - Dr. Samir Kumar Singh 6. Reporting and Editing in Journalism- K. C. Sharma, Anupama Sharma Pathak
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Radhika Rao

Course : 1901131201040003 Computer Skills and Verbal Communication Skills(Practical)

Course Code	1901131201040003																																																		
Course Title	Computer Skills and Verbal Communication Skills(Practical)																																																		
Credit	4																																																		
Teaching per Week	4 Hrs																																																		
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)																																																		
Effective From	June 2021																																																		
Purpose of Course	To develop communication skills in the student and computer skills for print media.																																																		
Course Objective	To hone the students' communication skills and develop in him knowledge and usage of the software used in print media production.																																																		
Course Outcomes	CO1 The student will get an understanding of the use of computers in print media: usage of computers and software like Corel draw, Photoshop and Indesign CO2 The students will learn how to make layouts in the above software. CO3 The student will have honed his communication skills: presentation skills, public speaking skills, debates, story telling skills, extempore speech and so on. CO4 The student will be trained in how to face job interview.																																																		
Mapping between COs with PSOs	<table><tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td><td>PSO6</td><td>PSO7</td><td>PSO8</td><td>PSO9</td></tr><tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	CO1										CO2										CO3										CO4									
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CO1																																																			
CO2																																																			
CO3																																																			
CO4																																																			
Pre-requisite	Basic knowledge of computers and basic communication skills.																																																		
Course Content	Unit 1 Gujarati and English typing Skills, MS Office, Word, Excel, Power Point Unit 2 Photoshop, coral draw,page maker/indesign/quark express. Unit 3 Presentation skills, extempore speech, debating, elocution skills Unit 4 How to appear at interviews, Anecdote and Story Telling, RJ talk, anchoring skills																																																		
Reference Books	1. Desk Top Publishing: Bittu Kumar 2. Effective Communication Skills: Kumar Kulbhushan 3. Professional Communication Skills: Jain A K																																																		

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Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Palpanat

Course: 201131203020001 Cinema Studies

Course Code	201131203020001									
Course Title	Cinema Studies									
Credit	4									
Teaching per Week	4 Hrs									
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)									
Effective From	June 2021									
Purpose of Course	To give the students an insight into Cinema as medium of communication.									
Course Objective	To give students an insight into the various aspects of cinema and film making									
Course Outcomes	CO1: Student will be able to understand the Cinema as a means of mass communication and gain an insight into its grammar. CO2: Student will be able to understand world cinema and national cinema. CO3: Student will be able to understand the process of film making from perspective to the audience.									
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
	CO1									
	CO2									
	CO3									
Pre-requisite	Interest in Cinema and film making.									

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Course Content	Unit 1 Cinema; language, development from Lumiere to present day, how to read films, major film movements; Italian neo-realism, French New Wave, German Expressionism, Dognie 95, Japanese cinema, Third world cinema, Hollywood, film theories: marxist, feminist, structuralist, psychoanalyst, post colonial, realist, auteur, ideological, film criticism, appreciation, review, film genres. Unit 2 Indian cinema: silent era, classic era, golden era, new wave, mainstream, art, parallel, milestones, important films and their directors: Phalke, Satyajit Ray, Raj Kapoor, Gurudutt, Shyam Benegal, Mrinal Sen etc regional cinema: Bengali, Tamil, Telugu, Malayalam, Marathi, and Gujarati. Unit 3 Pre production: idea to script, story board, screenplay, shooting and editing schedules, Production: production team: structure and function, set design, shooting, frame, colour, balance, basics of camera movements, shot compositions, lighting techniques, different kinds of lights and their usage, reflectors, sound, technical terms, post-production: editing principles, devices, video and audio editing, cut, mix, dissolve, fade, special and digital effects, sound mixing, off line and online editing. Unit 4 Government policy pertaining to cinema, committees: Khosla, Patil, Cinematograph Act, CBFC, NFAI, FD, FTII, CFS, IFFI, film clubs, film festivals, short movies, documentaries, certification, marketing, distribution, branding, merchandising, rights and promotion, film society, film awards.
Reference Books	1. Beginning Film Studies - Andrew Dix 2. Film studies : The Basics - Amy Villarejo 3. Film Studies : The Essential Introduction - Sarah Casey Benyahia, Freddie Gaffney 4. Film Art and Introduction - David Bordwell, Kristin Thompson 5. What is Cinema? - Andre Barin, Hugh Gray, Jean Renoir 6. Key Concept in Cinema Studies - Susan Huyward
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Or

palpana 2005

Course: 2101131204020002 Development Communication

Course Code	2101131204020002									
Course Title	Development Communication									
Credit	4									
Teaching per Week	4 Hrs									
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)									
Effective From	June 2021									
Purpose of Course	To provide an insight into specialised communication in the field of development communication.									
Course Objective	To give the student knowledge about the application of communication in specialised fields									
Course Outcomes	CO1: The student will get an insight into the concept and development communication in the international and national context CO2: The student will understand how to apply these concepts in preparing a development communication strategy for a topical issue.									
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
	CO1									
	CO2									
Pre-requisite	Bachelors degree and a continual reading of news and views regarding developmental issues.									
Course Content	Unit-1: Development: concept, definitions, approaches, problems, issues, indicators and paradigms, development and related concepts; growth, HDI, GDI, GEM, reason for underdevelopment, UN millennium goal, characteristics of developing countries. Unit 2: Development communication: concept, definition, process, models of Lerner, Schramm, Rogers and Shoemaker, Nair and White; barriers; social, cultural and economic, different media in development: small media, folk media, new media, development communication policy in India, action plan, democratic decentralisation democratic rights. Unit 3: Agricultural communication and rural development, genesis of agricultural extension, extension approach system, approach in agricultural communication, diffusion of innovation, model of agricultural extension, case studies of communication support to agriculture, development support communication: case studies in agriculture, health, environment, education communication. Unit 4: Development and rural extension agencies, Panchayati Raj, planning at national, state, regional, district, block and village levels, government and nongovernment organizations, macro-micro economic framework available for actual developmental activities.									

Kalpana Das

	case studies on development communication programs (UNICEF, WHO, CRY, SEWA)
Reference Books	1. Information technology and development communication - Brijnath Singh 2. Development communication and journalism - Dr Subhesh Chand Sharma
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Kalpana Rao

Course: 1901131201060002 Term Paper

Course Code	1901131201060002									
Course Title	Term Paper									
Credit	2									
Teaching per Week	2 Hrs									
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)									
Effective From	June 2021									
Purpose of Course	To enable the student to comprehend any relevant aspect of mass communication and journalism.									
Course Objective	To enable the student to gain insight in any current aspect of the journalism and mass media.									
Course Outcomes	CO1 The student will have the skills to comprehend aspects of mass media and journalism.									
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
	CO1									
Pre-requisite	Library reading of books, magazines and newspapers and exposure to other media like Television, New Media and Radio									
Course Content	The student will write under the guidance of the faculty a paper a topic pertaining to journalism and mass communication.									
Reference Books	Newspapers, Magazines, Television channels, Radio and News Portals									
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment									
Evaluation Method	30% Internal assessment based on oral submission and of Term Paper. 70% External based Viva and submission of the Term paper.									

Kalpana Rao

M.A. Mass Communication 2nd Semester

Course: 2001131202010001 Constitution of India, Media Law and Ethics

Course Code	2001131202010001																																								
Course Title	Constitution of India, Media Law and Ethics																																								
Credit	4																																								
Teaching per Week	4 Hrs																																								
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)																																								
Effective From	June 2021																																								
Purpose of Course	The purpose of the course is to make the student knowledgeable about the Constitution of India, the laws pertaining to the media in India and media ethics.																																								
Course Objective	To make students acquainted with the basic tenets of the Indian Constitution, media laws and the ethical standards as applicable to media professionals.																																								
Course Outcomes	CO1 Students will understand the basic structure of the Indian Constitution, fundamental rights and the structure of the Indian polity as envisaged in it. CO2 Students will be able to understand laws pertaining to the media, its impact of freedom of the citizen from the perspective of a journalist and media professional CO3 Students will understand the significance of ethical standards that are imperative for mass media and the specific code of conduct for a journalist.																																								
Mapping between COs with PSOs	<table><tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td><td>PSO6</td><td>PSO7</td><td>PSO8</td><td>PSO9</td></tr><tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	CO1										CO2										CO3									
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9																																
CO1																																									
CO2																																									
CO3																																									
Pre-requisite	Basic interest in understanding Law and interest in the national polity																																								

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Course Content	Unit 1 Constituent assembly, Indian constitution: salient features, preamble, fundamental rights and duties, directive principles, Art 19 (1) (a) freedom of speech reasonable restrictions, vis a vis concept of privacy, Art 32 including PIL, emergency and media, theory of separation of power under constitution. Unit 2 Concept of justice, law, punishment and fine, principles of natural justice, crime and civil wrong: concept, types, trends, criminal procedure (FIR, panchnama, chargesheet, bail, summons, arrest, warrant, cognizable and non-cognizable offences), types of punishment, current trends in crime and civil wrong, crimes against humanity, state, individual, women and children, offences like obstructing public officials, public tranquillity, sedition etc. Unit 3 Brief history of press laws in India, contempt of court, contempt of legislature, parliamentary privileges, civil and criminal defamation, official secret act vis-a-vis RTI, copyright act, obscenity, PRB act, working journalist act, cinematograph act, prasarbharati act. Unit 4 Media responsibility, accountability, code of conduct for journalists, media trial, fair trial, subjudice, privacy, sting operation, protection of sources, reporting of sexual crimes and communal violence, codes for radio, television, advertising and public relations, regulatory bodies: PCI, BCCC, NBA, IBF, ASCI.
Reference Books	1. Constitutional System in India: Continuity and Changes - Prof. H. G. Pant 2. Media laws and Indian constitution - Kundra S. 3. Indian Constitutional Documents. - Kanaiyalal Maneklal Munshi 4. Fundamental rights and constitutional Amendment - Dr. L. M. Singhvi 5. Mass media and Democracy - Nayyar Shamsi 6. Media Ethics and Laws - Naval Prabhakar, Narendra Basu
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

palpana Rao

Course: 2001131202040001 Print Media Skills (Practical)

Course Code	2001131202040001									
Course Title	Print Media Skills									
Credit	4									
Teaching per Week	4 Hrs									
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)									
Effective From	June 2021									
Purpose of Course	To train students in writing, editing and production of print media.									
Course Objective	To enable students in writing of editorials and features and editing of a newspaper.									
Course Outcomes	CO 1: The student will be able to write and editing for newspapers.									
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
	CO1									
Pre-requisite	Regular reading and study of newspapers and magazines.									
Course Content	Unit 1 Exercises in feature writing Unit 2 Exercises in editorial writing Unit 3 Practical work in production of newspaper pages. Unit 4 Practical work in production of magazine page.									
Reference Books	Desk Top Publishing: Bittu Kumar									
Teaching Methodology	Classwork, Discussion, Self-Study, Field Work, Assignment									
Evaluation Method	30% Internal assessment based on class attendance, participation, class test,quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination									

palpana Rao

Course: 1901131201050002 Reporting and Translation Skill (Practical)

Course Code	1901131201050002									
Course Title	Reporting and Translation Skill (Practical)									
Credit	4									
Teaching per Week	4 Hrs									
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)									
Effective From	June 2021									
Purpose of Course	To train students in reporting and translation skills									
Course Objective	Skill development in reporting and translation.									
Course Outcomes	CO1 Students will be able to do routine reporting independently CO2 Student will be able to do Translation of newspaper copy.									
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
	CO1									
	CO2									
Pre-requisite	Reading of newspapers and newsmagazines									
Course Content	Reporting and Translation Skills (Practical) Unit 1 Field reporting and interviewing skills Unit 2 Exercises in writing news reports Unit 3 Exercises in translation of news reports and news agency copy. Unit 4 Exercises in translation of features and editorials									
Reference Books	1. News Writing - B.S. Goyal 2. Reporting and Editing in Journalism – K.C.Sharma, Anupam Sharma Pathak 3. English to Hindi/Gujarati Dictionary									
Teaching Methodology	Field work, Practical Work, Classwork, Assignment.									
Evaluation Method	30% Internal assessment based on field work, class attendance, participation, class test, quiz, assignments, internal examination, etc., 70% External based on semester end University practical examination									

palpana

Course : 2001131204050001 Fundamentals of Advertising and Public Relations

Course Code	2001131204050001									
Course Title	Fundamentals of Advertising and Public Relations									
Credit	4									
Teaching per Week	4 Hrs									
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)									
Effective From	June 2021									
Purpose of Course	To introduce the students to the fundamental concepts of advertising and Public relations									
Course Objective	Students understand the fundamental concepts of advertising and public relations									
Course Outcomes	CO1: The student will understand the basics of advertising and will be able to apply this in the field CO 2: The student will understand the basics of public relations and will be able to apply this in the field									
Mapping between COs with PSOs		PSO1	PSO2	PSO1	PSO1	PSO5	PSO6	PSO7	PSO8	PSO9
	CO1									
	CO2									
Pre-requisite	Exposure to advertising in all media and reading of newspapers and magazines									

Malpana Rao

Course Content	Unit 1 Advertising: concept, objectives, types, role, function, criticism, benefits, advertising vis a vis communication, persuasion, marketing, marketing mix, propaganda, publicity, personal selling, sales promotion, public relations and advertising models: AIDA, DAGMAR, DRIP, Ehrenberg, VIPS checklist, DMP model, PLC, Maslow hierarchy of needs. Unit 2 Making of an ad; from creative brief to media scheduling, creative strategies; appeal, USP, brand image, positioning, personality, approaches/execution styles, advertising copy: types, headlines, text, and slogans, trademark, visualization: illustrations, colour, graphics and layout, advertising agency: structure, functions of departments, advertising campaign planning; market research, consumer behaviour, product analysis, media strategy, case studies in advertising, advertising awards. Unit 3 Public Relations: philosophy, concept, functions, misconceptions, PR vs. communication, public opinion, persuasion, propaganda, publicity, liaison, lobbying, spin, corporate communication, PRO: qualities, responsibilities, PR tools: news letter, house journal, brochure, posters, annual reports, corporate films, advertisements, press conference, grapevine, special events, speaking engagements, event etc, PR: types: media relations, employee relations, marketing PR; financial PR; community PR; tools and strategies. Unit 4 PR campaign planning; process and steps (case studies) PR during crisis/disaster management, PR in central, state government, writing for PR: press release, features, speech, background material, citizen charter, digital PR: need, methods, tools: social networks, online videos, content sharing, blogs, special-interest communities, RSS feeds, digital bazaar- Aegis Media, Publicis Groupe, measurement and monitoring methods, Integrating traditional PR with social media-web 2.0.
Reference Books	1. Journalism, advertisement and public relations - Shailendra Sengar 2. Introduction to advertising and public relations - Shipra Kundra 3. Advertising and public relations research - Jugenheimer 4. The practice of public relations - Wilfred Howard 5. Fundamentals of advertising public relations - Dhruv Sabarwal
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

palpana

Course: 2101131204010002 Women and Media

Course Code	2101131204010002									
Course Title	Women and Media									
Credit	4									
Teaching per Week	4 Hrs									
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)									
Effective From	June 2021									
Purpose of Course	To give students an insight into women studies and the intersection of women and the media.									
Course Objective	To bring knowledge to the students of the significance of the women's issues and the role of the media in ameliorating it.									
Course Outcomes	CO1: Students will understand the women's issues, at the global and Indian level, condition of women in India as also the way they are depicted in the media. CO2: Students will cognize the way research in women and media can be done. CO3: Students will be able to understand how women and their issues are depicted in various mass media.									
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
	CO1									
	CO2									
	CO3									
Pre-requisite	An interest in Indian society and gender issues.									

Kalpana Rao

Course Content	Unit 1 Women's studies: theoretical approaches; radical, marxist, socialist, liberal, concepts: feminism, patriarchy, gender equality, equity, parity, discrimination, empowerment, different waves: status of women in India: from ancient to modern, contribution of personalities: Raja Rammohan Roy, Phule, Ranade, Vidyasagar, Swami Dayanand Saraswati, Periyar, Vivekananda etc, Unit 2 Women's movements in India, ministry of women and child welfare, organizations, NCW, boards, legal perspective: regarding dowry, sexual assault, harassment, representation of women, sati, domestic violence, socioeconomic indicators of women's development, women's rights as human rights, efforts by UN in women's issues. Unit 3 Terms: marginalization, exclusion, trivialization, legitimization, internalisation, objectification, globalisation and representation of women in advertisements; content analysis, discourse analysis, semiotics, structuralism, marxian, foucaultian approaches, sex role stereotype, femininity, male gaze, body image, impact on women and teenagers, representation in women's magazines and men's lifestyle magazines. Unit 4 Representation in television serials, women in journalism, in cinema and advertisements
Reference Books	1. Gender Challenge - Bina Agarwal 2. Gender Inequality And Women's Empowerment - D. Pulla Rao 3. Gender Concern in South Asia.- Manjat Bhatia, Deepli Bhanot, Nirmalaya Samanta.
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Or

Manoj Kumar

Course:2101131204020002 International Communication

Course Code	2101131204020002									
Course Title	International Communication									
Credit	4									
Teaching per Week	4 Hrs									
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)									
Effective From	June 2021									
Purpose of Course	To inculcate in the students an interest in International communication so as to prepare them for further studies in research and NET exam.									
Course Objective	To make students understand the significance of International Communication									
Course Outcomes	CO1: Student will be able to understand the significance of international communication. CO2: Student will be able to understand the process and approaches, of international communication.									
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
	CO1									
	CO2									
Pre-requisite	Interest in international issues									
Course Content	<u>Unit 1:</u> International communication: concept, definition, political, economic and cultural dimensions; communication and information as a tool of equality and exploitation, international news flow, imbalance, media growth, disparities: international, national and regional. <u>Unit 2:</u> Communication as a human right, UNO's Universal Declaration of Human Rights, international news agencies and syndicates, their organisational structures and functions, critic of western news values, international media institutions and professional organisations. <u>Unit-3:</u> Impact of news communication technology in news flow, satellite communication, historical background, status, progress. effects. information super highways. international telecommunication and regulatory organisation, UNESCO's efforts in removal of imbalances in news flow, debate on new international information and economic order,									

Malpana Rao

	MacBride commission's report, non-aligned news pool: working, success, failure. <u>Unit 4:</u> Democratisation of information flow and media systems, professional standards, telecommunication tariffs, information prompted cultural imperialism, criticism, violence against media persons, effects of globalisation on media systems and their functions, media imperialism, transnational media ownership and issues of sovereignty and security, international intellectual property rights.
Reference Books	1. International media communication in a global age - Sourabha Verma 2. International Media Studies- Divya C. McMillix 3. Global Communication: Theories, Stakeholders and Trends- Thomas McPhail 4. International Communication: Continuity and Change - DayaKishanThussu 5. International communication -a reader edited by DayaKishanThussu
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Rajpaul 2008

Course: 2001131202060001Term Paper

Course Code	2001131202060001									
Course Title	Term Paper									
Credit	4									
Teaching per Week	4 Hrs									
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)									
Effective From	June 2021									
Purpose of Course	To inculcate in the students an interest in issues pertaining to communication									
Course Objective	To make students understand the significance of understanding issues in communication.									
Course Outcomes	CO1: Student will be able to understand the significance of different issues and writing about them.									
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
	CO1									
Pre-requisite	Interest in media and contemporary issues									
Course Content	The student will write a term paper on a relevant media topic									
Reference Books										
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars									
Evaluation Method	30% Internal assessment based on class attendance, and oral presentation. 70% External based on submission and viva.									

palpana Rao

M.A. Mass Communication:3rd Semester

Course:1901131203020001Communication Research

Course Code	1901131203020001																																								
Course Title	Communication Research																																								
Credit	4																																								
Teaching per Week	4 Hrs																																								
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)																																								
Effective From	June 2021																																								
Purpose of Course	To inculcate in the students an interest in communication research so as to prepare them for further studies in research (PhD) and a research scholars.																																								
Course Objective	To make students understand the significance of research and make them knowledgeable in Research Methodology.																																								
Course Outcomes	CO1: Student will be able to understand the significance of research in society and understand the process of research. CO2: Student will be able to understand the process of research, the approaches, methods and methodology. CO3: Student will be able to write a research proposal for a dissertation and be able to undertake it under guidance of the faculty.																																								
Mapping between COs with PSOs	<table><tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td><td>PSO6</td><td>PSO7</td><td>PSO8</td><td>PSO9</td></tr><tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	CO1										CO2										CO3									
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9																																
CO1																																									
CO2																																									
CO3																																									
Pre-requisite	Interest in research and communication research																																								

Malpanar

Course Content	Unit 1 Research: social science and mass communication research; concept, objectives, types, characteristics, method and methodology, reasoning: deductive and inductive, approaches (quantitative and qualitative), steps in research: topic selection, research questions and hypothesis, literature review, objectives, variables, research design, sampling, data collection, analysis and interpretation, concepts; reliability, validity. Unit 2 Qualitative research method – field observations, focus groups, in-depth interviews, case studies; quantitative method: survey, descriptive survey, analytical survey, content analysis – definitions, steps, sampling: types probability and non probability, sample size, sampling error. Unit 3 Introduction to statistics – basic statistical procedure; descriptive statistics: central tendencies, mean, median, mode, frequency distribution, inferential statistics: co-efficient of correlation, standard deviation, tests of significance (T-test, Anova). Unit 4 Application of media research: print media (circulation studies, etc) electronic media (TRPs,) advertising (pre testing, post testing) public relations, internet, writing of research proposal/research report/thesis, ethics in research.
Reference Books	1. Communication research - John and Sandy Hutchesor 2. Research methodology – Dr. A.K. Phophalia 3. Mass media research – Roger D. Wimmer, Joseph R. Dominick 4. Communication research – a half century appraisal - Danial Lerner
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

palpanas

Course: 2001131202030001 Fundamentals of Radio Medium

Course Code	2001131202030001									
Course Title	Introduction to Radio Media									
Credit	4									
Teaching per Week	4 Hrs									
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)									
Effective From	June 2021									
Purpose of Course	To give students and overview of the radio medium and the knowledge so that they can use this knowledge in the practical aspect of making radio programmes									
Course Objective	To train students in the theory of radio so that it forms a strong base for the practical work.									
Course Outcomes	CO 1 The student will have a strong base in the theory aspect of the radio medium CO 2 The student will be able to use this strong base in the the application when they work for radio medium									
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
	CO1									
	CO2									
Pre-requisite										

Balpana Rao

Course Content	Unit 1 Development of radio in India and world, introduction and growth of akashwani, vividhbharati, community radio, private (FM) radio channels; guidelines, role, functions, objectives, government policy regarding broadcasting, committees: Chanda, Verghese, Joshi, SenGupta, formation of PrasarBharati, code of broadcasting, introduction of satellite radio, web radio, radio from across borders: Radio Ceylon, BBC, VOA. Unit 2 Radio as a medium of mass communication, elements, characteristics, radio programme genres, format, radio rural forum, news, news feature, announcement, radio interviews, talk show, drama, phone-in, news reel, documentary, radio magazine, advertisement, music programme, link, narration, jingal, promo, jock talk, sparkler, signature tune etc, language, vocabulary and grammar of radio, radio programme: concept, idea, research, script, practical exercises of in basic writing skill of radio. Unit 3 Sound and voice : All India Radio hierarchy, radio production team, structure and function, introduction to sound, types of sound: natural, ambient, recorded, sound effects, radio terminology, voice modulation, moderating skills for radio discussion programmes, handling interactive live transmission, practical exercises in voice over and voice modulation. Unit 4 Production and post production: audio studio, recording equipment, microphones: types, uses, process of radio programme production: basic of audio recording, dubbing and mixing technique, field recording skills, non liner editing, practical exercises in basic audio recording.
Reference Books	1. Radio in New Avatar AM To FM - Dr. Amrisha Swana 2. Key Concept in Radio Studies.- Hugh Chignell 3. Radio Broadcasting Journalism in India - J. David 4. Radio, TV & Broadcast Journalism - R.K. Ravidran 5. Writing and Reporting for Radio - Henry Tenenbaum 6. Radio and Television Journalism - K. M. Srivastava
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Palpana Rao

Course: 2001131203030001 Fundamentals of Television Medium

Course Code	2001131203030001									
Course Title	Introduction to Television Medium									
Credit	4									
Teaching per Week	4 Hrs									
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)									
Effective From	June 2021									
Purpose of Course	The purpose of this course is to give insight the student with television medium.									
Course Objective	The student will be given knowledge into the theoretical aspects of television medium and the practical aspects of television production.									
Course Outcomes	CO1: Student will be able to understand television as a medium of communication. CO2: Student will be able to understand various aspects of television medium in the Indian context. CO3: Student will be able to prepare television programmes from ideation to post production.									
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
	CO1									
	CO2									
Pre-requisite	Viewing of Television programmes									

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Course Content	Unit-1 Development of television in the world and India, Doordarshan; genesis, growth, guidelines, role, functions and objectives, introduction of satellite communication, cable tv, video boom, private television channel in India, web television, national broadcast trust, Joshi committee. SITE, STEP, Kheda, Pij. Unit-2 Television; mass medium, visual communication, grammar, vocabulary, elements, characteristics, programme genres, format, news, news gathering, breaking news, news reports, documentary, interviews, discussions, chat shows, video spot, telefilms; pre production: idea to script, research, visualization, story board, shooting and editing schedules, practical exercises of story board, basic writing skills. Unit-3 Production: production team: structure and function, studio: layout and equipment, set design, shooting, frame, colour, balance, basics of camera movements, shot compositions, single and multi-camera set-up, lighting techniques, different kinds of lights and their usage, reflectors, sound, use of tele prompter, cue cards, technical terms, facing camera. Unit-4 Post-production: editing principles, devices, video and audio editing, cut, mix, dissolve, fade, special and digital effects, sound mixing, off line and online editing.
Reference Books	1. Television field products and reposting - Frederick Shook 2. Radio and television journalism - Meena Devi 3. TV news: building a career in broadcast journalism - Ray White 4. Television drama: theories and identities - Sue Thronham and Tony Purvis 5. टेलीविजन प्रकाशिका सिद्धांत एवं तकनीक - लेखक :- डॉ. इंद्रजीत स्वर्णमुलिकाराम
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

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Course: 2001131203040001 Radio Writing and Production Skills

Course Code	2001131203040001								
Course Title	Radio Writing and Production Skills								
Credit	4								
Teaching per Week	4 Hrs								
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)								
Effective From	June 2021								
Purpose of Course	To train the student in skills of radio writing and production.								
Course Objective	To train students in skills to work in the radio medium and to independently make programmes.								
Course Outcomes	CO1: The student will be trained in writing for radio, doing Jock Talk, producing programmes.								
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
	CO1								
Pre-requisite	Aptitude for audio medium and listening to radio medium								
Course Content	Unit 1 Writing for radio programmes: basic principles of radio writing, spoken language, usage of sound and sound effects, illustrating copy with sound effects, usage of radio grammar, news writing. Unit 2 Samacharprabhaag, announcement, interview, link, feature writing, documentary writing, skit, entertainment programme script writing, commercials, jock talk, sparklers, subject specialized programme writing, voice training and modulation. Unit 3 Radio programme production: basics of audio recording, microphone usage, dubbing and mixing technique, Usage of software, usage various sound and sound effects in editing, field recording skills, non liner editing. Unit 4 Exercises in Production								
Reference Books	Radio 1-Media Production : A Practical Guide To radio and TV - Willett Amanda, T and F India 2 - Producer to Producer - Maureen A. Ryan								
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment								
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination								

Kalpana Das

Course : 2001131203050001 Art Of Anchoring and Dubbing(Practical)

Course Code	2001131203050001								
Course Title	Art Of Anchoring and Dubbing (Practical)								
Credit	4								
Teaching per Week	4 Hrs								
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)								
Effective From	June 2021								
Purpose of Course	To train students in anchoring and dubbing.								
Course Objective	To train students in all aspects of anchoring and dubbing.								
Course Outcomes	CO1: Skill development in anchoring CO2: Skill development in dubbing								
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
	CO1								
	CO2								
Pre-requisite									
Course Content	Art of Anchoring and Dubbing(Practical) Unit 1 Know your voice, detailed study of method of voicing, voice modulation, basic skill of news presentation (tv and radio), RJ mention, Unit 2 Announcement, anchoring for fm and vividhbharti , anchoring (radio and tv), studio and outdoor interview skill, panel discussion skill, commercial, voice over, storytelling, pitch play, conduct different types of programme like agricultural, science, sports, women and children Exercises in anchoring Unit 3 Dubbing:Scope for voicing, lipsync, time scheduling, using subtitle, recording. Unit 4 Exercises in dubbing								
Reference Books	Anchoring 1 - Anchoring - Brain M fagan 2 - Anchoring : All techniques for all bottoms - Don Bamford 3 - Creative Anchoring - Chasing the horizon 4 - News Anchoring - Richa Jain Kalra								

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	Dubbing 1 - Dubbing, film and performance : uncanny encounters - Charlotte Bosseaux 2 - Dubbing and subtitling - gilbert fong 3 - Reassessing Dubbing - Irene Ranzato, serenella Zanoti 4 - Audio visual Translation : Dubbing - Frederic Chaume
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	50% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

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Course: 2101131204050003 Skills in Public Relations

Course Code	2101131204050003									
Course Title	Skills in Public Relations (Practical)									
Credit	4									
Teaching per Week	4 Hrs									
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)									
Effective From	June 2021									
Purpose of Course	To train students in the practical aspects of public relations.									
Course Objective	To train students in all aspects of public relations									
Course Outcomes	CO1: Skill development in writing press notes, newsletters, coordinating articles, features and photographs for the media. CO2: Skill development in organizing a press conference CO3: Skill development in internal communication.									
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
	CO1									
	CO2									
	CO3									
Pre-requisite	Reading of newspapers and newsmagazines. Basic command over language									
Course Content	Unit 1 Writing skills: newsletter, house journal, brochures etc. Unit 2 Writing skills: backgrounder, press note, features, etc. Unit 3 Production skills: newsletter, house journal, brochure, notice board, Unit 4 Practical exercises: speaking skills and organising skills for press briefing/ press conference/ events.									
Reference Books	1. Public Relations: Cutlip and Centre 2. Advertising and public relations research - Jugenheimer									

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	3. The practice of public relations - Wilfred Howard
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Kalpana Das

Internship Project

Course Code																					
Course Title	Internship Project																				
Credit	2																				
Teaching per Week	2 Hrs																				
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)																				
Effective From	June 2021																				
Purpose of Course	To train the student in applying concepts learnt in all 3 semesters in a field project																				
Course Objective	To enable student to apply theory concepts in field situations																				
Course Outcomes	CO 1:Students will be able to apply concepts learnt in real life situations																				
Mapping between COs with PSOs	<table><tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td><td>PSO6</td><td>PSO7</td><td>PSO8</td><td>PSO9</td></tr><tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	CO1									
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9												
CO1																					
Prc-requisite																					
Course Content	Students will do a project on a relevant topic.																				
Reference Books	The books relevant to the topic will be individually suggested to the student.																				
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment																				
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination																				

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Mass Communication:4th Semester

Fundamentals of New Media

Course Code																																																			
Course Title	Fundamentals of New Media																																																		
Credit	4																																																		
Teaching per Week	4 Hrs																																																		
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)																																																		
Effective From	June 2021																																																		
Purpose of Course	To introduce the student to the latest media: new/social/digital/online media both the theoretical and the practical aspects of it.																																																		
Course Objective	To enable the student to understand ne/social/online/digital media so as to work in this emerging area.																																																		
Course Outcomes	CO1: Students will understand the web and social media; the concept and impact on society. CO2: Students will be able to understand the concept of social media networks and the significance of blogging. CO3: Students will be able to understand online journalism and citizen journalism. CO4: Students will be able to understand ethics pertaining to citizen journalism.																																																		
Mapping between COs with PSOs	<table><tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td><td>PSO6</td><td>PSO7</td><td>PSO8</td><td>PSO9</td></tr><tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	CO1										CO2										CO3										CO4									
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9																																										
CO1																																																			
CO2																																																			
CO3																																																			
CO4																																																			
Pre-requisite	General awareness about internet and social media.																																																		

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Course Content

Unit 1

Internet: concept, history, development and growth, new media: concept, definition, characteristics, advantages, new media and mass media, knowledge society, public sphere, community media, participatory communication and media, keywords, SEO, permalink (URL), meta tags, analytics.

Social Media: social sharing and social networking, social media: concept, definition, history, growth, development, characteristics, impact, advantages, drawbacks, optimization, types, facebook, twitter, youtube, google plus, linkedin, pinterest, quora, whats app, instagram, fake news and photos on social media: impact and precautions.

Unit 2

Blogging: web 2.0, definition, concept, origins, modernisation, types, community and cataloging, blog search engines, blogging communities, blog content strategy, blog audience, blogging in India, video blogging, social blogging, micro blogging, defamation, liability, employment, content writing for blogging.

Social networking: features, types, emerging trends, future, power and value, mobile social networking, URL shortners, measuring social media performance, e-mail marketing, livestreaming, content writing for social networking.

Unit 3

Online Journalism: definition, characteristics, changing landscape: newspapers and broadcast outlets on the web, online tools to manage text : links, photos, maps, audio, video, viral content, online journalism in india, e-Governance

Citizen journalism: definition, concept, history, citizen journalists, citizen media, criticism, immediacy, interactivity, universality feature of online journalism, political dangers, personal safety.

Unit 4

Online Reporting: news blog, blogosphere, website, hypertext, multimedia, language and style, pod cast and web cast, tools for news gathering, wiki news, fake news; usage and impact in politics, economic and social forum (case studies), e-journalist; challenges, e-books, e-publishing, content writing for online reporting.

Ethics in online journalism: obscenity, piracy, copyright, libel, cyber crimes and cyber law, national ICT policy act 2000, MLM online scam, email scam. copy left and open source, fake news, privacy, plagiarism, porn, cyber bully, net war, cyber terrorism, cyber conflicts, fraudshacking.

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Reference Books	1. Cyber media journalism – Jagadish Chakravathy 2. Social media marketing – Paul Martin , Thomas Ericson 3. New media – Anna Everett 4. Social media: - a critical introduction - Christian Fuchs. 5. Digital media and weblog journalism - Arvind Kumar 6. Online journalism:a basic text – Tapas Roy 7. Digital broadcasting journalism author:- Jitendra Kumar Sharma 8. Digital media – T.K. Ganesh
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Kalpana Das

Course:2101131204050003 Skills in New Media (Practical)

Course Code	2101131204050003																																								
Course Title	Skills in New Media (Practical)																																								
Credit	4																																								
Teaching per Week	4 Hrs																																								
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)																																								
Effective From	June 2021																																								
Purpose of Course	To introduce the student to practical aspects of the theory learnt in the P 16 regarding the new media.																																								
Course Objective	To enable the student to do the practical aspects new/social/online/digital media so as to work in this emerging area.																																								
Course Outcomes	CO1:Students will learn to prepare websites, and create content for websites. CO2:Students will be able to engage in the social networks and do blogging. CO3:Students will be able to do online journalism and citizen journalism.																																								
Mapping between COs with PSOs	<table><tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td><td>PSO6</td><td>PSO7</td><td>PSO8</td><td>PSO9</td></tr><tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	CO1										CO2										CO3									
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9																																
CO1																																									
CO2																																									
CO3																																									
Pre-requisite	General awareness about internet and social media.																																								
Course Content	Unit 1 Practical exercises in preparing a news blog and an audio blog Unit 2 Practical exercises in preparing a you tube channel Unit 3 Pratical exercises in preparing a video blog Unit 4 Practical exercises in preparing online magazine andcontent writing for social networking sites.																																								

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Reference Books	1. Cyber media journalism – Jagadish Chakravarthy 2. Social media marketing – Paul Martin , Thomas Ericson 3. New media – Anna Everett 4. Social media: - a critical introduction - Christian Fuchs. 5. Digital media and weblog journalism - Arvind Kumar 6. Online journalism:a basic text - Tapas Roy 7. Digital broadcasting journalism author:- Jitendra Kumar Sharma 8. Digital media – T.K. Ganesh
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Kalpana Rao

Course: 2101131204040002 Television Writing and Production Skills(Practical)

Course Code	2101131204040002									
Course Title	Television Writing and Production Skills (Practical)									
Credit	4									
Teaching per Week	4 Hrs									
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)									
Effective From	June 2021									
Purpose of Course	To train students in television writing and production skills.									
Course Objective	To train students in writing for television, production and post production skills.									
Course Outcomes	CO1: Developing in students skills in Television Writing and Production Skills									
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
	CO1									
Pre-requisite										
Course Content	Unit 1 Writing for television programmes: basic principles of television writing, visual language, dope sheet writing, story formation, script writing, screenplay, story board, Unit 2 Writing news, interview, link, feature writing, documentary writing, skit, entertainment programme script writing, commercials, sitcom, subject specialized programme writing. Unit 3 Production for television: shooting, frame, basics of camera movements, shot compositions, lighting techniques, different kinds of lights and their usage, using reflectors, facing camera. Exercises in production Unit 4 Video editing, audio video editing, principles of editing, cut, mix, dissolve, fade, special and digital effects, sound mixing, off line and online editing. Exercises in editing									
Reference Books	Television Production 1 - Television Programme Production - Subhash Sharma, Vibha Malhotra 2 - Effective TV Production - Gerald Millerson 3 - Production Design - Visual Design for Film and Television : Peg McClellan 4 - Television Production - Jim Owens									

10/10/2021

	Producing for TV and Emerging Media : Dustin Marrow, Kacey Marrow 5- Directors Tells the story - Bethany Rooney, Mary Lou Belli 6 - Running the Show(the assistant gulde to being a First Assistant Director) - Liz Gill
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Kalpana Rao

Course: 2101131204050002 Short Film Production (Practical)

Course Code	2101131204050002									
Course Title	Short Film Production (Practical)									
Credit	4									
Teaching per Week	4 Hrs									
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)									
Effective From	June 2021									
Purpose of Course	To impart practical training to the students in short film production									
Course Objective	To impart to the students training in Short Film Production so that they can independently make short films									
Course Outcomes	CO1 To inculcate in students skills in short film production: writing skills, production and post production.									
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
	CO1									
Pre-requisite	Viewing of short films and films in general									
Course Content	Short Film Production (Practical) Unit 1 Pre production: basics of story, structure, concept development, storytelling elements, theme, plot, characters, character development, dialogue, synopsis, script, story board and subtitle. Unit 2 Production: cameras; parts, classification and comparison, mechanism of aperture, shutter shot composition; shot angle, camera angle, lighting arrangement, usage of outdoor and indoor lighting, white balance, images transport, lenses and camera operation, set design, prop and basic skills of direction. Unit 3 Post production: principles of editing, audio video editing, editing devices, basics of photo editing, software, basic movie editing, movie editing software, dubbing, mixing and different types of editing. Marketing of film on social media and film festivals. Unit 4 Exercises in making of short film									
Reference Books	1 Making Short Films: The Complete Guide from Script to Screen - Clifford Jhurlow 2 How Not to Make a Short Film - Robert Marie Munroe 3 The Short Screenplay: Your Short Film from Concept to Production - Dan Gurskis 4- Writing Short Film Scripts - Paul Kooperman									

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Teaching Methodology	Discussion, Field Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

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Course:2001131203050002 Photography and Photojournalism

Course Code	2001131203050002									
Course Title	Photography and Photojournalism (Practical)									
Credit	4									
Teaching per Week	4 Hrs									
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)									
Effective From	June 2021									
Purpose of Course	To impart practical training to the students in photography and photojournalism									
Course Objective	To impart to the students training in in photography so that they can independently work as photographers and photojournalists									
Course Outcomes	CO1To inculcate in students skills in so that they can make careers and photographers and photojournalists									
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
	CO1									
Pre-requisite	Viewing of photographs and familiarity with camera.									
Course Content	Photography and Photojournalism (Practical) Unit 1 Cameras; classification, comparison of different types, mechanism of aperture, shutter, camera body, view finder,shots composition, angle, camera angle, lighting arrangement and usage of outdoor and indoor lighting, white balance,images transport, lenses and camera operation,practical exercises in photography andphoto editing software Unit 2 Exercises in photography Unit 3 Significance of photos in journalism, writing captions, learn, recognize, verbalize and employ the qualities of storytelling images, producing a photo story, preparation/research, legwork, photography technique, editing technique, crafting of images through exposure, lens, composition, moment and light, Learn how to take quality photos, edit photos in latest software. Unit 4 Exercises in photojournalism									
Reference Books	1. Photojournalism – PoorvaTriakha 2. Photojournalism - David Herrod 3. Photojournalism and communication technology - Pankaj Sethi 4. The Art of Photography - Bruce Barabaum 5. Photography --- Susan Sontag									

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Teaching Methodology	Field Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University practical examination

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Course: 2101131204050003 Skills in Advertising

Course Code	2101131204050003									
Course Title	Skills in Advertising									
Credit	4									
Teaching per Week	4 Hrs									
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)									
Effective From	June 2021									
Purpose of Course	To enable students to understand how to get students to understand how to do the practical aspects of advertising.									
Course Objective	To enable students to understand how to prepare advertisements.									
Course Outcomes	CO1: The student will understand how to prepare advertisements									
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
	CO1									
Pre-requisite	Interest in advertisements.									
Course Content	Unit 1 Practical exercises in copy writing, creative strategy and design of advertisement Unit 2 Practical exercises in preparing of advertisements for print medium Unit 3 Practical exercises in preparing of advertisements for radio Unit 4 Practical exercises in preparing of advertisements for television.									
Reference Books	1. Journalism, advertisement and public relations ShailendraSengar 2. Introduction to advertising and public relations ShipraKundra 3. Advertising and public relations research - Jugenheimer 4. The practice of public relations - Wilfred Howard 5. Fundamentals of advertising public relations - DhruvSabarwal									
Teaching Methodology	Practical Assignment and Field Work									
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination									

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Course: 2101131204060002 Dissertation

Course Code	2101131204060002									
Course Title	Dissertation									
Credit	4									
Teaching per Week	4 Hrs									
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)									
Effective From	June 2021									
Purpose of Course	To enable students to understand how to do research in communication.									
Course Objective	To enable students to understand research approaches, methods and methodology									
Course Outcomes	CO1: The student will understand research methodology do research under the guidance of a faculty.									
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
	CO1									
Pre-requisite	Interest in research and communication studies.									
Course Content	The student will write a dissertation on a research topic under the guidance of a faculty.									
Reference Books	1. Communication research - John and Sandy Hutchesor 2. Research methodology – Dr. A.K. Phophalia 3. Mass media research – Roger D. Wimmer, Joseph R. Dominick 4. Communication research – a half century appraisal - Danial Lerner									
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment									
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination									

Kalpana Rao

P.G. Diploma in Journalism

Name of Program	P.G. Diploma in Journalism
Abbreviation	P.G. D. J.
Duration	1 Year
Eligibility Criteria	Graduate in any subject/faculty with 40% marks in graduation (35% for SC/ST category) from a recognised University.
Objective of Program	The core objective of the program is to train students for entry level careers in the Print media, News Media, Advertising and Public Relations industry by enhancing their core writing and communication skills and by providing an environment of teaching & learning.
Program Outcome	PO1: Fundamental Knowledge Enrichment Program trains students with the core Journalism and mass communication knowledge. It makes them capable of using core concepts in the theory of journalism in the practical application in the field. PO2: Understanding of Current Events and Trends The program trains students to understand the current events and trends and their significance in all areas and levels so as to comprehend their importance for society and the nation. PO3: Critical Thinking Development The program develops critical thinking skills of the issues and problems of the world around which are to be highlighted as news in the media. PO3: Development of Basic Media Skills: The program equips students with basic skills in writing, editing and translation. PO5: Development of Computer usage and Software Skills: The program increases students' familiarity with computers and trains them in the usage of the appropriate computer software for editing and presentation of content.
Program Specific Outcomes	PSO 1 Develop and strengthen students' understanding of the concept of mass communication, journalism, advertising and public relations. PSO 2 Develop and nurture in the students the insight into the concept of news, its identification, selection and composition of different news on a newspaper.

HEAD
Department of
Journalism and Mass Communication
Veer Narmad South Gujarat University
Surat-395007.

Kalpna Rao

	page.																																																																								
	PSO3Train students to apply concepts learnt, to write news reports, features and editorials.																																																																								
	PSO4Train students to translate news reports, features and editorials from English to Gujarati/Hindi.																																																																								
	PSO5Train students to edit news, prepare layout of pages on computer software.																																																																								
	PSO6Train students to take photographs, edit, select and write captions for them.																																																																								
	PSO7Develop the ability to create blogs and content writing skills for blogs.																																																																								
	PSO8Develop in them writing skills to work as journalists for News Portals.																																																																								
	PSO9Train students to understand current events and trends and express themselves comprehensively on current news.																																																																								
	PSO10Hone and refine students' verbal communication skills in all settings and boost their underlying confidence levels.																																																																								
	PSO11Inculcate in the students the highest ethical standards as expected of journalists in the India today.																																																																								
Mapping between POs and PSOs	<table><tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td><td>PSO6</td><td>PSO7</td><td>PSO8</td><td>PSO9</td><td>PSO10</td><td>PSO11</td></tr><tr><td>PO1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>PO2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>PO3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>PO4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>PO5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	PSO11	PO1												PO2												PO3												PO4												PO5											
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PO4																																																																									
PO5																																																																									
Medium of Instruction	Gujarati																																																																								
Program Structure	Semester I																																																																								
Course Code	Title	Teaching per week		Course Credits	University Examination		Internal Marks	Total Marks																																																																	
		Theory	Practical		Duration	Marks																																																																			
19012701010002	Principles Of Journalism and	4	0	4	2 Hrs	50	20	70																																																																	

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	History of Gujarati Journalism							
1901270101020002	Reporting and Newspaper Translation	4	0	4	2 Hrs	50	20	70
1901270101030002	General Knowledge and Law of The Press	4	0	4	2 Hrs	50	20	70
1901270101040002	Introduction to Public Relation and Adverting	4	0	4	2 Hrs	50	20	70
2001270101050002	Computer Skills (Practical)	0	4	4	2 Hrs	50	20	70
1901270101060002	Term Paper	2	0	2	2 Hrs	50	20	70
-	Total	18	4	22				
Program Structure		Semester 2						
Course Code	Title	Teaching per week		Course Credits	University Examination		Internal Marks	Total Marks
		Theory	Practical		Duration	Marks		
2001270102010001	Editing, Writing and Translation Skills	2	2	4	2 Hrs	50	20	70
72001270102020001	New Media And Online Journalism	4	0	4	2 Hrs	50	20	70
2101270102030002	Communication Skills(Practical)	0	4	4	4 Hrs	50	20	70
2001270102040001	Skills in Photography, Online Journalism, Public Relations and Advertising(Practical)		4	4	4 Hrs	50	20	70
2001270102050001	Print Journalism (Practical)	0	4	4	4 Hrs	50	20	70
2001270102060001	Term Paper	2	0	2	2 Hrs	50	20	70
	Total	14	8	22				

Kalpavansha

P.G. Diploma in Journalism 1st Semester

Course: 19012701010002: Principles of Journalism and History of Gujarati Journalism

Course Code	19012701010002																																																																								
Course Title	Principles of Journalism and History of Gujarati Journalism																																																																								
Credit	4																																																																								
Teaching per Week	4 Hrs																																																																								
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)																																																																								
Effective From	June 2019																																																																								
Purpose of Course	To give students an insight into concepts of Mass Communication, Mass Media and Journalism and history and development of Journalism in Gujarat																																																																								
Course Objective	To enable the students to understand the basic concepts of media studies to students can make careers in mass media and journalism																																																																								
Course Outcomes	CO1 Student will understand the nature, concept, characteristics of mass media, mass communication and journalism and the significant models of both. CO2 Students will understand the concept of journalism, its significance in a democracy and the different types of journalism as practised today. CO3 Students will understand the working of a newspaper office, the different sections and their functions, the production process of the newspaper. CO4 Students will gain an insight into newspaper ownership patterns, press commissions and media units associated with press. CO5 Students will get an overview of the significance of Gujarati language journalism, its contribution in social reforms and India's Independence movement.																																																																								
Mapping between COs with PSOs	<table><tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td><td>PSO6</td><td>PSO7</td><td>PSO8</td><td>PSO9</td><td>PSO10</td><td>PSO11</td></tr><tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	PSO11	CO1												CO2												CO3												CO4												CO5											
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CO3																																																																									
CO4																																																																									
CO5																																																																									
Pre-requisite	Basic knowledge of school/college level Social Studies																																																																								

Malpana Rao

Course Content	Unit 1 Communication and mass communication; concept, characteristics, functions, models: Aristotle, Newcomb, Lasswell, Lazarsfeld, opinion leaders, news flow models; McNelly, Bass and Mowlana, 7 C's, Sadharanikaran, four normative theories of press, mass media effect theories: hypodermic needle, limited effects, spiral of silence, selective exposure, perception, retention, agenda setting, gate keeping, knowledge-gap hypothesis, attitude and public opinion formation. Unit 2 Journalism: concept, principles, functions, role journalism and democracy, fourth estate, types of journalism: investigative, interpretative, rural, film, women's, children, business, sports, science, health, yellow, tabloid, citizen, alternative, development, journalism in newspapers, magazines, television, radio, online. Unit 3 Newspapers, organizational structure, functions and hierarchy of editorial, advertising, circulation, production, printing departments, coordination between departments, procedure to launch a publication, ownership patterns of newspapers, first and second press commissions, bodies: ABC, DAVP, RNI, INS. Unit 4 Origin and development, different phases (1822-1857, 1857-1915, 1915-1947), contribution of Parsis, journalism in Saurashtra, Ahmedabad, Surat; profile of important newspapers; Mumbai Samachar, Jame Jamshed, Vartaman, Raste Goftar, Satyapraksh, Dandiyo, Navjivan, Harijan, Editors: Dadabhai Navroji, Zaverchand Meghani, Ichchihaaram Desai, Karsandas Mulji, Gandhi, Narmad.
Reference Books	1. Mass communication in India – Keval J. Kumar 2. Journalism – M V Kamath 3. Saurashtrano Patrakaratva – Yasin Dalal 4. Patrakaratvano Itihas – Vishnu Pandya
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Kalpna Rao

Course: 190127010102002 Reporting and Newspaper Translation

Course Code	190127010102002																																																																																				
Course Title	Reporting and Newspaper Translation																																																																																				
Credit	4																																																																																				
Teaching per Week	4 Hrs																																																																																				
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)																																																																																				
Effective From	June 2019																																																																																				
Purpose of Course	To give students an insight into concept of news and features and to make them capable of writing the same.																																																																																				
Course Objective	To give the student knowledge of news reports, features and the capacity to independently write them. To give students translation skills from English to Gujarati/Hindi.																																																																																				
Course Outcomes	CO1 Student will understand news, news values, how to analyse news, structure of news report and how to write a news report. CO2 Students will understand different types of news reports, beats, different types of beats in a newspaper, concept of a news agency, its structure and functions. CO3 Students will be able to understand the concept, types and structure of features in newspaper and magazines. CO4 Student will be able to write news report for a newspaper and a news agency. CO5 Student will be able to understand and analyse features and will be able to write a simple feature for a magazine or a newspaper CO6 Student will be able to translate news agency copy and press notes from English to Hindi/Gujarati. They will be able to edit the news reports.																																																																																				
Mapping between COs with PSOs	<table><tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td><td>PSO6</td><td>PSO7</td><td>PSO8</td><td>PSO9</td><td>PSO10</td><td>PSO11</td></tr><tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO6</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	PSO11	CO1												CO2												CO3												CO4												CO5												CO6											
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CO4																																																																																					
CO5																																																																																					
CO6																																																																																					
Pre-requisite	Regular reading of newspapers and magazine, basic knowledge of newspaper English/Hindi/Gujarati																																																																																				

Rajendra Rao

Course Content	Unit 1. News; definition, concept, sources, news values, type of news; political, social, cultural etc., hard, soft, predictable, unpredictable, infotainment, reporting unit; hierarchy, duties of chief reporter, stringer, etc., news report; format, parts, lead; types, structure, headlines: kinds, purpose, practical exercises in writing news reports. Reporter; qualities, reporting; types: beat, sports, crime, politics, business, education, etc., news stories; follow up, curtain raiser, news features, developing news, breaking news, exclusive stories, scoops, interviewing for news, news agencies: functions, role; PTI, UNI, AP, UPI, AFP, Reuters. Unit 2 Feature: concept, objectives, difference between feature and essay, news report, editorial; types of features: timeless features news feature, columns, how to, first person, vox pop, backgrounder, photo feature, travelogues, lifestyle, interviews, personality sketch, reviews, agony aunt, string of pearls, process of feature writing: idea generation, data collection, data processing, writing, feature: structure lead, use of pictures and graphics Unit 3 and Unit 4 Practical exercises in translation of news reports and news agency copy.
Reference Books	1. News writing -- B.S. Goyal 2. Reporting and Editing in Journalism- K. C. Sharma, Anupama Sharma Pathak. 3. Journalism -- M V Kamath 4. Reporting -- Yasin Dalal
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Anupama Pathak

Course: 1901270101030002 General Knowledge and Law of the Press

Course Code	1901270101030002											
Course Title	General Knowledge and Law of the Press											
Credits	4											
Teaching per Week	4 Hrs											
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)											
Effective From	June 2019											
Purpose of Course	To give students an insight into General Knowledge, Current events and an insight into the Constitution of India, and Media laws and ethics.											
Course Objective	To enable students to understand, analyse and write about current events in the right perspective and to understand the basic aspects of the Indian Constitution and Media Law and Ethics.											
Course Outcomes	CO1Student will understand, analyse and write comprehensively on current events and trends and understand the reasons behind events. CO2Students will understand the salient aspects and basic structure of the Constitution of India, fundamental rights, duties and the Directive Principles of State Policy. CO3Students will be able to understand law from the perspective of a journalist; will understand the basics of civil wrong, crime and punishment and the produce of CrPC for the same. Student will be well versed in the ethical aspects and the code of conduct for a journalist.											
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	PSO11
	CO1											
	CO2											
	CO3											
Pre-requisite	Regular reading of newspapers, magazines and news channels.											

Malpana Rao

Course Content	Unit 1 and Unit 2 The syllabus in these two units will consist of topics pertaining to news, current affairs and trends that occurred during the time period of the semester. Specifically developments in the field of politics, economics, culture, as also issues pertaining to terrorism, globalization, women, marginalised castes, migration, etc., will be discussed. The class room sessions will be interactive and will consist of quiz, presentations, seminars and library work. The student will be evaluated in his/her understanding and interpretation of news, current affairs, and trends. Unit 3 Indian Constitution: salient features, preamble, fundamental rights and duties, directive principles, Art 19 (1) (a) freedom of speech and expression, reasonable restrictions, emergency and media, brief history of press laws in India, privileges of parliament (Article 105 and 194), laws: defamation, contempt of court, contempt of legislature, obscenity, official secrets act., copyright act, RTI Act, IT act, PRB act, working journalist act. Unit 4 Concept of criminal and civil wrong, criminal procedure (FIR, bail, summons, arrest, warrant, cognizable and non-cognizable offences), code of conduct for journalists, media trial, subjudice, privacy, protection of sources, sting operation, reporting of sexual crimes and communal violence, regulatory body: Press Council.
Reference Books	1. Media laws and Indian constitution - Kundra S. 2. Fundamental rights and constitutional Amendment - Dr. L. M. Singhvi 3. Mass media and Democracy - Nayyar Shamsi 4. Media Ethics and Laws - Naval Prabhakar, Narendra Basu 5. Patrakaratva Kayada - Vishnu Pandya 6. Pratiyogita Darpan 7. Competition Success Review 8. Newspapers and News magazines
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Kalpana Rao

Course: 1901270101040002 Introduction to Public Relations and Advertising

Course Code	1901270101040002																																																												
Course Title	Introduction to Public Relations and Advertising																																																												
Credit	4																																																												
Teaching per Week	4 Hrs																																																												
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)																																																												
Effective From	June 2019																																																												
Purpose of Course	To give students an insight into the theoretical aspects of Public Relations and Advertising and to give them an insight into the profession and job opportunity in advertising and public relations.																																																												
Course Objective	To enable students to understand the theoretical aspects of the professions of public relations and advertising so as to enable them to make careers in the area.																																																												
Course Outcomes	CO1 Students will understand the public relations and allied concepts and the process of PR and PR as a management function. CO2 Students will be able to independently write press note, arrange press conference, press meets and organise press activities. CO3 Students will understand advertising as a part of marketing mix and the process of advertising campaign. CO4 Students will be able to write advertising copy for simple advertisements.																																																												
Mapping between COs with PSOs	<table><tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td><td>PSO6</td><td>PSO7</td><td>PSO8</td><td>PSO9</td><td>PSO10</td><td>PSO11</td></tr><tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	PSO11	CO1												CO2												CO3												CO4											
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CO2																																																													
CO3																																																													
CO4																																																													
Pre-requisite	Regular reading of advertisements in mass media.																																																												

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Course Content	Unit 1 Public Relations: philosophy, definition, role, misconception, public relations vs. communication, corporate communication, propaganda, advertising, publicity, public opinion, marketing, liaisoning, lobbying, promotion, PRO: role, organisation set-up of PR departments/ agencies; PR in Central and State depts. Unit 2 Writing for PR; press release, handout, feature, articles, speech writing, background material, tools of PR: news letter, house journal, brochure, annual reports, posters, corporate films, advertisements, press conference, press kit, new/social media, media relations, marketing, financial and community PR, PR campaign planning, crisis management, citizen charter. Unit 3 Advertising; concept, definition, types, objectives, role, criticism, benefits; advertising and personal selling, marketing mix, advertising media: print, electronic, outdoor, web, radio, television, concepts: consumer analysis, product analysis, media planning, market analysis, market segmentation, advertising agency: structure and function of departments. Unit 4 Models of advertising: AIDA, DAGMAR, Maslow's, making of an ad, creative process, creative strategies: USP, appeal, brand image, identity, positioning, personality, execution style (demonstration, slice of life, narration, use of endorser, etc.), parts of a print ad, practical exercises in copy writing.
Reference Books	1. Journalism, advertisement and public relations - Shailendra Sengar 2. Introduction to advertising and public relations - Shipra Kundra 3. Advertising and public relations research - Jugenheimer 4. The practice of public relations - Wilfred Howard 5. Fundamentals of advertising and public relations - Dhruv Sabarwal
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Rajendra Rao

Course: 2001270101050002 Computer Skills (Practical)

Course Code	2001270101050002											
Course Title	Computer Skills (Practical)											
Credit	4											
Teaching per Week	4 Hrs											
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)											
Effective From	June 2019											
Purpose of Course	To give student a practical training into the use of Computer in print media.											
Course Objective	To make student skilled with usage of computers and software used in Print media production.											
Course Outcomes	CO1The student will understand MS Office, Excel, PPT. CO2The student will have proficiency in Gujarati and English typing. CO3Student will be able to work on software: Photoshop, Indesign and Coral Draw and independently prepare layouts of pages in print media.											
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	PSO11
	CO1											
	CO2											
	CO3											
Pre-requisite	Basic knowledge of computers.											
Course Content	This is a practical paper in which the following topics are covered: Gujarati and English typing, MS Office, Photoshop, Coral Draw, Page Maker, Indesign, Quark Express and Internet usage.											
Reference Books	1. Desk Top Publishing: Bitu Kumar											
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment											
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination											

Kalpna Das

Course: 1901270101060002 Term Paper

Course Code	1901270101060002											
Course Title	Term Paper											
Credit	2											
Teaching per Week	2 Hrs											
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)											
Effective From	June 2019											
Purpose of Course	To enable the student to comprehend any relevant aspect of mass media, journalism advertising and public relations.											
Course Objective	To enable the student to gain insight in any current aspect of the journalism and mass media.											
Course Outcomes	CO1The student will have the skills to comprehend aspects of journalism, advertising and public relations.											
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	PSO11
	CO1											
Pre-requisite	Library reading of books, magazines and newspapers and exposure to other media like Television, New Media and Radio											
Course Content	The student will write under the guidance of the faculty a paper a topic pertaining to journalism and mass communication.											
Reference Books	Newspapers, Magazines, Television channels, Radio and News Portals											
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment											
Evaluation Method	30% Internal assessment based on oral submission and of Term Paper. 70% External based Viva and submission of the Term paper.											

Malpani

P.G. Diploma in Journalism 2nd Semester

Course: 2001270102010001 Editing, Writing and Translation Skills

Course Code	2001270102010001																																																
Course Title	Editing , Writing and Translation Skills																																																
Credit	4																																																
Teaching per Week	4 Hrs																																																
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)																																																
Effective From	June 2019																																																
Purpose of Course	To enable the student to understand the theory and practical aspects of editing and editorial writing and training in writing of news reports, features and editorials.																																																
Course Objective	The student will understand the concept of editing and editorial writing and the theory and practical aspects.																																																
Course Outcomes	CO1Students will be able to understand the concept of editing and editorial writing. CO2Student will be able to write editorials, features and news reports. CO3Students will hone their translation skills																																																
Mapping between COs with PSOs	<table><tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td><td>PSO6</td><td>PSO7</td><td>PSO8</td><td>PSO9</td><td>PSO10</td><td>PSO11</td></tr><tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	PSO11	CO1												CO2												CO3											
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CO1																																																	
CO2																																																	
CO3																																																	
Pre-requisite	Regular reading of newspapers, magazines and news portals.																																																

Malpana Rao

Course Content	Unit 1 Editing; concept, guiding principles, process, news copy: types and sources, news room; hierarchy, functions of the staff; editor, news editor, chief sub-editor, etc., news day, preparation of pages, news flow and co-ordination, symbols: editing and proof reading, editing of special pages, concept of design and layout: elements, types, use of photos and graphics, practical exercises in editing and layout. Editorials: concept, objectives, language, types, style, language, edit page, content, layout, process of editorial writing; letters to the editor, Op Ed page, significance and content. Unit 2 The student will be given practical exercises to develop his writing skills in writing of features, news reports and editorials. Unit 3 and Unit 4 Practical exercises in translation of features and editorials.
Reference Books	1. Editing -- Bruce Westley 2. Editing -- M J S George 3. Mass Communication in India --Keval J Kumar 4. Lekh Lakhvani Kala -- Kumarpal Desai 5. Sampadan na Siddhant -- Vishnu Pandya
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Kalpana Rao

Course: 2001270102020001 New Media and Online Journalism

Course Code	2001270102020001																																																												
Course Title	New Media and Online Journalism																																																												
Credit	4																																																												
Teaching per Week	4 Hrs																																																												
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)																																																												
Effective From	June 2019																																																												
Purpose of Course	To enable the students to have insight into the working of social digital media and online journalism.																																																												
Course Objective	To enable the student to use the knowledge in working for online social and digital media.																																																												
Course Outcomes	CO1The student will be able to understand the Internet, social media and online journalism. CO2The student will be able to develop blogs and blog content and upload photos, audio and video files on blogs. CO3The student will be able to prepare website content. CO4Student will be able to create content for online new portals																																																												
Mapping between COs with PSOs	<table><tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td><td>PSO6</td><td>PSO7</td><td>PSO8</td><td>PSO9</td><td>PSO10</td><td>PSO11</td></tr><tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	PSO11	CO1												CO2												CO3												CO4											
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	PSO11																																																		
CO1																																																													
CO2																																																													
CO3																																																													
CO4																																																													
Pre-requisite	Understanding and constant exposure to social media, digital media and online media.																																																												

Rajpaul Rao

Course Content	Unit 1 Internet: concept, history, development and growth, new media: concept, definition, characteristics, advantages, new media and mass media, knowledge society, community media, keywords. Unit 2 Social Media: social sharing and social networking, social media: concept, definition, history, growth, development, characteristics, impact, advantages, drawbacks, types, facebook, twitter, youtube, etc., fake news and photos on social media: impact and precautions. Unit 3 Online Journalism: definition, characteristics, changing landscape: newspapers and broadcast outlets on the web, online tools to manage text : links, photos, maps, audio, video, viral content, online journalism in india, e-Governance, citizen journalism: definition, concept, citizen journalists, criticism, immediacy, interactivity, universality feature of online journalism, political dangers, personal safety. Unit 4 Online Reporting: news blog, language and style, pod cast and web cast, tools for news gathering, wiki news, fake news: usage and impact in politics, economic and social forum (case studies), e-journalist; challenges, e- books, e- publishing, content writing for online reporting.
Reference Books	1. Cyber media journalism – Jagadish Chakravarthy 2. Social media marketing – Paul Martin , Thomas Ericson 3. New media – Anna Everett 4. Social media: - a critical introduction - Christian Fuchs. 5. Digital media and weblog journalism - Arvind Kumar 6. Online journalism: a basic text - Tapas Roy 7. Digital broadcasting journalism author:- Jitendra Kumar Sharma 8. Digital media – T.K. Ganesh
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Malpana Das

Course: 2101270102030002 Communication Skills (Practical)

Course Code	2101270102030002											
Course Title	Communication Skills (Practical)											
Credit	4											
Teaching per Week	4 Hrs											
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)											
Effective From	June 2019											
Purpose of Course	To develop verbal communication skills and confidence in communication.											
Course Objective	Development of speaking skills and confidence of communication.											
Course Outcomes	CO1The student will be able to face job interviews with confidence. CO2The student will hone his speaking skills and public speaking skills before small and large groups. CO3The students will confidently participate in group discussions, speak extempore, compere programs and participate in debates and elocutions.											
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	PSO11
	CO1											
	CO2											
	CO3											
Pre-requisite	Confidence, language skills and exposure to mass media.											
Course Content	The paper imparts practical training in verbal communication skills, specifically presentation, extempore speech, debating, anchoring, elocution skills and so on.											
Reference Books	1. Effective Communication Skills; Kumar Kulbhushan 2. Professional Communication Skills: Jain A K											
Teaching Methodology	Practical sessions in the class rooms in storytelling, compering, mock interviews and so on.											
Evaluation Method	30% Internal assessment based on attendance, test in practical work. 70% External based on semester end practical Universityexamination											

Prasanna Rao

Course : 2001270102040001 Skills in Photography, Online Journalism, Public Relations and Advertising (Practical)

Course Code	2001270102040001											
Course Title	Skills in Photography, Online Journalism,Public Relations and Advertising(Practical)											
Credit	4											
Teaching per Week	4 Hrs											
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)											
Effective From	June 2019											
Purpose of Course	To develop skills in photography, online journalism, public relations and advertising											
Course Objective	The develop in the student skills in the practical aspects of journalism											
Course Outcomes	CO1The students will be able to take photographers at a professional level. CO2Student will be able to report and write for online news portals. CO3To be able to write press notes, organise press conferences, press meets, generate stories for an organisation and produce newsletters. CO4Student will be able to write copy for advertisements.											
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	PSO11
	CO1											
	CO2											
	CO3											
	CO4											
Pre-requisite	General awareness of the mass media and exposure and advertisements.											

Rajaram Rao

Course Content	This paper consists of practical work in photography, online journalism, public relations and advertising. Unit 1 Cameras; classification, comparison of different types, mechanism of aperture, shutter, camera body, view finder, shots composition, angle, camera angle, lighting arrangement and usage of outdoor and indoor lighting, white balance, images transport, lenses and camera operation, practical exercises in photography and photo editing software. Unit 2 Exercises in the following: preparing a news blog, audio blog, Facebook page, YouTube channel, online magazine, content writing for social networking. Unit 3 Exercises in the following: preparing a house journal, content for notice board, brochures, press release, press briefing and press conference, organising an event, Unit 4 Exercises in writing advertising copy, preparing of advertisements in print, radio and TV medium.
Reference Books	1. Photojournalism and communication technology - Pankaj Sethi 2. The Art of Photography - Bruce Barnbaum 3. New Media Techniques and Trend - Ashwin Razdan 4. Blogging For Writers : Robin Houghton 5. Create your own blog : Tris Hussey 6. Blogging - Amy Lupold Bair 7. Photography -- Susan Sontag 8. Public Relations: Cutlip and Centre 9. Advertising: Wright , Warner, Zeigler
Teaching Methodology	Practical assignments in the Classroom, Computer Lab and field.
Evaluation Method	30% Internal assessment based on class attendance, practical assignments in the subject. 70% External based on semester end practical University examination

: *Kalpna Rao*

Course : 2001270102050001 Print Journalism (Practical)

Course Code	2001270102050001
Course Title	Print Journalism(Practical)
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)
Effective From	June 2019
Purpose of Course	To develop skills in writing, editing and production of print media,
Course Objective	To develop skills in reporting, editing, translation, layout and production of a lab newspaper.
Course Outcomes	CO1The student will be able to prepare layouts in print media of articles, features and news reports. CO2The student will be able to work on Coral Draw, Photo shop, Indesign.
Mapping between COs with PSOs	
Pre-requisite	Understanding of the concepts taught in the first semester and continual reading and analysis of newspapers and magazines.
Course Content	This segment consists of practical work in reporting, editing, feature and editorial writing exercises.
Reference Books	1. Journalism – M V Kamath 2. Reporting -- Yasin Dalal 3. Desk Top Publishing: Bittu Kumar
Teaching Methodology	Practical work in Computer Lab.
Evaluation Method	30% Internal assessment based on class attendance, and practical examination. 70% External based on semester end University practical examination

Kalpana Rao

Course: 2001270102060001 Term Paper

Course Code	2001270102060001											
Course Title	Term Paper											
Credit	2											
Teaching per Week	2 Hrs											
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)											
Effective From	June 2019											
Purpose of Course	To enable the student to comprehend any relevant aspect of mass media, journalism advertising and public relations.											
Course Objective	To enable the student to gain insight in any current aspect of the journalism and mass media.											
Course Outcomes	CO1The student will have the skills to comprehend aspects of journalism, advertising and public relations.											
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	PSO11
	CO1											
Pre-requisite	Library reading of books, magazines and newspapers and exposure to other media like Television, New Media and Radio											
Course Content	The student will write under the guidance of the faculty a paper a topic pertaining to journalism and mass communication.											
Reference Books	Newspapers, Magazines, Television channels, Radio and News Portals											
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment											
Evaluation Method	30% Internal assessment based on oral submission and of Term Paper. 70% External based Viva and submission of the Term paper.											

Malpana Rao

P.G. Diploma in Journalism

Name of Program	P.O. Diploma in Journalism
Abbreviation	P.G. D. J.
Duration	1 Year
Program Outcome	PO1: Fundamental Knowledge Enrichment Program trains students with the core Journalism and mass communication knowledge. It makes them capable of Using core concepts in the theory of journalism in the practical application in the field. PO2: Understanding of Current Events and Trends The program trains students to understand the current events and trends and their significance in all areas and levels so as to comprehend their importance for society and the nation. PO3: Critical Thinking Development The program develops critical thinking skills of the issues and problems of the world around which are to be highlighted as news in the media. PO4: Development of Basic Media Skills: The program equips students with basic skills in writing, editing and translation. PO5: Development of Computer usage and Software Skills: The program increases students' familiarity with computers and trains them in the usage of the appropriate computer software for editing and presentation of content.

P.G. Diploma in Journalism

Name of Program	P.O. Diploma in Journalism
Abbreviation	P.G. D. J.
Duration	1 Year
Program Specific Outcomes	PSO 1 Develop and strengthen students' understanding of the concept of mass communication, journalism, advertising and public relations. PSO2 Develop and nurture in the students the insight into the concept of, news, its identification, selection and composition of different news on a newspaper page. PSO3 Train students to apply concepts learnt, to write news reports features and editorials. PSO4 Train students to translate news reports, features and editorials from English to Gujarati/Hindi. PSO5 Train students to edit news, prepare layout of pages on computer software. PSO6 Train students to take photographs, edit, select and write captions for them. PSO7 Develop the ability to create blogs and content writing skills for blogs. PSO8 Develop in them writing skills to work as journalists for News Portals. PSO9 Train students to understand current events and trends and express themselves comprehensively on current news. PSO10 Hone and refine students' verbal communication skills in all settings and boost their underlying confidence levels. PSO11 Inculcate in the students the highest ethics standards as expected of journalists in the India today.

PROGRAM OUTCOME

Statistics is the language of the uncertainties riddled modern information age. This program is a compact combination of detailed courses of Statistics and adequate amount of courses on Computer Science, Mathematics and Operations research to complement and offer diversification after the completion of program.

B.Sc.(General) Statistics programme consists of 70 credits spread over six semesters. Each credit has one hour of class room teaching per week. Total hours per week per paper 2 hours (theory) and 2 hours practical per paper. This programme emphasizes both theory and applications of statistics and is structured to provide knowledge and skills in depth necessary for the employability of students in industry, government sector, Banking, Insurance other organizations, as well as in academics.

P-1: understand basic theoretical and applied principles of statistics needed to enter the job force.

P-2: communicate key statistical concepts to non-statisticians.

P-3: develop the skills to analyze complex statistical data coming from the various fields like industry, marketing, finance, agriculture and business

P-4: implement data analysis strategies to develop efficient models for various theoretical postulations.

P-5: understand the intricacies of statistical testing and its applications in real life problems.

P-6: develop, design and analyze experiments in empirical research.

P-7: develop the skill of estimation of the parameters of the probability distribution of random variable.

PROGRAM DETAILS AND OUTCOME OF SCIENCE FACULTY FOR GRADUATION

F.Y.B.Sc.					
SEM	PAPER NO.	TITLE	CREDIT	TOPIC	OUT COME
1	101	Descriptive Statistics.	2(Theory) 1 (Practical)	Collection of Data:	After successfully completing this course, students will be able to: :distinguish between different types of data and learn level of measurement of data :understand the meaning and purpose of data collection; :know different methods of collection of data; :distinguish between primary and secondary sources.
				Classification and tabulation of data:	:classify the data for further statistical analysis; :find the difference between quantitative and qualitative classification; :prepare a frequency distribution table; :know the technique of forming classes; :differentiate between univariate and bivariate frequency distributions; :present data using table.
				Diagrammatic and graphic presentation of data:	learn importance of presentation of diagrammatic data :distinguish between diagram and graph;

					:learn how to visualize your data; :create bar diagram, pie chart, stem and leaf chart, box plot chart etc; :construct and interpret a graph like histogram, frequency polygon and frequency curve for numerical data.
	102	Different Measures of Statistics	2(Theory) 1 (Practical)	Measures of central tendency:	:state the need for summarizing a set of data by a single number; :distinguish between different types of averages; :learn to compute different averages; :draw meaningful conclusions from a set of data.
				Measures of dispersion:	:know the limitations of average; :encourage the need of measures of dispersion; :understand various types of measures of dispersion; :obtain the measures and then compare them; :differentiate between absolute and relative measures.
				Moments:	:know the purpose of moments; :obtain various types of moments; :understand different characteristics of data
	Practical:			Topics based On Paper -101 & 102	:Prepare frequency distribution for univariate and bivariate variable; :construct table from given data; :represent statistical data diagrammatically; - analyze statistical data graphically, using frequency distributions and cumulative frequency distributions; :obtain and interpret different measures of central tendency :compute and interpret different

					measures of dispersion; : obtain different types of moments and interpretation of it.
2	201	Skewness, Kurtosis, Probability	2(Theory) 1 (Practical)	Skewness and Kurtosis:	:knowthecomplementaryrelationshipofskewnesswithmeasure sofcentraltendencyanddispersion in describing set of data; :know whether the distribution is normal or not; :tell the direction and extent of asymmetry in a data series; :learn the importance of kurtosis; :evaluate and interpret types of kurtosis; :distinguish difference between skewness and kurtosis
				Probability-I:	:be familiar with some basic concepts of probability; :distinguish between random and non-random experiments; :understand axioms of probability and various theorems on probability; :find the probabilities of various events.
				Probability-II:	:understand the concepts of conditional probability and independence of events; :know about Bayes'theorem and its applications; :find probabilities of various events.
	202	Univariate and Bivariate Probability functions and Moments	2(Theory) 1 (Practical)	Random Variables, Probability functions and Mathematical expectation:	:know the basic concept of random variables; :understand events associated with random variables, probabilities of events and how they are related; :understandthedifferencebetweenadiscreteandacontinuousrand omvariable,recognize when an experiment should be modelled by a discrete or a continuous random Variable :know about p.m.f., p.d.f. and c.d.f.; :obtain probability functions; : Interprettheexpectation, varianceandstandardeviationofadiscrete and continuous

					random variable.
				Bivariate Random Variables:	:distinguish between univariate and bivariate random variables; :understand joint, marginal and conditional p.m.f. and p.d.f. of two random variables; :compute of probabilities of events in bivariate probability distribution
				Moments, Measure of central tendency and dispersion for discrete and continuous random variables:	:understand measure of central tendency related to random variables; :understand measure of dispersion related to random variables; :obtain different moments of a probability distribution
Evaluation Method(Internal & External)					
Paper no	Internal evaluation		Internal exam (Marks)		Ass ign me nt
101	MCQ		11		04
102	MCQ		11		04
201	Subjective		11		04
202	Subjective		11		04
	PRACTICAL:	Z			:findskewnessusinganappropriatemethodforagivenfrequency distributionandinterpret theresult; :obtain kurtosis forgiven frequency distribution and interpret result; :solve examples of probability; :construct bivariate frequency distribution;

					:calculate probabilities and derive marginal and conditional distributions of bivariate random variables.																									
Evaluation Method (Internal & External) <table><tr><td>Paper no</td><td>Viva-I & Viva-II</td><td>Journal & Attendance</td><td>Total</td><td>University exam</td></tr><tr><td>101</td><td>05</td><td>05</td><td>10</td><td>20</td></tr><tr><td>102</td><td>05</td><td>05</td><td>10</td><td>20</td></tr><tr><td>201</td><td>05</td><td>05</td><td>10</td><td>20</td></tr><tr><td>202</td><td>05</td><td>05</td><td>10</td><td>20</td></tr></table>						Paper no	Viva-I & Viva-II	Journal & Attendance	Total	University exam	101	05	05	10	20	102	05	05	10	20	201	05	05	10	20	202	05	05	10	20
Paper no	Viva-I & Viva-II	Journal & Attendance	Total	University exam																										
101	05	05	10	20																										
102	05	05	10	20																										
201	05	05	10	20																										
202	05	05	10	20																										
S.Y.B.Sc.																														
3	301	Correlation, Regression And Association of Attributes	2(Theory) 1(Practical)	Linear Correlation Analysis:	After successfully completing this course, students will be able to: :comprehend the meaning of the term ‘correlation’; :interpret then at urge of relation ship between two variables; :compute correlation coefficient and interpret its value; :critically examine the degree and direction of the relationships between two or more variables; :under stand applications of correlation in the various fields, viz., agriculture, business, medical science, industry etc.																									
				Linear Regression Analysis:	:describe the difference between ‘correlation’ and ‘regression’; :understand the purpose of a linear regression equation; :calculate and interpret linear regression equation; :understand and interpret coefficient of determination;																									

					:understand applications of regression analysis in various fields,viz., agriculture,business, industry etc.
				Measures of association of attributes (for two attributes):	:learn about importance of measures of association; :understand different types of measures of association; :learn the concepts of independence and association of two attributes; :calculate measures of association using different methods.
	302	Numerical Analysis	2(Theory) 1(Practical)	Finite Differences Interpolation Numerical Integration and Differentiation	:understand basics of numerical analysis; :understand the difference operators and the use of interpolation; :understand numerical differentiation and integration; :develop problem solving skills through numerical methods.
	303	Sampling techniques	2(Theory) 1(Practical)	Terminology and Simple random sampling Stratified random sampling Systematic random sampling	:know about the concept of sampling; :understand about sample survey; :distinguish between a population and a sample and between parameters and statistics; : recognize some common types of sampling design, such as simple random sampling, stratified sampling and systematic sampling.
	PRACTICAL:			Topics based On Paper -301 , 302,303	:find and interpret the correlation between two variables; :obtain simple linear regression equation for a set of data;

					:employtheprinciplesoflinearregressionandcorrelation,includ ingleastsquaremethod, predicting a particular value of Y for a given value of X and understand the significance of the correlation coefficient; :know the association between two attributes; :learn how to select as SRS with and without replacement; : obtain estimated mean and standard error for various sampling techniques.
4	401	Generating Function and discrete probability distribution	2(Theory) 1(Practical)	Generating functions, Bernoulli distribution and Binomial distribution Poisson distribution and discrete uniform distribution Hyper geometric, Geometric and Negative binomial distribution	:obtain moment generating function, cumulative generating function etc. of a probability function define discrete variables and study their distributions; :know the applications of discrete probability distribution in different situations; :understand some standard discrete probability distributions such as Binomial, Poisson, Geometric, Hyper geometric, Negative binomial, Uniform with real life situations.
	402	Continuous Probability distribution	2(Theory) 1(Practical)	Normal distribution Rectangular distribution and Exponential distribution Gamma distribution, Beta distribution of first	:understand various continuous probability distributions theoretically; :know the applications of normal distribution in different fields;;relate gamma and beta distribution; :obtainpropertiesofexponentialdistribution

				kind and second kind	
	403	Testing of hypothesis	2(Theory) 1(Practical)	Terminology Test of significance-I (Large sample test) Test of significance-II(Small sample test)	:understand the concept of hypothesis and its testing and applications in various fields; :identify the components of a classical hypothesis test, including the parameter of interest, the null and alternative hypotheses, type I error and type II error, Critical region, the test statistic etc; :understand the difference between large and small sample and tests based on it; :use the p-value decision rule to make a statistical decision; :carry out appropriate statistical test of significance;;obtain different large and small sample tests; relate to ,Find chi-square variates.

Evaluation Method(Internal & External)

Paper no	Internal evaluation	Internal exam (Marks)	Assignment	Attendance	Total	University exam
301	MCQ	11	04	05	20	50
302	MCQ	11	04	05	20	50
303	MCQ	11	04	05	20	50
401	Subjective	11	04	05	20	50
402	Subjective	11	04	05	20	50
403	Subjective	11	04	05	20	50

	PRACTICAL:			Topics based On Paper -401 , 402, 403	:know the application problems based on Normal distribution; :compute probabilities of normal distribution; :learn testing of hypothesis based on small sample tests; :fit various probability distributions; : learn testing of hypothesis based on large sample tests.

Evaluation Method (Internal & External)

Paper no	Viva-I & Viva-II	Journal & Attendance	Total	University exam	
301	05	05	10	20	
302	05	05	10	20	
303	05	05	10	20	
401	05	05	10	20	
402	05	05	10	20	
403	05	05	10	20	

T.Y.B.Sc.

5	501	Mathematical Statistics-I	2(Theory) 1(Practical)	Chebyshev's inequality Characteristic function Central limit theorem, Law of large numbers	After successfully completing this course, students will be able to know use of Chebyshev's inequality for finding upper and lower bound of the probability , which is used in General insurance and LIC.
	502	Mathematical Statistics-II	2(Theory) 1(Practical)	Log normal distribution. Cauchy distribution. Trinomial distribution Bivariate Normal distribution.	After successfully completing this course, students will be able to know use of Log normal distribution ,Cauchy distribution, Trinomial distribution, Bivariate Normal distribution for real life problems with their applications.
	503	Statistical inference-I	2(Theory) 1(Practical)	Decision theory Introduction of theory of estimation.	After successfully completing this course, students will be able to know meaning of parameters, estimators, by using properties for decision of finding best estimator.

				Cramer Rao inequality.	
	504	Statistical inference-II	2(Theory) 1(Practical)	Methods of estimation Interval estimation, Optimum Linear combination of independent unbiased estimators of same parameter.	After successfully completing this course, students will be able to know various statistical methods for finding estimators for different probability distributions.
	505	Operation Research-I	2(Theory) 1(Practical)	Introduction of OR General linear programming problems Simplex method Charles's Big –M method	After successfully completing this course, students will be able to know use of operation research in defense services, National planning and Budgeting, industries, private sector, Research to find best solution for simple or complex problems by using various techniques of OR. As graphical method, simplex method and Charle's Big –M method
	506	Sampling	2(Theory) 1(Practical)	Sample survey Simple random sampling Stratified sampling. Systematic sampling	After successfully completing this course, students will be able to know techniques of selecting elements of sample from a target population keeping objectives and nature of population through sample survey.
	507(GE)	Numerical methods	2(Theory)	Numerical differentiation. Numerical integration. Iterative Methods for finding roots	After successfully completing this course, students will be able to know various numerical methods for predicting future value or estimate middle value of a series. Also know the solution of equations which are not solvable by some algebraic method that can be solved by some iterative method.

Evaluation Method(Internal & External)

Paper no	Internal evaluation	Internal exam (Marks)	Assignment	Attendance	Total	University exam
501	Subjective	11	04	05	20	50

502	Subjective	11	04	05	20	50	
503	Subjective	11	04	05	20	50	
504	Subjective	11	04	05	20	50	
505	Subjective	11	04	05	20	50	
506	Subjective	11	04	05	20	50	
507(GE)	Subjective	11`	04	05	20	50	

	PRACTICAL:			Topics based On Paper -501 , 502, 503,504,505,506	know the application, real life problems based on on the topics of papers 501 to 506.
Evaluation Method (Internal & External)					
Paper no	Viva-I & Viva-II	Journal & Attendance	Total	University exam	
501	05	05	10	20	
502	05	05	10	20	
503	05	05	10	20	
504	05	05	10	20	
505	05	05	10	20	
506	05	05	10	20	
6	601	Mathematical Statistics-III	2(Theory) 1(Practical)	Sampling distributions distribution of sample correlation coefficient. Z transformation Sampling distributions. Multiple and partial correlation and regression.	After successfully completing this course, students will be able to know its applications in statistical inference . And when more then two variables are linearly related are knowing to solve real life problems occurred in social science, Industry.
	602	Mathematical Statistics-IV	2(Theory) 1(Practical)	Testing of hypothesis. Non parametric test-I Non parametric test-II	After successfully completing this course, students will be able to know use of Tests hypotheses Simple, composite null and alternative hypotheses, critical region, types of error, level of significance, p-values, size and power of a test.The

					most powerful test of simple hypothesis against simple alternative using Neyman Pearson lemma, Likelihood ratio test procedure, Comparison of parametric test with non parametric test procedure, Advantages and disadvantages of nonparametric tests. Different types of one sample, two sample and more samples non parametric test. How it is applicable in medical sciences, pharmacy and social science.
	603	Operation Research-II	2(Theory) 1(Practical)	Two Phase Simplex method Duality in LPP Transportation problem Assignment problem Inventory problem	After successfully completing this course, students will be able to know use of operation research techniques of two phase method and duality method for justification of the solution in defense services, National planning and Budgeting, industries, private sector, Research to find best solution for simple or complex problems by using various techniques of OR. Also learn various techniques of Transportation problem ,Assignment problem and solving various methods of inventory problems for finding minimum cost.
	604	Operation Research-III	2(Theory) 1(Practical)	Game theory Queuing theory Network Scheduling By PERT & CPM	After successfully completing this course, students will be able to know use of game theory, two pearson zero sum game, minimax principle, various techniques for solving game, Queueing theory, PERT and CPM, use of these techniques in big projects like construction of bridge, industry, mole etc.
	605	Design of Experiments	2(Theory) 1(Practical)	Properties of randomization. Completely Randomized Design. Randomized Block	After successfully completing this course, students will be able to develop strategy of experiment that maximizes learning using minimum resources. These methods mostly used in Biostatistics, Agriculture, Marketing, Software engineering, Industry, etc.by learning fundamental cocept of

				Design Latin square Design Analysis of covariance up to two way classification. Factorial design	design of experiments, CRD,RBD, LSD, factorial designs .
	606	Statistical Quality control	2(Theory) 1(Practical)	Statistical techniques in quality control-I Statistical techniques in quality control-II Acceptance sampling plan for attributes.	Students will understand the concept of process control and they will be able to distinguish between different types of variable charts and attribute charts. From the plotted graphs of these variable charts they will be able to know whether the process is in control or not and if it is not they will try to find out what are the causes and rectify them.. Also able to understand single sampling and double sampling plan, the concepts of -Acceptance Sampling , Operating Characteristic (OC) Curves , Average Outgoing Quality. They will be able to apply the concepts using Problem solving .
	607(GE)	Economic Statistics & demography	2(Theory)	Demand Analysis Utility function. & Demography Life tables	After successfully completing this course, students will be able to know concept of demand function, supply function, revenue function, profit function, various types of elasticity, its interpretation, concept of utility function for two commodity, its properties, maximization process of utility function, use of vital statistics in actuarial science.

Evaluation Method(Internal & External)

Paper no	Internal evaluation	Internal exam (Marks)	Assignment	Attendance	Total	University exam
601	Subjective	11	04	05	20	50
602	Subjective	11	04	05	20	50
603	Subjective	11	04	05	20	50
604	Subjective	11	04	05	20	50
605	Subjective	11	04	05	20	50
606	Subjective	11	04	05	20	50
607(GE)	Subjective	11`	04	05	20	50

	PRACTICAL:		1	Topics based On Paper -601 , 602, 603,604,605,606	:know the application, problems based on sampling distributions, Z transformation, linear and multiple regressions; :application of various non parametric test in solving real life problems.for one sample, two sample and for more samples. :application of transportation problems, assignment problems, Inventory problems of real life problems, how it is use ful in industry, : application of game theory, Queueing theory, and how PERT and CPM procedure in solving problem of big project. : application of designs in agriculture, marketing and industries. :application of control charts to judge production process is in control or out of control, also uses of acceptance plans for deciding lot is accepted in market or not.

Evaluation Method (Internal & External)

Paper no	Viva-I & Viva-II	Journal & Attendance	Total	University exam
601	05	05	10	20
602	05	05	10	20
603	05	05	10	20
604	05	05	10	20
605	05	05	10	20
606	05	05	10	20

PROGRAM DETAILS AND OUTCOME FOR FACULTY OF COMMERCE FOR GRADUATION

B.Com .(General) Statistics programme consists of **70** credits spread over six semesters. Each credit has one hour of class room teaching per week. This programme emphasizes both theory and applications of statistics and is structured to provide knowledge and skills in depth necessary for the employability of students in industry, government sector, Banking, Insurance other organizations, as well as in academics.

SEM	PAPER NO.	TITLE	CREDIT	TOPIC	OUT COME
1	102 CE (1) Compulsory	Business Statistics-1	3	Limit and Differentiation	They will be able to Compute limits, derivatives, and definite & indefinite integrals of algebraic, logarithmic and exponential functions. The concepts of total differential and partial derivative functions shall be understood. Applications of these techniques in the fields of business and commerce shall be done. .They shall develop proficiency in using different mathematical tools in solving daily life problems.
				Analysis of categorical data	Students will understand the meaning of categorical data and the difference between data types like categorical data , variable data and continuous variable data. They will understand relationships among measurable attributes of objects and determine measurements, Explore relationships between categorical variables using contingency tables. Students will be able to use different techniques of

					analysis of categorical data.
				Probability	Students will be able to understand the meaning of probability and the knowledge of probability will take Students statistical skills to the next level. They will be able to Use various methods to compute the probabilities of events. General probability, Bayes Theorem/Law of total probability. Summarize the concepts of Sample space and random variable. Students will be able to compute probabilities and conditional probabilities in appropriate ways. Organize, present and interpret statistical data, both numerically and graphically. The knowledge gained will also help the Students in practical life of solving problems.
				Statistical Quality Control	Students will understand the concept of process control and they will be able to distinguish between different types of variable charts.
	Elective	Mathematics for statistics-I	3	Calculus	They will be able to Compute limits, derivatives, and definite & indefinite integrals of algebraic, logarithmic and exponential functions. The concepts of total differential and partial derivative functions shall be understood. Applications of these techniques in the fields of business and commerce shall be done. .They shall develop proficiency in using different mathematical tools in solving daily life problems.
				Series	Students will know the use of arithmetic and geometric progression.
				Coordinate geometry	Students will know the use of coordinate geometry for solving engineering and industrial problems.
2	102 CE (2) Compulsory	Business Statistics-2	3	Integration	As the students are having the knowledge of limits differentiation ,under that background they will now study integration which they will apply in practical field. They will develop proficiency in using different mathematical tools in solving daily life problems.

				Probability distribution	Students will know about Binomial, Poissons ,Hypergeometric Distributions their properties uses in different field and will be able to make prediction about the data by the different patterns.They will be able to Illustrate the problems in standard distributions. Students will know about Binomial, Poissons ,Hypergeometric Distributions their properties uses in different field and will be able to make prediction about the data by the different patterns.They will be able to Illustrate the problems in standard distributions.
				Normal distribution	Students will get the fundamental knowledge about the normal distribution its properties and uses and the characteristics of the normal curve.
				Statistical quality control	Extended knowledge of Statistical Quality control techniques for charts of attributes will be known to the students and with the help of graphs students will be able to make out whether the process is in control or not.If not find out the causes and rectify them (np chart , p chart , c chart) Extended knowledge of Statistical Quality control techniques for charts of attributes will be known to the students and with the help of graphs students will be able to make out whether the process is in control or not.If not find out the causes and rectify them (np chart , p chart , c chart) Extended knowledge of Statistical Quality control techniques for charts of attributes will be known to the students and with the help of graphs students will be able to make out whether the process is in control or not.If not find out the causes and rectify them (np chart , p chart , c chart)
	Elective	Mathematics for statistics -2	3	Probability	Students will be able to understand the meaning of probability and the knowledge of probability will take Students statistical skills to the next level. They will be able to Use various methods to compute the probabilities of events. General probability, Bayes

					Theorem/Law of total probability. Summarize the concepts of Sample space and random variable. Students will be able to compute probabilities and conditional probabilities in appropriate ways. Organize, present and interpret statistical data, both numerically and graphically. The knowledge gained will also help the Students in practical life of solving problems.
				Probability distribution	Students will know about Binomial, Poissons ,Hypergeometric Distributions their properties uses in different field and will be able to make prediction about the data by the different patterns.They will be able to Illustrate the problems in standard distributions. Students will know about Binomial, Poissons ,Hypergeometric Distributions their properties uses in different field and will be able to make prediction about the data by the different patterns.They will be able to Illustrate the problems in standard distributions.
				Mathematical expection and moments	Students will be able to understand the concept of mathematical expectation and they will be able to solve examples related to discrete random variables. Define, illustrate, and apply the concepts of discrete and continuous random variables, Define, illustrate, and apply the concept of expectation to the mean, variance, and covariance of random variables. And different moments to know various measures of the distribution or series.
3	Elective	Statistics-3	3	Matrices and Determinants	Students will be able to know the difference between matrix and determinants, different types of matrices ,examples related to matrices and determinants and linear system of Equations. Solve systems of linear equations by use of the matrix.CO2: develop proficiency in using different mathematical tools in solving daily life problems. solve a System of Linear equations using the inverse of a matrix.

				Mathematical Expectations	Students will be able to understand the concept of mathematical expectation and they will be able to solve examples related to discrete random variables. Define, illustrate, and apply the concepts of discrete and continuous random variables, Define, illustrate, and apply the concept of expectation to the mean, variance, and covariance of random variables.
				Demographic Methods	Students will know about mortality rate ,reproduction rate, gross reproductive rate, net reproductive rate, crude birth rate and about the life tables and will solve the examples related to all topics
	Special	Statistics-4	3	Time series analysis	After completing this course, students will be able to know Meaning and different types of trends. Various methods for study of trend.
				Theory of correlation & regression	After successfully completing this course, students will be able to: :comprehend the meaning of the term ‘correlation’; :interpret then at urge of relation ship between two variables; :compute correlation coefficient and interpret its value; :critically examine the degree and direction of the relationships between two or more variables; :under stand applications of correlation in the various fields, viz., agriculture, business, medical science, industry etc. :describe the difference between ‘correlation’ and ‘regression’; :understand

					the purpose of a linear regression equation; :calculate and interpret linear regression equation; :understand and interpret coefficient of determination; :understand applications of regression analysis in various fields,viz., agriculture,business, industry etc.
				Probability distribution.	Students will know about Binomial, Poissons ,Hypergeometric Distributions their properties uses in different field and will be able to make prediction about the data by the different patterns.They will be able to Illustrate the problems in standard distributions. Students will know about Binomial, Poissons ,Hypergeometric Distributions their properties uses in different field and will be able to make prediction about the data by the different patterns.They will be able to Illustrate the problems in standard distributions.
4	Elective	Statistics-5	3	Moments	Students will know how to Illustrate and apply theorems concerning the distributions of functions of

					random variables and the moment-generating functions. They will be able to Calculate the measures of dispersion, skewness and kurtosis
				Testing of Hypothesis	Students will be able to differentiate between null and alternative hypothesis, simple & composite hypothesis .Knowledge on types of errors and the critical error . Apply central limit theorem to describe inferences, Construct and interpret confidence intervals to estimate means, standard deviations and proportions for populations, Perform parameter testing techniques, including single and multi-sample tests for means, standard deviations and proportions. After completing the course, the student shall be able to: understand meaning and scope of business research ,familiarize with research terminologies and various types of research design, get an insight into various scaling techniques and sources of data collection ,get acquainted with various techniques of data analysis and its implications and have basic learning of analytics in business.
				Acceptance Sampling	Students will be able to understand single sampling and double sampling plan, the concepts of - Acceptance Sampling , Operating Characteristic (OC) Curves , Average Outgoing Quality. They will be able to apply the concepts using Problem solving .
	Special	Special	3	Mathematical economics	After successfully completing this course, students will be able to know concept of demand function, supply function, revenue function, profit function, various types of elasticity, its interpretation, concept of utility function for two commodity, its properties, maximization process of utility function
				Multiple & partial	After successfully completing this course,

				regression & correlation	students will be able to know its applications of when more than two variables are linearly related are knowing to solve real life problems occurred in social science, Industry.
				Sampling distributions	After successfully completing this course, students will be able to know its applications of t distribution, chisquare distribution, F distribution.
5	Elective	Statistics-7	3	Decision Theory	Students will be able to understand decision theory regarding certainty , uncertainty and risks and to arrive at these decisions, concerned methods will be used which will be cleared with practical examples. After completion of this paper, the students will be able to assess and apply a range of research method on a practical project. They will be able to obtain critical thinking and problem-solving aptitude.
				Small sample tests	Recognize and compute the sampling distributions, sampling distributions of means and variances (S^2) and the t- and F-distributions, Understand, apply and compute in one- and two- sample tests of hypotheses problems, Recognize the relationship between the confidence interval estimation and tests of hypothesis, Understand, apply and examine the goodness-of-fit test, test for independence, and homogeneity. Analyze the test of significance for mean, proportion, variance based on normal, t, F, Chi- square statistics and apply the concepts to solve problems. Evaluate the problems based on analysis of variance in one way and two way classification. Summarize the concepts of test of hypothesis and solve the problem based on it. Evaluate

					the fitting of binomial, Poisson and Normal distributions, and testing the goodness of fit. After completion of this paper, the students will be able to assess and apply a range of research method on a practical project.	
	Special	Statistics-8	3	Theory of estimation	After successfully completing this course, students will be able to know meaning of parameters, estimators, by using properties for decision of finding best estimator.	
				Deterministic inventory model	After successfully completing this course, students will be able to know meaning of deterministic inventory problems and solving various methods of inventory problems for finding minimum cost.	
6	Elective	Statistics-9	3	Linear programming	Calculate the formulation of LPP, graphical methods. Evaluate the mathematical formulation of transportation and assignment problems. Students will be able to develop proficiency in using different mathematical tools in solving daily life problems.	
				Non parametric test	Explain and successfully apply all aspects of appropriate non-parametric tests. After completion of this paper, the students will be able to assess and apply a range of research method on a practical project.	
	Special	Statistics-10	3	Business forecasting	After completion of the course Application of forecasting in business	
				Theory of finite differences and interpolation.	:understand basics of numerical analysis; :understand the difference operators and the use of interpolation; :understand numerical differentiation and integration; :develop problem solving skills through	

					numerical methods.
				PERT/CPM	After successfully completing this course, students will be able to know use of , PERT and CPM, use of these techniques in big projects like construction of bridge, industry, mole etc.
Evaluation pattern		30% internal assessment based on internal examination like MCQ/ subjective, class attendance, assignment and 70% external based on university examination pattern.			
PROGRAM DETAILS AND OUTCOME FOR FACULTY OF ART'S FOR GRADUATION					
B.A .(Subsidiary) Statistics program consists of 36 credits spread over 4 semesters. Each credit has one hour of class room teaching per week. This programmed emphasizes both theory and applications of statistics and is structured to provide knowledge and skills in depth necessary for the employability of students in industry, government sector, Banking, Insurance other organizations, as well as in academics. Mostly this topics are very useful to solve mathematically problems of economics and making planning for the government of India. So there is special employability for UPSC for sector of economics and statistical post.					
1	Paper-I	Elements of Statistics-I	3	Collection of data	After competition of course student will recognize difference between Qualitative and Quantitative data. Study of different types of scales Nominal and Ordinal scales for attributes.
				Classification and Tabulation of Data	After competition of course student will learn Meaning and types of classification.
				Tabulation	After competition of course student will learn Meaning, rules, types and essential parts of tabulation, Discrete and continuous and cumulative, discrete and continuous types of bivariate probability

					distributions.
				Diagrammatic and Graphic presentation of data, Graph	After competition of course student will know Types of diagrams, Bar, Circle and Pie diagram, graphs of frequency distributions, Histogram, Frequency polygon, Frequency curve, Cumulative frequency polygon, Cumulative frequency curve.
				Measures of Central tendency and Measures of Dispersion.	After competition of course student will know Meaning of central tendency, types of measures of central tendency, mean, median, mode, harmonic mean, geometric mean of discrete and continuous type of data. And its limitations, Meaning of measures of dispersion, various types of its, like range, quartile deviation, average deviation about mean median, mode, standard deviation, coefficient of variation.
	Higher Paper-I	Statistics Higher Paper-I	3	Function,	After competition of course student will learn Definition, types of functions, linear, parabolic functions, concept of domain, range and graph of different types of functions.
				Limits	After competition of course student will learn Meaning, rules and examples
				Differentiation.	Definition, rules, and examples of some mathematical functions.
				Use of differentiation.	After competition of course student will Able to find maximum profit, maximum revenue, minimum cost and concept and interpretation of elasticity of demand and

					supply's
	Higher Paper-II	Statistics Higher Paper-II	3	Index number	After competition of course student will meaning of index number, construction, uses of various types of index numbers,
				Large sample test	After competition of course student will meaning of hypothesis, types of errors, significance level, test of number of success, single proportion, difference of two proportions, test for population mean, difference of two means, difference of standard deviation, correlation coefficient.
				National income	After competition of course student will know definition of national income, uses., various methods of estimation of national income.
2	Paper -II	Elements of Statistics-II	3	Diagrammatic & Graphic presentation of data	After completing this course, students will be able to: :distinguish between different types of data and level of measurement of data; :understand the meaning and purpose of data collection; :know different methods of collection of data; :distinguish between primary and secondary sources.
				Skewness	After completing this course, students will be able to: : absolute and relative measures of skewness, calculation of Karl Pearson and Bowley's coefficient of skewness.
				Correlation	After completing this course, students will be able to:

					Meaning of correlation, types of correlation, method to study correlation.
				Regression	After completing this course, students will be able to: Utility of regression, lines of regression, regression coefficient, properties of correlation coefficient and regression coefficient.
				Association of attributes.	After completing this course, students will be able to: Notations and terminology of consistency of data, types of association, methods of studding of association.
	Higher Paper-III	Statistics Higher Paper-III	3	Interpolation	After completing this course, students will be able to: Meaning and uses of interpolation, elementary methods of interpolation.
				Permutation & Combination	After completing this course, students will be able to: Meaning uses and relation of permutation and combination.
				Elementary theory of probability,	After completing this course, students will be able to: Meaning of probability, addition and multiplication law, various types of events. Able to solve real life problems.
				Mathematical expectation & Moments	After completing this course, students will be able to: Meaning of expectation, raw and central moments. Relation between them.
	Higher	Statistics Higher	3	Standard	After completing this course, students will

	Paper-IV	Paper-IV		distributions	be able to: Meaning , properties and uses of binomial, Poisson Normal distribution
				Small sample test	After completing this course, students will be able to: Use of sampling distributions
				Population Census	After completing this course, students will be able to: Various methods of estimation of population census, characteristics, advantages , limitations of its, study and interpretation of last two populations census of India.
3	Higher Paper-V	Statistics Higher Paper-V	3	sampling	:know about the concept of sampling; :understand about sample survey; :distinguish between a population and a sample and between parameters and statistics; : recognize some common types of sampling design, such as simple random sampling, stratified sampling.
				Meaning of analysis of variance.	After completing this course, students will be able to: Meaning , advantages of one way and two way analysis of variance.
				Time series analysis	After completing this course, students will be able to: Meaning, uses , components of time series, types of trend, various methods of measurement of trend.
	Higher Paper-VI	Statistics Higher Paper-VI	3	Demand and Supply	After completing this course, students will be able to:

					Meaning and assumptions of demand and supply law, graphical representation of both curves, concept of market equilibrium elasticity of demand and supply and interpretation of various values of it.
				Vital statistics	After completing this course, students will be able to: Meaning and uses of vital statistics, different types of death rates.
				Fertility rate	After completing this course, students will be able to: Concept of different types of fertility rates and how it is useful for GIC, LIC and in actuarial sciences.
4	Higher Paper-VIII	Statistics Higher Paper-VIII	3	Statistical quality control	After completing this course Students will understand the concept of process control and they will be able to distinguish between different types of variable charts and attribute charts. From the plotted graphs of these variable charts they will be able to know whether the process is in control or not and if it is not they will try to find out what are the causes and rectify them..
				Single and double acceptance sampling plan for attributes	After completing this course Students will understand able to understand single sampling and double sampling plan, the concepts of - Acceptance Sampling , Operating Characteristic (OC) Curves , Average Outgoing Quality. They will be able to apply the concepts using Problem solving .
	Higher	Statistics Higher	3	Operation research	After successfully completing this course,

	Paper-IX	Paper-IX			students will be able to know use of operation research in defense services, National planning and Budgeting, industries, private sector, Research to find best solution through linear programming using graphical method.
				Transportation problem	After successfully completing this course, students will be able to know use of transportation problem for minimizing cost, time with available resources.
				Assignment problem	After successfully completing this course, students will be able to know use assignment techniques for minimization cost and maximization profit.
Evaluation pattern		30% internal assessment based on internal examination like MCQ/ subjective, class attendance, assignment and 70% external based on university examination pattern.			

PROGRAM DETAILS AND OUTCOME FOR FACULTY OF COMMERCE FOR POST GRADUATION

Mcom Statistics program consists of **36** credits spread over 4 semesters. Each credit has one hour of class room teaching per week. This programme emphasizes both theory and applications of statistics and is structured to provide knowledge and skills in depth necessary for the employability of students in industry, government sector, Banking, Insurance other organizations, as well as in academics. Mostly these topics are very useful to solve mathematical problems of economics and making planning for the government of India. So there is special employability for UPSC for sector of economics and statistical post.

1	Paper-104	Advanced statistics-1	3	Statistical inference Estimation	After successfully completing this course, students will be able to know various properties of judging best estimator among available group of the estimators for parameter of the probability distribution. Also

					learn various method of finding estimators of the population or probability distributions.
				Univariate distribution.	After successfully completing this course, students will be able to know use of different types probability distributions like hyper geometric distribution, geometric distribution, Cauchy distribution, log normal distribution, Laplace distribution, negative binomial distribution for solving real life problems.
	Paper-105	Advanced statistics-2	3	Demography	After completing this course, students will be able to know Meaning and uses of vital statistics, different types of death rates. And its uses in actuarial sciences.
				Index number	After completing this course, students will be able to know Meaning and different types of construction of index numbers, its uses.
	Paper-106	Advanced statistics-3	3	Mathematical Economics	After completing this course, students will be able to know Meaning and scope of econometrics difference between statistics and econometrics, concept of utility,demand. Production function and method of estimation of elasticity of demand.
				Time series analysis.	After completing this course, students will be able to know Meaning and different types of trends. Various methods for study of trend.
2	Paper-204	Advanced	3	Testing of hypothesis.	After completing this course Students will be able

		statistics-4			to differentiate between null and alternative hypothesis, simple & composite hypothesis .Knowledge on types of errors and the critical error . Apply central limit theorem to describe inferences, Construct and interpret confidence intervals to estimate means, standard deviations and proportions for populations, Perform parameter testing techniques, including single and multi-sample tests for means, standard deviations and proportions. After completing the course, the student shall be able to: understand meaning and scope of business research ,familiarize with research terminologies and various types of research design, get an insight into various scaling techniques and sources of data collection ,get acquainted with various techniques of data analysis and its implications and have basic learning of analytics in business.
				Non parametric test.	After completing this course, students will be able to apply all aspects of appropriate non-parametric tests. After completion of this paper, the students will be able to assess and apply a range of research method on a practical project.
	Paper-205	Advanced statistics-5	3	National income.	After completion of course student will know definition of national income, uses., various methods of estimation of national income.
				Demography, life table, Indian official statistics	After completing this course, students will be able to know Meaning of demography, construction of life table and its uses in actuarial science. Also know various types of official statistics.
	Paper-206	Advanced	3	Econometrics methods.	After completing this course, students will be able to know

		statistics-6			Different types of linear models like single equation model, simultaneous equation model, methods of estimation for a problem of heteroscedasticity, multicollinearity, auto correlation for a linear model.
				Time series Analysis.	After completing this course, students will be able to know Meaning and different types of trends. Various methods for study of trend.
3	Paper-304	Advanced statistics-7	3	Design of experiments	After completing this course, students will be able to know One way two way classification, concept of different types of designs and uses of different types of designs in solving real life problems of agriculture pharmacy and in industries.
				Sample survey	After successfully completing this course, students will be able to know techniques of selecting elements of sample from a target population keeping objectives and nature of population through sample survey.
	Paper-305	Advanced statistics-8	3	Game theory.	After completing this course, students will be able to know Various types of game, concepts of strategies, different types of methods for solving different types of game.
				PERT/CPM	After completing this course, students will be able to know PERT and CPM, use of these techniques in big projects like construction of bridge,

					industry, mole etc.
				Simulation.	After completing this course, students will be able to know Use of it, methodology, advantages and drawbacks, application of simulation in management.
	Paper-306	Advanced statistics-9	3	Linear programming and its application	After completing this course, students will be able to know Different types of techniques like simplex, Charle's big -m method, Two phase method,
				Inventory models	After completing this course, students will be able to know EOQ Models in solving problem without shortage, and without shortages
4	Paper-404	Advanced statistics-10	3	Design of experiments	After completing this course, students will be able to know Application of LSD and missing plot techniques in CRD, RBD and in LSD.
				Sample survey-2	After completing this course, students will be able to know Use of stratified and systematic sampling in project and in real life problem.
	Paper-405	Advanced statistics-11	3	Statistical quality control	After completing this course, students will be able to know able to understand single sampling and double sampling plan, the concepts of -Acceptance Sampling , Operating Characteristic (OC) Curves , Average Outgoing Quality. They will be able to apply the concepts using Problem solving .
				The sequencing problems	After completing this course, students will be able to know how this theory for solving

					management problem.
				Decision theory	After completing this course, students will be able to know Application of decision theory in different types of problems of management.
	Paper-406	Advanced statistics-12	3	Linear programming.	After completing this course, students will be able to know Concept of duality in linear programming.
				Queueing theory	After completing this course, students will be able to know Concept of queueing theory for minimization of cost and time.
Evaluation pattern		30% internal assessment based on internal examination like MCQ/ subjective, class attendance, assignment and 70% external based on university examination pattern.			

PROGRAM DETAILS AND OUTCOME FOR FACULTY OF SCIENCE FOR POST GRADUATION

M. Sc. Statistics

1st Semester

Course-101: Real Analysis

Course Code	101
Course Title	Real Analysis
Credit	4

Teaching per Week	4	
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)	
Effective From	1970	
Purpose of Course	The aim of the Course is to introduce fundamental Concept of real analysis such as the Concept of field, sigma field etc. hence to provide mathematical foundation for statistics Courses.	
Course Objective	The purpose of this course is to make students acquainted with concepts of real analysis which is base of probability theory paper.	
Course Outcomes	After completing this course, the students will be able to: CO1: Describe fundamental properties of the real numbers, sets, classes, function, inverse function, simple and measurable functions, distribution functions, measures etc. that lead to the formal development of real analysis/ probability theory. CO2: Comprehend rigorous arguments developing the theory underpinning real analysis and base to probability theory. CO3: Demonstrate and understanding of limits of sequences, series etc. Construct rigorous mathematical proofs of basic results in real analysis. CO4: Students will be aware of the need and use of Real Analysis. CO5: Concept of measure, its properties, and important results related to measure & their proofs and Construction of Lebesgue measure and Lebesgue Stiltjes measure.	

Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
	CO1							
	CO2							
	CO3							
	CO4							
	CO5							
Pre-requisite	Basics of set theory, limits of sequences and series, functions and limits of sequence of functions							

Course Content	UNIT I: ➤ Set, Indicator functions and classes of sets: ➤ Recap of elements of set theory and Real number system. ➤ Limits of sequences of sets, ➤ Classes of sets like Semi-rings, rings, fields, σ-rings, σ-fields, Monotone classes. ➤ Generated classes, Borel σ-field of $\mathbb{R}$ and $\mathbb{R}^k$ and related results. UNIT: II: ➤ Measurable Space: ➤ Measurable space, simple function, Measurable function, Borel measurable function and related results. ➤ Almost everywhere convergence of sequence of measurable functions and related results. UNIT: III: ➤ Set function and Measures: ➤ Finitely additive and σ-additive set functions, ➤ Measures & its properties ➤ Monotone convergence theorem, ➤ Absolute continuity and singularity of measures. ➤ Statements of 'Lebesgue Decomposition theorem' and the Radon – Nikodym theorem. UNIT: IV: ● Integration of Simple functions and measurable function ➤ Integration of Simple functions with respect to a given measure & its properties ➤ Integration of measurable function with respect to a given measure. ➤ Elementary properties of integral of measurable function and related results. UNIT: V: ● Caratheodory extension theorem & its Applications: ➤ Caratheodory extension theorem (statement only) ➤ Construction of Lebesgue measures ➤ Lebesgue- Stieltjes measures through distribution functions.	
Reference Books	1. Ash Robert : "Real Analysis and Probability"; Academic Press. 2. Halmos P.R. : "Measure Theory"; McGraw Hill. 3. Kingman JEC and Taylor S.L. : "Introduction to Measure and Probability"; Cambridge Uni. Press.	

M. Sc. Statistics 1st Semester**Course-103: Univariate Distributions**

Course Code	102
Course Title	Univariate Distributions
Credit	4
Teaching per Week	4
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Effective From	2019-20
Purpose of Course	The purpose of this course is to expose the students to different aspects of distribution theory and construction of these distributions.
Course Objective	To present the general theory of statistical distributions as well as the standard distributions found in statistical practice. To train students with essential tools for statistical analyses at the post graduate level.
Course Outcomes	After successful completion of this course, student will be able to: CO1: Understand the most common discrete and continuous probability distributions and their real-life applications. CO2: Calculate moments, quartiles and characteristic function from distributions CO3: Get familiar with different transformation of univariate distribution CO4: Apply compound, contagious, Neyman type-A and Truncated distributions to solve problems CO5: Become aware about power series distributions CO6: Differentiate between central and non-central distributions CO7: Learn how to model product failure, droughts, floods and other extreme occurrences on studying the theory of order statistics

Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	
	CO1								
	CO2								
	CO3								
	CO4								
	CO5								
	CO6								
	CO7								
Pre-requisite	Basics of probability distributions as Binomial, Poisson, Normal, Beta-Gamma etc.								
Course Content	UNIT I: - Laplace, Lognormal and Cauchy distributions. Idea of truncated distributions, Truncated Poisson and Normal distributions. UNIT II: - Univariate compound distribution: Contagious distributions: Neyman type-A, Poisson-Binomial and Poisson –Negative Binomial distribution, Univariate Power series distributions. UNIT III: - Non-central distributions: Non-central chi-square, t and F distribution. UNIT IV: - Ordered statistics, their distributions and properties, distribution of Range.								
Reference Books	1. Johnson N.L. and Kotz S.: “Distributions in Statistics”; John Wiley. 2. Fioz M.: “Probability Theory and Mathematical Statistics”; John Wiley. 3. Rohatgi V.K. : “An Introduction to Probability Theory and Mathematical Statistics”; John Wiley. 4. Jaiswal M.C. : “Statistical Distributions”; (in Gujarati), University Book Publication Board. 5. Patel J.K. et al. : “Handbook of Statistics Distributions”; Marcel Dekker. 6. Mood A.M., Graybill F. and Boes D.C. : “Introduction to the Theory of Statistics”; McGraw Hill.								
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment								
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination								

M. Sc. Statistics 1st Semester
Course-104: Linear Algebra

Course Code	104
Course Title	Linear Algebra
Credit	4
Teaching per Week	4
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)
Effective From	1970
Purpose of Course	To make students conversant with matrix theory and related results those are base of other papers to be taught
Course Objective	To make students understand all the aspects of matrix theory which are used in different subsequent papers to be teach such as Multivariate Analysis, Design of Experiments, Econometrics, Stochastic Process etc.
Course Outcomes	After completing this course, students will be able to: CO1: Understanding and applying basic concepts of linear Algebra CO2: Identifying applications of Matrix Algebra in statistics CO3: Express and solve system of equations with multiple dimensions/variables in matrix notations CO4: Understand use of determinants, inverse of a matrix rank, characteristic polynomial, Eigen values, Eigen vectors etc., other special types of matrices. CO5: Understand concepts of linear transformation, linear product and quadratic equations with their applications.

Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7		
	CO1									
	CO2									
	CO3									
	CO4									
	CO5									
Pre-requisite										
Course Content	UNIT I: - Fields, Vector Spaces, subspaces, linear dependence and independence, basis and dimension of a vector space, finite dimensional vector space, completion theorem. Vector spaces with an inner product, Gram-Schmidt orthogonalization process, orthogonal basis. UNIT II: - Symmetric, skew-symmetric, Hermitian, skew-hermitian, orthogonal, unitary and normal matrices. Laplace expansion method, Matrix polynomial, Rank of a matrix, Properties of rank of a matrix, Idempotent matrices, generalized inverses, Moore-Penrose generalized inverse. UNIT III: - Real quadratic forms, reduction and classification of quadratic forms, index and signature, properties of quadratic forms. UNIT IV: - Characteristic roots and vectors, properties of characteristic roots and vectors of a real symmetric, hermitian, skew-hermitian, orthogonal, unitary and normal matrices, Algebraic and geometric multiplicity of a characteristic root.									

Reference Books	1. Gralbill F. A.: “Matrices with Applications in Statistics”; 2nd Ed., Wadsworth. 2. Rao C.R. : “Linear Statistical Inference and its Application”; 2nd Ed., John Wiley and Sons, Inc. 3. Searle S.R.: “Matrix Algebra useful for Statistics”; John Wiley and Sons, Inc. 4. Rao C.R. and Bhimasankaram P.: “Linear Algebra”; Tata McGraw Hill Pub.Co. Ltd. Additional Books 1. Bellman R. : “Introduction to Matrix Analysis”; 2nd. Ed., McGraw Hill. 2. Biswas S. : “Topics in Algebra of Matrices”; Academic pub. 3. Hadley G. : “Linear Algebra”; Narosa Pub. House. 4. Halmos P.R.: “Finite Dimensional Vector Spaces”; 2nd Ed., D. Van Nostrard Co. Inc. 5. Hoffman K. and Kunze R.: “Linear Algebra”; 2nd Ed., Prentice Hall, Inc. 6. Rao C.R. and Mitra S.K.: “Generalized Inverse of Matrices and its Application”; John Wiley and Sons, Inc.	
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment	
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination	

Course: 105: COMPUTER PROGRAMMING LANGUAGE – ‘C’

Course Code	105
Course Title	COMPUTER PROGRAMMING LANGUAGE – ‘C’
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Effective From	June 2008
Purpose of Course	The purpose of the course is to make the student capable of implementing the concepts, methods, debugging tools of programming and learn their implementation.
Course Objective	To make students acquainted with knowledge of programming using C language.
Course Outcomes	After completing this course, students will be able to: CO1: Understand the basic concepts and fundamentals of programming such as algorithm and flowchart. CO2: Understand the basic C fundamentals such as data types, operators etc. CO3: Design programs involving control statements such as conditional and unconditional statements. CO4: Implement advanced programming approach such as modular programming along with

UNIT II:

- Data Input and Output
 - Single Character input and output
 - The scanf function
 - The printf function
 - Gets and Puts functions
- Control Statements
 - The While Statement
 - do-while statement
 - for statement
 - if - else statement
 - switch statement
 - break statement
 - continue statement
 - goto statement

UNIT III:

- Functions
 - Introduction to functions
 - Function definition
 - Accessing function
 - Passing arguments to function
 - Recursive function
- Data Files

UNIT IV:

- Arrays
 - Defining an array
 - Processing an array
 - Multi dimensional arrays
 - Passing array to a function
 - Arrays and Strings
- Structures and Unions
 - Defining a structure

	➤ Processing a structure ➤ Unions	
Reference Books	1. Karnighan B. W. and Ritchie D. M. (1978) : “C programming Language”; Prentice Hall- Gale, ISBN: 0131101633, ISBN-13: 9780131101630 2. VijayMukhi: “The C Odyssey -vol. 6: Windows”; Bpb, ISBN:8170291682, ISBN-13: 9788170291688 3. Stephan G. Kochan (2001) : “Programming In C” ; CBS Publishers & Distributors, ISBN PB : CBS0000031 4. Stephen G. Kochan (2004): “Programming in C”; 3rd Edition, Sams, ISBN-10:0672326663, ISBN-13: 978-0672326660 5. Kelly Stan and Bootle (1988): “Mastering turbo C”; BPB Publications 6. Stan Kelly Bootle (1988): “Mastering Turbo C”; Wiley John & Sons Incorporated, ISBN-13: 9780895884626 , ISBN: 0895884623 7. Kanetkar Yashwant (2006) : “Let us C” ; 9th Edition , BPB, ISBN: 8183331637, ISBN-13: 9788183331630, 8. E Balaguruswamy (2007) : “Programming In C#”; Tata Mgraw Hill, ISBN: 0070667578 ISBN-13: 9780070667570, 978-0070667570 9. Robert Lafor (2001) : “Object - Oriented Programming in C” ; Sams , 4th Edition, ISBN: 0672323087, ISBN-13: 9780672323089, 978-0672323089 10. Robert Lafore (1995) : “Object Oriented Programming in C++”; Galgotia Publications.	
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment	
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination	
M. Sc. Statistics 1st Semester Course-106: Practical paper-I		
Course Code	106	
Course Title	Practical paper-I	
Credit	4	
Teaching per Week	8	
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)	

Effective From	2019-20								
Purpose of Course	The purpose of this course is to enrich the computing power of students using MS office tools Excel.								
Course Objective	Learning analysis of various kinds of data using excel will help the students to understand how to go around with the computing part of some of the theoretical aspects using MS office tools Excel.								
Course Outcomes	After successful completion of this course, student will be able to: CO1: Handle and process the data using excel CO2: Perform the analysis with analysis tool pack in excel CO3: Customize menus and toolbars in excel CO4: Understand and apply various functions available in excel. CO5: Solve linear algebra problems by excel CO6: Fit the distributions to a real life data CO7: Perform statistical formula using C programming								
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	
	CO1								
	CO2								
	CO3								
	CO4								
	CO5								
	CO6								
	CO7								
Pre-requisite	Basics knowledge of computer, Basics of mathematics and Statistics								
Course Content	Based on theory paper 101 to 105								
Reference Books	Reference book mention in theory paper 101 to 105								
Teaching Methodology	Classwork, Discussion, Lab work, self-study, practical session, Live demo, hands on training.								
Evaluation Method	30% Internal assessment based on class attendance, journal, internal practical examination, VIVA etc. 70% External based								

	on semester end University examination.								
M. Sc. Statistics 2nd Semester Course-201: Estimation Theory									
Course Code	201								
Course Title	Estimation Theory								
Credit	4								
Teaching per Week	4								
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)								
Effective From	2019-20								
Purpose of Course	This paper deals with point estimation, types of estimation and interval estimation.From this paper the students a build a foundation on inferential statistics which is the basis of higher-levelmathematical statistics.								
Course Objective	The purpose of this course is to derive suitable point estimators of the parameters of the distribution of a random give a measure of their precision and to learn computational skills to implement various statistical inferential app								
Course Outcomes	After completion of this course, the students will be able to: CO1: Understand the concept of estimator with different properties CO2: Demonstrate and understanding the concept of unbiasedness and biasedness with theory CO3: Derive a foundation on different theorem based on estimators CO4: Describe the concept of BLUE, BAN, MVUE, MVBUE, UMVUE with theorems. CO5: Students have the knowledge methods of obtaining minimum variance unbiased estimators. CO6: Learn the methods for interval estimation for small and large size confidence internal								
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	
	CO1								
	CO2								
	CO3								
	CO4								
	CO5								
	CO6								

Pre-requisite	Basic of probability distributions, calculus and estimation theory	
Course Content	UNIT I: - Concept of Estimator and Estimate, Different measures of closeness of an estimator: Pitman's closeness, Some desirable properties of estimators: Definition of Unbiasedness and Biasedness, Definition of Consistent estimator, Theorem of derivation of Consistent estimator, Efficiency: Best linear combination of unbiased estimator, BAN estimators. Sufficient statistics. UNIT II: - Neyman factorization theorem for discrete case, Minimal sufficient statistics, complete sufficient statistics, Minimum variance unbiased estimation: Lower bound of variance of an unbiased estimator, Cramer-Rao inequality, Minimum variance bound unbiased estimators, condition of existence of Minimum Variance Bound Unbiased Estimator. Chapman-Robbins inequality, Bhattacharya inequality, Rao-Blackwell theorem. Lehmann-Scheffe theorem, One parameter family of exponential distribution, Concept of finding uniformly minimum variance unbiased estimator (UMVUE) UNIT III: - Maximum likelihood estimator and its properties. Method of maximum likelihood, other methods of estimation: Method of moments, Method of minimum chi-square, Method of modified minimum chi squares, Method of scoring, MLE for grouped data, Method of scoring, Location invariance and scale invariance estimator and parameter, Pitman estimators for location and scale parameters. UNIT IV: - Confidence intervals: Methods of finding confidence interval, Large sample confidence intervals, confidence intervals for parameters of elementary distributions, confidence bounds of fixed length, Stein's two-stage procedure.	Some desirable properties of estimators: Definition of Unbiasedness and Biasedness, Definition of Consistent estimator, Theorem of derivation of Consistent estimator, Efficiency: Best linear combination of unbiased estimator, BAN estimators. Sufficient statistics.
Reference Books	REFERENCES 1. Rohatgi V.K. : "An Introduction to Probability Theory and Mathematical Statistics". 2. Rao C.R. : "Linear Statistical Inference and its Applications"; John Wiley. 3. Mood A.M., Graybill F. and Boes D.C. : "Introduction to the Theory of Statistics"; McGraw Hill. 4. Lehmann E.L.: "Theory of Point Estimation"; John Wiley. 5. Ferguson T.S.: "Mathematical Statistics: A Decision Theoretic Approach"; Academic Press.	

	6. Zacks S. : “Theory of Statistical Inference”; John Wiley.	
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment	
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination	
M. Sc. Statistics 2nd Semester Course-202: Multivariate Analysis		
Course Code	202	
Course Title	Multivariate Analysis	
Credit	4	
Teaching per Week	4	
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)	
Effective From	2019-20	
Purpose of Course	The purpose of this course is to understand the extensions of univariate techniques to multivariate frameworks and apply dimension reduction techniques used in the data analysis with the use of probability distributions.	
Course Objective	In multivariate analysis students learn how to deal with the data analysis of several variables simultaneously. N theoretical deductions of different multivariate techniques and deduction of multivariate probability distribution learning objectives of this paper.	

Course Outcomes	After completing this course, the students will be able to: CO1: Understand the development of multinomial and multivariate normal distribution with their properties. CO2: Understand the concept of Wishart distribution with various properties CO3: Understand the idea of partial and multiple correlation coefficient with testing of hypothesis CO4: Get Derivation of Hotelling T ² statistic and their various application in real life problems CO5: Demonstrate the knowledge and understanding of the basic ideas behind classification and discriminant analysis CO6: Understand the concept of data reduction technique like factor, principal and Canonical correlation analysis																																																									
Mapping between COs with PSOs	<table><tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td><td>PSO6</td><td>PSO7</td></tr><tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO6</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	CO1								CO2								CO3								CO4								CO5								CO6								
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CO4																																																										
CO5																																																										
CO6																																																										
Pre-requisite	Univariate distribution in both cases discrete and continuous, concept of linear algebra																																																									

Course Content	UNIT I: • Multivariate distributions: Multinomial distribution, Marginal and Conditional distributions, Characteristic function. Multivariate Normal distribution, Characteristic function, Marginal and conditional distributions, Distribution of linear function. Distribution of sample mean vector. UNIT II: • Distribution of sample generalized variance. Wishart Distribution: p.d.f of Wishart distribution, Properties of Wishart distribution, Additive property, Distribution of HWH', marginal distribution of W_{11}, distribution of $h'wh/h'\Sigma h$, $h'\Sigma^{-1}h/h'w^{-1}h$, Characteristic function. • Null and Non-null distribution of sample correlation coefficient r. Definition of Multiple and partial correlation coefficients. Null distributions of sample multiple and partial correlation coefficients. Testing of H_0: (i) $\rho = 0$, (ii) $\rho = \rho_0$ (iii) $\rho_{1(2,p)} = 0$ (iv) $\rho_{12.3\dots p} = 0$ (v) $\rho_{12.3\dots p} = \rho_0$ UNIT III: • Hotelling T^2 statistic. Null distribution of T^2, application in tests on mean vector for one and two multivariate normal populations and in testing equality of the components of mean vector (Problem of symmetry). • Multivariate Analysis of variance (MANOVA): One-Way classification problem. UNIT IV: • Classification Problem and Fisher's linear discriminant function, Probabilities of misclassification. Classification with more than Two multivariate normal populations. • Concept and application of (i) Factor analysis (ii) Principal Component analysis and (iii) Canonical Correlation analysis.	

Reference Books	1. Anderson T. W. : “An Introduction to Multivariate Statistical Analysis”; John Wiley. 2. Johnson and Wichern : “Applied Multivariate Statistical Analysis”. 3. Khirsagar A. M. : “Multivariate Analysis”; Marcel Dekker. 4. Morrison D.F.: “Multivariate Statistical Methods”; McGraw Hill. 5. Muirhead R.J. : “Abstracts of Multivariate Statistical Theory”; John Wiley. 6. Seber G.A.F. : “Multivariate Observations”; John Wiley. 7. Srivastava and Khatri C.G.: “An Introduction to Multivariate Statistics”; North Holland	
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment	
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination	

M. Sc. Statistics 2nd Semester
Course-203: Sampling Theory

Course Code	203
Course Title	Sampling Theory
Credit	4
Teaching per Week	4
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)
Effective From	1970
Purpose of Course	The purpose of the course is to provide the knowledge of sample survey and sampling designs starting with the
Course Objective	The objective of this course is to acquaint the students about the need & merits of sampling over census, theoretical and practical applications of different probabilistic, non-probabilistic sampling techniques and point estimation & interval estimation of different parameters of interest under different sampling techniques.

Course Outcomes	After completing this course, the students will be able to: CO1: Understand the basic principles of survey design and estimation. CO2: Apply different sampling methods, like SRSWR, SRSWOR, post-stratification (stratified sampling), Systematic sampling, Cluster sampling, Two stage sampling, multistage sampling for designing and selecting a sample from population under study and estimation of parameter of interest. CO3: Have Theoretical understanding and practical applications of use of auxiliary variable at estimation stage, e.g. Ratio, product and Regression methods of estimation under different sampling techniques and use of two phase /double sampling. CO4: Apply unequal probability sampling designs viz. PPSWR, PPSWOR including cumulative sum method, Lahiri's method, sen-midzuno sampling.																																									
Mapping between COs with PSOs	<table><tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td><td>PSO6</td><td>PSO7</td></tr><tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	CO1								CO2								CO3								CO4								
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CO3																																										
CO4																																										
Pre-requisite	Probability theory and Basics of Statistical inference.																																									
Course Content	UNIT I: • Basic concepts of sample survey and sampling theory: ➤ Concepts of population and sample need for sampling, Census and sample survey, basic concepts in sampling, organizational aspects of survey sampling, sample selection and sample size. ➤ Concept of parameter, statistic, sampling distribution and standard error, revision of properties of good estimator and criteria for comparison of estimators. UNIT II: • Basic Probabilistic Sampling techniques: ➤ Simple random sampling ➤ Stratified sampling ➤ Systematic sampling and ➤ Cluster sampling (with equal and unequal cluster sizes)																																									

	UNIT III: • Methods of estimation in sampling: ➤ Ratio method of estimation- Ratio estimator , unbiased ratio estimator and almost unbiased ratio estimator ➤ Product method of estimation ➤ Regression method of estimation ➤ Difference estimator UNIT IV: • Advanced Probabilistic sampling techniques: ➤ Two–stage sampling and its generalization. ➤ Two phase sampling for ratio and regression estimators. ➤ Probability Proportional to size sampling (with and without replacement), Sen-Midzuno sampling scheme	
Reference Books	1. Cochran W. G. : “Sampling Techniques”; John Wiley & Sons, Inc., New York. 2. Hansen M. H., et al.: “Sample Survey Methods and Theory”; John Wiley & sons, Inc., New York. 3. Kish L. : “Survey Sampling”; John Wiley & Sons, Inc., New York. 4. Murthy M. N. : “Sampling Theory and Methods”; Statistical Publishing Society, Calcutta. 5. Raj D. : “Sampling Theory”; McGraw-Hill Book co., New York. 6. Raj D. : “The Design of Sample Surveys”; McGraw-Hill Book Co., New York. 7. Sukhatme P.V., et al.: “Sampling Theory of Surveys with Applications”; The Iowa State Univ. Press, Ames, Iowa, USA and Indian Society of Agricultural Statistics, New Delhi. 8. Yates F. : "Sampling Methods in Censuses and Surveys"; Charles Griffin & Co. Ltd., London. 9. Goulden C. H. : "Methods of Statistical Analysis", Asia Publishing House, Bombay. 10. Snedecor G.W. and Cochran W.G. : "Statistical Methods"; The Iowa State Univ. Press, Ames, Iowa, USA.	
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment	

Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination							
Course: 204: Actuarial Statistics M. Sc. Statistics 2nd Semester Course-205: Linear Models								
Course Code	205							
Course Title	Linear Models							
Credit	4							
Teaching per Week	4							
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)							
Effective From	2019-20							
Purpose of Course	Main purpose of this course is to introduce need of the modelling for different real life phenomenon as a linear model and its statistical significance and interpretation.							
Course Objective	The main objective of this course is to provide the theoretical foundation of the Linear models and related aspects and testing of hypotheses related to its parametric functions.							
Course Outcomes	After completing this course, students will be able to: CO1: To understanding general linear models under Gauss-Markoff set up (GLM and GGMLM) including parameter estimation using method of least squares and its significance testing CO2: To understand the use and need of restricted linear regression and related theory CO3: To understand the process of simultaneous estimation of parametric functions, use of quadratic form, canonical for different purposes. CO4: Cochran's theorem and its application for linear models							
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
	CO1							
	CO2							
	CO3							
	CO4							

Pre-requisite	Linear Algebra, Probability theory, Estimation theory, Testing of Hypotheses, Multivariate analysis	
Course Content	UNIT I: - The general linear model: Gauss-Markoff set up, least squares, and generalized least squares, Normal equations and least squares estimates, estimation of linear parametric functions, variances and covariances of least squares estimates, estimation with correlated observations. UNIT II: - Least squares estimates with restrictions on parameters, simultaneous estimates of linear parametric functions, Canonical form of the linear hypothesis model and Error and Estimation spaces. UNIT III: - Estimation of scale parameter in the general linear model by quadratic functions. Necessary and sufficient conditions for (i) a quadratic form to be distributed as chi-square (ii) independence of a linear form and a quadratic form (iii) independence of two quadratic forms. UNIT IV: - Cochran's theorem and its generalizations. - Tests of hypotheses regarding parameters of a general linear model, tests involving linear functions of parameters, tests of sub hypotheses.	
Reference Books	- Rao C.R. (1973): "Linear Statistical Inference and its Applications"; 2nd Ed., John Wiley and Sons, Inc. - Searle S.R. (1971): "Linear Models". - Seber G.A.F. (1977): "Linear Regression Analysis". - Graybill F. A. (1961): "An Introduction to Linear Statistical Models". - Kshirsagar A.M. (1983): "A Course in Linear Models".	
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment	
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination	

M. Sc. Statistics 2 nd Semester								
Course-206: Practical paper-II								
Course Code	206							
Course Title	Practical paper-II							
Credit	4							
Teaching per Week	8							
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)							
Effective From	2019-20							
Purpose of Course	The purpose of this course is to enrich the computing power of students using MS office tools Excel.							
Course Objective	Learning analysis of various kinds of data using excel will help the students to understand how to go around with part of some of the theoretical aspects using MS office tools Excel.							
Course Outcomes	After successful completion of this course, student will be able to: CO1: Handle and process the data using excel CO2: Perform the analysis with analysis tool pack in excel CO3: Understand and apply various functions available in excel. CO4: Estimate parameters using formula in excel by different methods CO5: Solve problem related multivariate data with use of excel CO6: Apply sampling technique to solve real life problem using excel							
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
	CO1							
	CO2							
	CO3							
	CO4							
	CO5							
	CO6							
Pre-requisite	Basics knowledge of computer, Statistical inference, Multivariate technique, Sampling Technique and Actuarial							

Course Content	Based on theory paper 201 to 205	
Reference Books	Reference book mention in theory paper 201 to 205	
Teaching Methodology	Classwork, Discussion, Lab work, self-study, practical session, Live demo, hands on training.	
Evaluation Method	30% Internal assessment based on class attendance, journal, internal practical examination, VIVA etc. 70% External based on semester end University examination.	

M. Sc. Statistics 3rd Semester
Course-301: Testing of Hypothesis

Course Code	303
Course Title	Testing of Hypothesis
Credit	4
Teaching per Week	4
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)
Effective From	1970
Purpose of Course	The purpose of this course is to teach classical theory of testing of hypotheses, use of the concept of likelihood of hypothesis and sequential testing of hypothesis for different types of hypothesis and their applications.
Course Objective	To make students aware of Neyman-Pearson Theory of testing of hypotheses, likelihood ratio based parametric test as well as, composite hypotheses) and sequential testing (simple) procedures.

Course Content	UNIT I: • Basic concepts of testing of hypotheses Statistical Hypotheses- Simple and Composite. Statistical tests, Critical region, randomized test, non-randomised test, Errors of Type I and Type II, Size and Power of a test • MP and UMP tests Neyman–Pearson’s Lemma & Generalized Neyman–Pearson’s Lemma and its applications to find Most Powerful test and UMP tests for families of distributions admitting monotone likelihood ratio, two sided hypotheses UNIT II: • Unbiasedness for testing of hypotheses: Similar test, relationship with UMP unbiased test, UMP similar test and its application for one parameter exponential family, Similarity and completeness, tests with Neyman structure, UMP unbiased tests for multi-parameter exponential families UNIT III: • Concept of Invariance in testing of hypotheses: Maximal invariant test, most powerful invariant test • Concept of least favourable distribution and its use in testing of hypotheses UNIT IV: • Likelihood ratio tests: Likelihood ratio test for simple and composite hypotheses. UNIT V: • Sequential testing of hypotheses: Wald’s sequential probability ratio test (SPRT), Properties of SPRT, approximate bounds, OC and ASN functions, Efficiency of SPRT, Fundamental identity of sequential analysis and its use to obtain OC and ASN functions of SPRT.	

Reference Books	1. Ferguson T.S. : “Mathematical Statistics”; Academic Press. 2. Kendall M.G. and Stuart A.: “The Advanced Theory of Statistics”; Vol. 2., Ed. IV, Charles and Griffin. 3. Lehman E.L. : “Testing Statistical Hypotheses”; Wiley Eastern. 4. Mood A.M., Grabill F. and BoesD.C. : “Introduction to the Theory of Statistics”; McGraw Hills, International Student Ed. III. 5. Rao C.R. : “Linear Statistical Inference and its Applications”; Wiley Eastern, EdII. 6. S. Wilks : “Mathematical Statistics”, Wiley New York. 7. S. Zacks : “The Theory of Statistical Inference”; Wiley New York. 8. Goon A. M., Gupta M. K. and Dasgupta B. : “An Outline of Statistical Theory” Vol.1, 2; World press. 9. Rohatgi V.K.: “Introduction to Probability Theory and Mathematical Statistics”; Wiley Eastern.	
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment	
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination	

M. Sc. Statistics 3rd Semester
Course-302: Econometrics

Course Code	302
Course Title	Econometrics
Credit	4
Teaching per Week	4
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Effective From	1970

Purpose of Course	The purpose of this course is to give students a proper and thorough understanding of the applications of linear and non-linear regression models, its limitations and foundation in econometric techniques for forecasting. This will enable students to develop regression model and apply for the specific perspective fields/ data sets.								
Course Objective	The objective of this course is to introduce the subject of econometrics from its origin to its advance developments with their application for studying economic phenomena and hence to introduce branch which is an integration of mathematics, statistics, and economics.								
Course Outcomes	After completing this course, the students will be able to: CO1: Understand importance of descriptive techniques, graphical techniques and correlation analysis before using regression analysis and drawing inference out of it. CO2: Apply simple linear regression model to real life data/ situations CO3: Understand multiple linear regression models with applications and concept of Multicollinearity, autocorrelation and heteroscedasticity. CO4: Residual analysis for validation of the fitted model as well as identifying the problems with the fitted model. CO5: To suggest the correct regression model for the given problem CO6: To analyse the robustness of the regression model.								
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	
	CO1								
	CO2								
	CO3								
	CO4								
	CO5								
	CO6								
Pre-requisite	Linear algebra, Linear Models, Probability theory, Estimation theory, Testing of Hypotheses, Probability distributions								
Course Content	UNIT I: - Econometrics, Introduction to econometric models. Review of Single Equation method OLS estimation: Estimation, Prediction, and tests of hypotheses, G.L.M. and generalized least squares estimation. Aitken's generalized least square (G.L.S) estimator, UNIT II: - GLM with stochastic regressors. Instrumental variables, estimation, consistency property, asymptotic variance of								

	instrumental variable estimators. • Dummy and Lagged variables: The nature of dummy variables, caution in the use of dummy variables, ANOVA models with two qualitative variables, regression with a mixture of quantitative and qualitative regressors: the ANCOVA models, the dummy variable alternative to the chow test, interaction effects using dummy variables, the use of dummy variables in seasonal analysis, piecewise linear regression. UNIT III: • Autocorrelation : Introduction, its consequences and tests and remedial measures to it. • Heteroscedasticity: Problem of heteroscedasticity, Consequence of heteroscedasticity, Tests for detecting the presence and nature of heteroscedasticity, Methods for handling heteroscedasticity. Grouping of observations. • Multicollinearity: Detection and consequences, tools for handling multicollinearity, ridge regression and properties of ridge regression. UNIT IV: • Simultaneous equation system: structure and models, typology of economic relations, structural form, reduced form and final form of an economic model. Problem of identification under linear homogeneous and Covariance restrictions. Rank and Order conditions of Identification, Restrictions on structural parameters. • Methods of estimation: Limited information models, indirect least squares. Two stage least squares, limited information maximum likelihood (LIML), full information methods. Three stage least square (3SLS) and full information maximum likelihood (FIML). K-class estimators, Instrumental variable method of estimation, 3-SLS estimation.	
Reference Books	1. Apte P.G.: "Text Book of Econometrics"; Tata McGraw Hill. 2. C. F. Charist: "Econometric Models and Methods"; John Wiley. 3. Chatterjee and Price B.: "Regression Analysis by Example"; John Wiley & Sons. 4. Cramer: "Empirical Econometrics"; North Holland. 5. D.Gujarati: "Basic Econometrics"; McGraw Hill. 6. Intriligator, M.D. : Economic models -techniques and applications, Prentice Hall	

	7. Intrilligtor H.: “Econometric Methods, Techniques and Applications”; Prentice Hall Pub. Co. 8. J. Jonston: “Econometric Methods”; McGraw Hill, Kogakusha Ltd. 9. Jan Kmenta : Elements of Econometrics, University of Michigan Press 10. Judge, G.C., Hill, R, C. Griffiths, W.E., Lutkepohl, H. and Lee, T-C. (1988). Introduction to the Theory and Practice of Econometrics, Second Edition, John Wiley & Sons. 11. Kendall, M.G. and Stuart, A. (1968). The Advanced Theory of Statistics (Vol. III), Second Edition, Charles Griffin. 12. Klein L.R.: “An Introduction to Econometrics”; Prentice Hall of India. 13. Klein, L.R. : Applied Economics, Taylor and Francis 14. Kmenta, J. (1986). Elements of Econometrics, Second Edition, Mac Millan. 15. Kontsoyiannis A.: “Theory of Econometrics”; Mac Millan press. 16. Maddala, G.S. : Econometrics, North Holland 17. Malinvad E.: “Statistical Methods in Econometrics”; North Holland. 18. Theil H. C.: “Introduction to the Theory and Practice of Econometrics”; John Wiley.	
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment	
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination	

M. Sc. Statistics 3rd Semester

Course-303:

Operations Research I

Course Code	303
Course Title	Operations Research I
Credit	4
Teaching per Week	4
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)
Effective From	1970

Purpose of Course	<i>The purpose of this course is to study Operations research (OR) which is an analytical method of problem-solving and decision-making that is useful in the management of organizations.</i>								
Course Objective	To learn the mathematical formulation of complex decision-making problems and arrive at optimal or near-optimal solutions using different techniques of operations research.								
Course Outcomes	After completing this course, the students will be able to: CO1: Understand the basics and formulation of linear programming problems, solve linear programming problems using graphical method, simplex, two-phase and Big-M method. CO2: Become aware of transportation problem with their properties, methods and real-life applications. CO3: Understand concept of the assignment problem with real life situations. CO4: Understand the concept of duality, their properties and methods CO5: Develop the concept of simulation, their type and applications CO6: Understand the concept of inventory management system with EOQ model with different scenario like probabilistic and deterministic								
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	
	CO1								
	CO2								
	CO3								
	CO4								
	CO5								
	CO6								
Pre-requisite	Concept of linear algebra, basic mathematical operations								
Course Content	UNIT I: Linear Programming: ➤ Definition of linear programming problem (LPP) ➤ Formulation of LPP. ➤ Solution of LPP by Graphical and Simplex Method (including Big-M and Two-phase method) UNIT II:								

- **Transportation and Assignment Problems:**

- Definition of Transportation Problem (TP)
- Special structure of TP
- Methods for getting basic feasible solution to TP
- Methods for getting optimum solution to TP
- Unbalanced TP
- Definition of Assignment Problem (AP)
- Algorithm for solving an AP
- Unbalanced AP
- Routing Problem

UNIT III:

- **Duality:**

- Definition of Dual Problem.
- Rules for converting any Primal into its Dual
- Properties of Duality
- Dual-Simplex Method

- **Simulation**

- Introduction & definitions
- Types of simulation
- Uses & limitation
- Phases of simulation Model
- Even type simulation
- Monte-Carlo Simulation & its applications
- Advantages and Disadvantages

	UNIT IV: • Inventory Management Systems: ➤ Definition ➤ Costs involved in Inventory Problems ➤ Classical EOQ Models without and with shortages ➤ Multi-item Deterministic Models ➤ Probabilistic Inventory Models ➤ Inventory Models with Price Breaks	
Reference Books	1. K. Swarup, Gupta P.K. and Man Mohan : “Operations Research”; S.Chand & Co.,New Delhi. 2. G. Hadley : “Linear Programming”; Oxford & IBH Pub. Co. 3. Murthy K.G. : “Linear and Nonlinear Programming”. 4. Kasana H.S. and Kumar K.D. : “Introductory Operations Research”; Springer. 5. Kapoor V.K. : “Operations Research”; S.Chand & Co.,New Delhi. 6. Sharma S.D. : “Operations Research”; Kedar Nath Ram Nath & Co. Publishers, Meerut.	
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment	
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination	

M. Sc. Statistics 3rd Semester
Course-304: Introduction to Statistical Softwares

Course Code	304
Course Title	Introduction to Statistical Softwares
Credit	4
Teaching per Week	4
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)

Effective From	2019-20								
Purpose of Course	This is a course after studying which students can perform different statistical computations using statistical package and can think a career on data analysis and even get self-employed as a data analyst.								
Course Objective	To learn statistical techniques and their implementation using comprehensive SPSS software and R								
Course Outcomes	After completing this course, the students will be able to: CO1: Get familiar with SPSS software and understand SPSS environment. CO2: Create and edit the data files, plot graphs using SPSS. CO3: Compute descriptive statistics using SPSS. CO4: Perform inferential statistical analysis through SPSS. CO5: Understand basics of R environment. CO6: Perform various operations on data in R. CO7: Do descriptive statistical analysis in R. CO8: Perform different computational facilities provided in the package.								
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	
	CO1								
	CO2								
	CO3								
	CO4								
	CO5								
	CO6								
	CO7								
	CO8								
Pre-requisite	Basics of computer and Statistical inference								
Course Content	UNIT I: SPSS: ➤ SPSS Introduction								

- Starting SPSS
- Types of Data
- Levels of Measurement
- Missing Values
- Important Files // database files
- **Data Management**
- Selecting Cases
- Standardizing Data
- Transformation of Data
- Split File
- Variable and Value Labels
- Recode Variables/Visual Binning
- Random Sample of the Data
- Creating a Population Variable
- Multi Response
- Time Saving Features / SPSS MACRO

UNIT II:

- **Basic Data Analysis**
- Descriptive Statistics
- Frequency Tables/Cross Tabs
- Independent T test
- Paired T Test
- One-Way ANOVA
- Correlation / Regression

Presentation with live data

UNIT III:

R:

- **Introduction to R**
 - Background and resources
 - Installing R.
 - R console.
 - R commander
 - Command and syntax
 - Packages and libraries
 - Help in R
 - Workspace in R
- **Data Structures**
 - Introduction to data structure
 - Vectors
 - Matrices
 - Arrays
 - Lists
 - Factors
 - Data frames
 - Importing and Exporting data
 - Data types
- **Frequencies & Descriptive Statistics**
 - Frequency
 - Measure of central tendency
 - Measure of Dispersion
 - Measure of skewness
 - Box and Whisker part
- **Data management**

- Split
- Find and replacement
- Manipulations with alphabets
- Evaluation of strings
- Data frames.

UNIT IV:

- **Graphical Analysis**
 - Creating a simple graph
 - Modifying the points and line of graph
 - Modifying title and subtitle of a graph
 - Modifying axes of the graph
 - Adding additional elements to graph
 - Adding legend on a graph
 - Special graph
 - Multiple plots
- **Comparing Populations**
 - Cross tabulation
 - One sample t test
 - Independent sample t test
 - Paired sample t test
 - One way ANOVA
- **Bivariate Data Analysis**
 - Correlation
 - Simple linear regression
 - Multiple linear regression

	• Conditional executions and loops ➤ If loop ➤ While loop ➤ For loop	
Reference Books	1. Miller R. L., Ciaran Acton and Fullerton D. A., John Malthy(2009), "SPSS for Social Scientists"; 2nd Edition, Palgrave Macmilan. ISBN: 9780230209930. 2. Wagner W. E. III (2006): "Using SPSS for Social Statistics and Research Methods"; SAGE Publications, ISBN-13: 9781412940771. 3. Einsprucho E. L.: "An Introductory Guide to SPSS for Windows"; ISBN:1-412904153. 4. Pandya K. and Bulsari S.: "Enjoy Statistics with SPSS for Windows"; Popular. 5. Gaur A. S. and Gaur S. S(2009).: "Statistical Methods for Practice and Research- A guide to data analysis using SPSS"; 2nd Ed., Sage Publications, New Delhi. 6. George: "SPSS For Windows: Step By Step"; 8th Ed., Pearson, ISBN: 8131724298, 9788131724293. 7. Sudha G. Purohit, Sharad D. Gore, and Shailaja R. Deshmukh (2008), "Statistics using R, Second edition", Narosa Publishing House, ISBN-978-81-8487-455-6 8. Dr. Mark Gardener (2015), "Beginning R: The statistical programming language", Wiley, ISBN-978-81-265-4120-1 9. Jared P. Lander (2014), "R for everyone advance analytics and graphics", Addison Wesley data & analytics series, Dorling Kindersley (India) Pvt. Ltd., ISBN-978-93-325-3924-2 10. Yanchang Zhao and Yonghua Cen (2014), "Data mining application with R",Elsevier, ISBN-978-93-5107-218-8 11. Nina Zumel and John Mount (2015), "Practical data science with R", Dreamtech Press, ISBN-978-93-5119-437-8 12. Paul D. Lewis (2010), "R for medicine and biology", Jones and Bartlett Publishers, ISBN-978-0-7637-5808-0.	
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment	
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination	

M. Sc. Statistics 3 rd Semester								
Course-306: Practical paper- III								
Course Code	306							
Course Title	Practical paper- III							
Credit	4							
Teaching per Week	8							
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)							
Effective From	2019-20							
Purpose of Course	The purpose of this course is to introduce practical based on theory papers using statistical software (SPSS and office tools excel							
Course Objective	To learn analysis of various kinds of data using software to help the students understand how to go around with part of some of the theoretical aspects.							
Course Outcomes	After successful completion of this course, student will be able to: CO1: Solve problem related to testing of hypothesis by excel and software CO2: Apply different econometrics model to real life situations run by excel and software. CO3: Apply Operations research technique to real life problems. CO4: Use statistical packages in different types of data. CO5: Handel and process the data using statistical packages CO6: Apply Data mining technique in large scale data CO7: Draw controls charts and apply acceptance sampling plans in industry point of view							
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
	CO1							
	CO2							
	CO3							
	CO4							
	CO5							
	CO6							
Pre-requisite	Students should be aware about Parametric Test, Regression models, Operations Research Technique, basic ab							

	software SPSS and R, Data Mining tools etc.	
Course Content	Based on theory paper 301 to 304 and elective papers (3051 to 3054)	
Reference Books	Reference book mention in theory paper 301 to 304 and elective papers (3051 to 3054)	
Teaching Methodology	Classwork, Discussion, Lab work, self-study, practical session, Live demo, hands on training.	
Evaluation Method	30% Internal assessment based on class attendance, journal, internal practical examination, VIVA etc. 70% External based on semester end University examination.	

**M. Sc. Statistics 3rd Semester
Course-401: Decision Theory**

Course Code	401
Course Title	Decision Theory
Credit	4
Teaching per Week	4
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)
Effective From	1970
Purpose of Course	To make students understand decision theory based on Bayesian probability i.e., making rational decisions against uncertainty without having any parametric information.
Course Objective	The main objective of this course is to provide the detailed knowledge of statistical inference under Bayesian framework.
Course Outcomes	After successful completion of this course, student will be able to: CO1: Identifying and dealing with the situations of decision making under risk and uncertainty CO2: Understand decision problem, loss function, risk function and decision rules, their admissibility and comparison CO3: use of different decision rules under uncertainty and risk. CO4: Obtaining best decision rules using different types of prior, posterior distributions and loss functions CO5: Understand the applicability of different nonparametric statistical tests for one, two (paired as well as unpaired) samples CO6: Solve hypothesis testing problems where the conditions for the traditional parametric inferential techniques are not satisfied.

Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	
	CO1								
	CO2								
	CO3								
	CO4								
	CO5								
	CO6								
Pre-requisite	Detailed knowledge of Probability theory, Estimation Theory and Probability distribution.								
Course Content	UNIT I: Review of basic elements of statistical decision problem: Various inference problems viewed as decision problems. UNIT II: Introduction to Decision Analysis: Pay-off table for decisions and discussion of decision criteria, Decision trees. UNIT III: Main theorems of Decision Theory: Natural ordering of decision rules. Complete and essentially complete classes of decision rules. Admissibility of Bayes rules. Existence of complete class when parameter space is finite and the risk set is closed and bounded from below. UNIT IV: Invariant decision problems Invariant decision rules, Admissible, minimax invariant rules. UNIT V: Non-Parametric Methods for Testing of hypotheses: ➤ Tests for one sample ➤ Tests for two related samples ➤ Tests for two independent samples ➤ Tests for k related samples ➤ Tests for k independent samples ➤ Tests of significance of measures of correlation								
Reference Books	1. Berger J.O. : “Statistical Decision Theory”; Springer –Verlag Pub. Co., New York.								

	2. Gibbons J.D. : “Nonparametric Statistical Inference”; McGraw Hills. 3. Ferguson T.S. : “Mathematical Statistics”; Academic Press. 4. Kendall M.G. and Stuart A.: “The Advanced Theory of Statistics”; Vol. 2., Ed. IV, Charles and Griffin. 5. Mood A.M., Grabill F. and Boes D.C. : “Introduction to the Theory of Statistics”; McGraw Hills, International Student Ed. III. 6. Sedney Seigal : “Nonparametric Methods for Behavioral Sciences”; McGraw Hill. 7. Gibbons J.D. and Pratt J.W. : “Concepts of Nonparametric Theory”; Springer-Verlag. 8. Daniel W.W. : “Applied Nonparametric Statistics”; PWS-KENT publishing Co., Boston. 9. Conover W.J. : “Practical Nonparametrics”; John Wiley. 10. Wald A. : “Sequential Analysis”; Wiley 11. Hettmansperger, T.P. (1984). Statistical inference Based on Ranks, John Wiley & Sons. 12. Randles, R.H. and Wolfe, D.A. (1979). Introduction to the Theory of Nonparametric Statistics, John Wiley & Sons. 13. Rohatgi, V.K. and Saleh, A.K. Md. E. (2005). An Introduction to Probability and Statistics, Second Edition, John Wiley & Sons.	
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment	
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External University examination	

Course: 402:
DESIGN OF EXPERIMENTS

Course Code	402
Course Title	DESIGN OF EXPERIMENTS
Credits	4
Teaching per Week	4 Hrs
Maximum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Effective From	June 2020
Purpose of Course	The purpose of the course is to learn the applications of different designs in agriculture, medicine and industry.
Course Objective	To make students acquainted with various techniques of design of experiment.
Course Outcomes	After completing this course, students will be able to:

		UNIT IV: Factorial Experiments : Characterization of experiments, factorial experiments, factorial experiments with factors at two levels, grouping for interaction contrasts, confounding, confounding in more than two blocks, experiments with factors at three levels each, analysis of factorial experiments.	
Reference Books		- Montgomery, D. C. (1997): “Design and Analysis of Experiments”; 4th edition, John Wiley & Sons, New York - Montgomery, D. C. (2006): “Design and Analysis of Experiments”; 5th Ed, Wiley (India), ISBN: 812651048X, ISBN-13: 9788126510481, 978-8126510481 R. Mead. (1990): “The Design of Experiments: Statistical Principles for Practical Application”; Cambridge Uni. Press. ISBN-10: 0521287626, ISBN-13: 978-0521287623 - Cochran W.G. and Cox G.M. (2003): “Experimental Designs”; 2nd Edition, John Wiley (wie) ISBN: 9971513110, ISBN-13: 9789971513115, 978-9971513115. - Cochran W.G. and Cox G.M. (1957): “Experimental Designs”; 2nd Edition, John Wiley & Sons Inc., New York, ISBN: 0471162035, ISBN-13: 9780471162032 - Das, M.N. and Giri, N.C. (1986). Design and Analysis of Experiments. Wiley Eastern Ltd., New Delhi. - Das M.N. and Giri N.C.(1999) : “Design and Analysis of Experiments”; 2nd Edition, New Age International Publishers Ltd, ISBN: 0852269145, ISBN-13: 9780852269145. - Federer W.T. (1993) : “Statistical Design And Analysis For Intercropping Experiments”; Springer-verlag, ISBN: 0387979239, ISBN-13: 9780387979236, 978-0387979236 - Federer, W. T. (1955): “Experimental Design: Theory and Application”; The Macmillan Co., New York. - Klaus Hinkelmann, Kempthorne Oscar (2005): “Design and Analysis of Experiments”; Wiley-interscience, ISBN: 0471551775, ISBN-13: 9780471551775 - Kempthorne, O. (1952), The Design and Analysis of Experiments, John Wiley & Sons, New York - Fisher R. A. (2005): “Statistical Methods for Research Workers”; Cosmo Publications, ISBN: 8130701332, ISBN-13: 9788130701332, 978-8130701332 - Panse, V.G. and Sukhatme, P.V. (1978): “Statistical methods for agricultural workers”; ICAR, New Delhi.	

Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment	
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination	

M. Sc. Statistics 4th Semester
Course-403: Operations Research-II

Course Code	403
Course Title	Operations Research II
Credit	4
Teaching per Week	4
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)
Effective From	1970
Purpose of Course	The purpose of this course is to Study Operations research (OR) which is an analytical method of problem-solving decision-making that is useful in the management of organizations with the help of mathematical and statistical techniques.
Course Objective	To develop the optimization techniques that will be useful in the personal and professional life.

Course Outcomes	After completing this course, the students will be able to: CO1: Understand basic concept of sensitivity analysis with changes in objective function, vector b and matrix A. Also discuss the cases for addition and deletion of variable and constraints with example CO2: Construct integer programming problems with different types to discuss the solution techniques. CO3: Select the best sequence through different machine to different jobs to minimize time CO4: Understand the concept of PERT/CPM and their real life application CO5: Become aware of the concept of replacement problems with fixed money and variable money effect. Comparison of group and individual policy CO6: Explain the concept of Goal programming problem, their formulation method and example																																																									
Mapping between COs with PSOs	<table><tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td><td>PSO6</td><td>PSO7</td></tr><tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO6</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	CO1								CO2								CO3								CO4								CO5								CO6								
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Pre-requisite	Concept of liner algebra, basic mathematical operations	

Course Content	UNIT I: ● Sensitivity Analysis: ➤ Basic concepts ➤ Changes in the coefficient of objective function ➤ Changes in the components of vector b and of Matrix A ➤ Addition / Deletion of variable in the problem ➤ Addition / Deletion of constraint in the problem UNIT II: ● Integer Programming: ➤ Introduction ➤ All and mixed integer programming (IPP) problems ➤ Gomory's all-IPP algorithm ➤ The branch and bound technique ➤ Zero - one programming ● Sequencing Problems: ➤ Definition, Notations and Assumptions ➤ Solution of sequencing problem. ➤ Problems with n-jobs and 2-machines ➤ Problems with n-jobs and 3-machines ➤ Problems with 2-jobs and m-machines UNIT III: ● PERT / CPM: ➤ Basic concepts . ➤ Construction and Time Calculation of the Network ➤ Determination of Float and of the Critical Path ➤ Crashing a Project ➤ Scheduling a Project ➤ Resource Analysis and Allocation ➤ Application of PERT/ CPM ➤ UNIT IV:	

	Seasonal ARIMA model, Introduction to conditional Heteroscedasticity model; Volatility models, ARCH model, GARCH model, properties, estimation and forecasting of these models.	
Reference Books	14. Allen R. G. D. (1975). Index Numbers in Theory and Practice, Macmillan. 15. Kendall M. : “Time Series”; Charles Griffin and Company. 16. Box and Jenkins : Time Series Analysis : Forecasting and Control; Holden Day Pub. 17. Chatfield C. : The Analysis of Time Series : Theory and Practice; Chapman and Hall. 18. Waller Vancuels : Applied Time Series and Box Jenkins Models. 19. Karmel P.H. : “Applied Statistics for Economics”. 20. Sen A.K. : Growth Economics : Penguin Modern Economic Reading Edition. 21. Pillai S. : Economic & Business Statistics; Progressive Corporation Pvt. Ltd. 22. Mukhopadhyay P. : Applied Statistics; New Central Book Agency (P) Ltd. 23. Gupta S.C. and Kapoor V.K. : Fundamentals of Applied Statistics; Sultan Chand & Sons. 24. Anderson. T. W. (1971). The Statistical Analysis of Time Series Wiley, N. Y. 25. Montgemory, D. C. Johnson L. A (1990) Forecasting and Time Series Analysis, McGraw Hill. 26. Brockwell, P. J. and Davis R. A. (2006) Time Series: Theory and Methods (Second Edition) Springer-Verlag.	

Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

well as practical knowledge of analyzing the data coming out from share market, Business analytics, sports, medical science, and public health and so on.

M. Sc. Statistics 4th Semester
Elective Paper
Course-4042: Official Statistics

Course Code	4042
Course Title	Official Statistics
Credit	4
Teaching per Week	4
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Effective From	2019-20
Purpose of Course	To understand official statistics and its role in framing policies in Economics and Business and the system of official statistics in India
Course Objective	To make students competent in theories and practices of official statistics.
Course Outcomes	After completing this course, students will be able to: CO1: Understand Indian Statistical systems, its role, functions and activities i.e. understand the role of MoSPI, CSO, NSSO, National Statistical Commission. CO2: Appreciate and use techniques of quantitative analysis in social work research CO3: Discuss the scope and contents of population census of India. CO4: Identify Statistics related to industries, foreign trade, balance of payment, cost of living inflation, educational and social statistics etc. CO5 : Understand economic development and national income estimation CO6: Discuss the measures of inequality in income and measures of incidence

Reference Books	10. Bhaduri, A. (1990). Macroeconomics: The Dynamics of Commodity Production, Macmillan 11. India Limited, New Delhi. 12. Branson, W. H. (1992). Macroeconomic Theory and Policy, Third Edition, Harper Collins 13. Publishers India (P) Ltd., New Delhi. 14. C. S. O. (1990). Basic Statistics Relating to the Indian Economy. 15. C.S.O. (1995). Statistical System in India. 16. C. S. O. (1999). Guide to Official Statistics. 17. C. S. O. (2016). Guide to Official Statistics. 18. Goon A. M., Gupta M. K., and Dasgupta. B. (2001), Fundamentals of Statistics, Vol. 2, 19. World Press, India. 20. Mukhopadhyay P. (2011). Applied Statistics, Second Edition, Books & Allied Ltd, India. 21. Asthana, B.N. and Srivastava, S.S.(1984): Applied Statistics of India, Chaitanya Publishing 22. House, Allahabad.	
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment	
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination	
M. Sc. Statistics 3rd Semester Elective Paper Course-4043: Bio-Statistics & Clinical Research		
Course Code	4043	
Course Title	Bio-Statistics & Clinical Research	
Credit	4	
Teaching per Week	4	
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)	
Effective From	2019-20	

	UNIT II: • Design of clinical trials : parallel vs. cross-over designs, cross-sectional vs. longitude designs, • review of factorial designs, objectives and endpoints of clinical trials, design of Phase I trials, • design of single-stage and multi-stage Phase II trials, design and monitoring of Phase III trials • with sequential stopping, design of bioequivalence trials. UNIT III: • Reporting and analysis: analysis of categorical outcomes from Phase I - III trials, analysis of • survival data from clinical trials. Interim analysis method, motivating intent- to-treat analysis. UNIT IV: • Determining sample size. Surrogate endpoints: selection and design of trials with surrogate • endpoints, analysis of surrogate endpoint data.	
Reference Books	15. Prem Narayan, Bhatia & Malhotra (1979): Handbook of Statistical Genetics, IASRI, New Delhi. 16. Jain, J.R. (1982): Statistical techniques in quantitative genetics, Tata Mcgraw Hill. 17. Govindarajulu, Z. and Kargar, S. (2000): Statistical Techniques in Bioassay. 18. Finney, D.J (1971): Statistical Method In Bioassay, Griffin. 19. Finney, D.J (1971): Probit Analysis (3rd Edition), Griffin. 20. Weatherile, G.B. (1966): Sequential Methods in Statistics, Griffin. 21. Piantadosi, S. (1977): Clinical: A Methodologic Perspective. Wiley and Sons. 22. Jennison, C. and Turnbull, B.W (1999): Group Sequential Methods with Applications to 23. Clinical Trials, CRC Press. 24. Flesis, J.L (1989): The Design and Analysis of Clinical Experiments. Wileyand Sons. 25. Marubeni, E. and Valsechhi, M.G (1994): Analyzing Survival Data From Clinical Trials and 26. Observational Studies. Wiley and Sons. 27. Friendman,L.M., Furbery, C.D. and Demets, D.L.(1998): “ Fundamental of clinical Trials	

	28. “ Springer Publication,3rd ed., Springer. 29. Duolaowang, A. B. (2006): Clinical Trials A Practical Guide to Design, Analysis, and Reporting, 30. Published by Remedica, USA 31. Indrayan and L. Satyanarayana : Biostatistics for medical, nursing and pharmacy students, Eastern Economy Edition, Prentice hall India 32. B. K. Mahajan: Method in Biostatistics for medical students and research work, Sixth edition, 33. Jaypee Brothers medical publisher LTD. ISBN 81-7179-520-X.	
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment	
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination	
M. Sc. Statistics ^{4th} Semester Elective Paper Course-4044: Statistical Simulation		
Course Code	4044	
Course Title	Statistical Simulation	
Credit	4	
Teaching per Week	4	
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)	
Effective From	2019-20	
Purpose of Course	Students are expected to choose proper models for a given research in applied problem and apply the theory to behaviour in different fields of applied science.	
Course Objective	To develop an ability to analyse run simulation model to real world problem.	
Course Outcomes	After completing this course, the students will be able to: CO1: Generate random numbers CO2:Generate random numbers from probability distribution CO3: Use simulation for statistical inference	

	13. Davison, A.C. and Hinkley,D.V. (1997) Bootstrap methods and their applications (Chapman and Hall). 14. Sho.J and Tu,D (1995); The Jackknife and the Bootstrap. Springer Verlag.	
Teaching Methodology	Classwork, Discussion, Self-Study, Seminars and/or Assignment	
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination	

Master of Science (Applied Statistics): Semester – I
Course: MAS-101: BASIC MATHEMATICS AND ELEMENTS OF PROBABILITY THEORY

Course Code	MAS-101
Course Title	BASIC MATHEMATICS AND ELEMENTS OF PROBABILITY THEORY
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Effective From	June 2007
Purpose of Course	The purpose of the course is to present and apply the general theory of statistical distributions as well as the standard distributions found in statistical practice.
Course Objective	To make students acquainted with concepts of probability distribution and its applications.
Course Outcomes	After completing this course, the students will be able to: CO1: Understand the concept of functions, Differentiation and Integration with application. CO2: Understand some standard series of positive terms. Concept of interpolations and its application. CO3: Understand the concept of determinant and matrices. Types of matrices and its application. PO4: Understand the concept of Permutation and Combination with some examples. CO5: Understand the concept of Probability and its applications PO6: Understand the use of discrete and continuous probability distributions, including requirements,

	UNIT II: • Sums of some standard series of positive terms. • Numerical Methods: Solution of algebraic and transcendental equations, Numerical integration, Concept of interpolation, Simpson 1/3 rule & 3/8 rule & its Applications. UNIT III: • Determinants, Matrices, Algebra of matrices: Determinants & its properties. Scalar multiplication, addition and multiplication of matrices. Inverse of a square matrix. Concept of rank of a matrix. Rank determination. Linear equations, Systems of linear equations as matrix equations. Characteristic roots and vectors. UNIT IV: • Permutations and Combinations. • Probability: Sample space of a chance experiment, Elementary outcomes, Events, Representation of events as sets, Combination of events (Complements, Intersections, Unions). Probability functions over a sample space (Discrete case). Case of Equally likely, elementary outcomes: Laplace definition of probability of an event, Axioms of probability. Combinatorial problems of Probability calculation. Conditional Probability. Bayes Theorem. Independent events.
Reference Books	15. John Scheick(1997):Linear Algebra With Applications, Mcgraw-hill, ISBN: 10:0071155309, ISBN-13: 9780071155304, 16. Strang(2008):Linear Algebra And Its Applications, Cengage Learning (Thompson), ISBN: 10:8131501728,ISBN-13: 9788131501726 17. Dutta K. B.(2003) : “Matrix and Linear Algebra”; Prentice Hall India, ISBN: 10:8120306368, ISBN-13: 9788120306363 18. Thomas S. Shores(2007): Applied Linear Algebra And Matrix Analysis, Springer Verlag Publication, ISBN:10: 0387331956, ISBN-13:9780387331959, 19. S. Lang, Serge A. Lang (1997): Introduction To Linear Algebra, Springer Publication, ISBN-10: 0387962050, ISBN-13: 9780387962054 20. K.M. Abadir& J.R. Magnus (2005): Matrix Algebra. Cambridge University Press: ISBN-10: 0521822890; ISBN-13: 978-0521822893. [MR2408356] 21. Fuzhen Zhang (1999):Matrix theory: basic results and techniques:, Springer Verlag new York,

	ISBN: 0387986960
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

PROGRAM DETAILS AND OUTCOME FOR FACULTY OF SCIENCE FOR POST GRADUATION

M.Sc Applied Statistics.

Master of Science (Applied Statistics): Semester – I

Course: MAS-101: BASIC MATHEMATICS AND ELEMENTS OF PROBABILITY THEORY

Course Code	MAS-101
Course Title	BASIC MATHEMATICS AND ELEMENTS OF PROBABILITY THEORY
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Effective From	June 2007
Purpose of Course	The purpose of the course is to present and apply the general theory of statistical distributions as well as the standard distributions found in statistical practice.
Course Objective	To make students acquainted with concepts of probability distribution and its applications.
Course Outcomes	After completing this course, the students will be able to: CO1: Understand the concept of functions, Differentiation and Integration with application. CO2: Understand some standard series of positive terms. Concept of interpolations and its application.

	• Concept of Derivative of a function. Derivatives of x^n, e^x, $\log x$. Algebra of differentiation. Interpretation of derivative as rate of change & Applications. • Integration as an inverse operation of differentiation. Definite Integral. Integral as the area under a curve. Properties of Integral. Integrals of some standard functions & its Applications. UNIT II: • Sums of some standard series of positive terms. • Numerical Methods: Solution of algebraic and transcendental equations, Numerical integration, Concept of interpolation, Simpson 1/3 rule & 3/8 rule & its Applications. UNIT III: • Determinants, Matrices, Algebra of matrices: Determinants & its properties. Scalar multiplication, addition and multiplication of matrices. Inverse of a square matrix. Concept of rank of a matrix. Rank determination. Linear equations, Systems of linear equations as matrix equations. Characteristic roots and vectors. UNIT IV: • Permutations and Combinations. • Probability: Sample space of a chance experiment, Elementary outcomes, Events, Representation of events as sets, Combination of events (Complements, Intersections, Unions). Probability functions over a sample space (Discrete case). Case of Equally likely, elementary outcomes: Laplace definition of probability of an event, Axioms of probability. Combinatorial problems of Probability calculation. Conditional Probability. Bayes Theorem. Independent events.
Reference Books	22. John Scheick(1997):Linear Algebra With Applications, Mcgraw-hill, ISBN: 10:0071155309, ISBN-13: 9780071155304, 23. Strang(2008):Linear Algebra And Its Applications, Cengage Learning (Thompson), ISBN: 10:8131501728,ISBN-13: 9788131501726 24. Dutta K. B.(2003) : “Matrix and Linear Algebra”; Prentice Hall India, ISBN: 10:8120306368, ISBN-13: 9788120306363 25. Thomas S. Shores(2007): Applied Linear Algebra And Matrix Analysis, Springer Verlag Publication, ISBN:10: 0387331956, ISBN-13:9780387331959, 26. S. Lang, Serge A. Lang (1997): Introduction To Linear Algebra, Springer Publication, ISBN-10:

	0387962050, ISBN-13: 9780387962054 27. K.M. Abadir& J.R. Magnus (2005): Matrix Algebra. Cambridge University Press: ISBN-10: 0521822890; ISBN-13: 978-0521822893. [MR2408356] 28. Fuzhen Zhang (1999):Matrix theory: basic results and techniques:, Springer Verlag new York, ISBN: 0387986960
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Master of Science (Applied Statistics): Semester – I
Course: MAS-102: Probability Distribution

	MAS-102
	Probability Distribution
	4
	4 Hrs
er	15 (Including Class work, examination, preparation, holidays etc.)
	June 2007
	The purpose of the course is to present and application of the general theory of different probability distributions to real life situations/problems.
	To make students acquainted with concepts probability distribution and its applications.

	After completing this course, the students will be able to: CO1: Understand the use of discrete and continuous probability distributions, including requirements, properties of distributions and its use in making decisions. CO2: Identify the characteristics of different discrete and continuous distributions. CO3: Identify the type of situation to which different distributions can be applied. CO4: Understand the most common discrete and continuous probability distributions and their real life applications CO5: Compute marginal and conditional distributions from joint distributions. Get familiar with transformation of univariate and bivariate distributions. CO6: Understand the distribution which helps to understand the nature of data and selection of appropriate analysis.	

COs with	PSOs								
			PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
		CO1							
		CO2							
		CO3							
		CO4							
		CO5							
		CO6							
		Basics concept of Statistics and distributions							

UNIT I:

- **Random Variables & their Distributions :**

Definition of random variable, Discrete and continuous random variable. Probability distribution of a random variable.

s Concept of Probability mass function and Probability density function, Distribution Function (d.f.) of a random variable.

- **Expectations & Moments of a Distribution :**

Expectation of a random variable & a function of a random variable (Discrete and Continuous case). Moments,

Different types of moment generating functions, Mean, Variance, Standard deviation, Skewness and Kurtosis

of a random variable (distribution). Independence of variables. Linear transformation of variable, Moments

under linear transformation, Problems on calculation of mean, variance, S.D. and other moments of a distribution.

UNIT II:

- **Frequency Distributions :**

Frequency distribution of a discrete and continuous random variable (Grouping of data in terms of class intervals).

Mean, variance and Moments of a frequency distribution. Bivariate frequency distribution, Conditional distributions and their properties.

	UNIT II: • Simple random sampling: Selection of sample, Estimation of population total and means, standard error and coefficient of variation of estimator. • Stratified random sampling: Estimation of mean, variance of the estimator, Estimation of the variance, Estimation of gain due to stratification from a stratified sample: finding sample sizes under proportional and optimum allocations and their comparisons for a given sample. UNIT III: • Systematic Sampling : Estimation of mean, variance of the estimator, Estimation of variance based on interpenetrating sub samples, Comparison of systematic and simple random sampling for a given population. • Two stage sampling : Estimation of the population mean, variance of the estimator and Estimation of the variance for first stage units of equal sizes, finding optimum values of first and second stage sample sizes for a given simple cost function.
Reference Books	1. Cochran W. G.(1977): "Sampling Techniques"; Ed.-III, John Wiley & Sons, Inc., New York, ISBN: 047116240X 2. Hansen M. H., et al.(1993): "Sample Survey Methods and Theory"; Wiley Blackwell; Volume 1 edition, ISBN-10: 0471309672, ISBN-13: 978-0471309673 3. Kish L. (1995) : "Survey Sampling"; John Wiley & Sons, Inc., New York. ISBN: 0471109495, 9780471109495 4. Murthy M. N. : "Sampling Theory and Methods"; Statistical Publishing Society, Calcutta. 5. Raj D. : "Sampling Theory"; McGraw-Hill Book co., New York. 6. Raj D. and Chandhok P. (1998): Sample Survey Theory, Sample Survey Theory, ISBN: 8173191379, 9788173191374 7. Raj D. : "The Design of Sample Surveys"; McGraw-Hill Book Co., New York. 8. Sukhatme P.V.,et al. (1997): "Sampling Theory of Surveys with Applications";III-Ed., The Iowa State Univ. Press, Ames, Iowa, USA and Indian Society of Agricultural Statistics, New Delhi. 9. Yates F.(1960) : "Sampling Methods in Censuses and Surveys"; Ed.-III, Charles Griffin & Co. Ltd., London. 10. Goulden C. H.(2007) : "Methods of Statistical Analysis"; READ BOOKS Publisher , ISBN: 1406737070, 9781406737073 11. Snedecor G.W. and Cochran W.G.(1989): "Statistical Methods"; Ed.:VIII, Wiley-Blackwell, ISBN: 0813815614, 9780813815619 12. Poduri S.R.S. Rao (2000):Sampling Methodologies with

	Applications, ISBN: 9781584882145, ISBN 10: 158488214X, Chapman & Hall/CRC Texts in Statistical Science 13. Arijit Chaudhuri (2005):Survey Sampling: Theory and Methods, Ed.,-II, Horst Stenger, University of Mannheim, Germany Series: ISBN:13: 9780824757540, ISBN 10: 0824757548 14. Ranjan K. Som (1995):Practical Sampling Techniques, Ed.,-II, Series: Statistics: A Series of Textbooks and Monographs, ISBN: 9780824796761,ISBN:10: 0824796764 15. Foreman E. K. (01991): Survey sampling principles, Marcel Dekker, ISBN: 0824784073, 9780824784072
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Course: MAS-104: Industrial Statistics

Course Code	MAS-104
Course Title	Industrial Statistics
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Effective From	June 2007
Purpose of Course	The purpose of the course is to develop scientific view to analyze the industrial problem from specific perspective. • To learn the statistical quality control techniques used in industries such as control charts, acceptance sampling plans etc. • To learn some advanced control charts, capability indices and the concept of six-sigma.
Course Objective	To make students acquainted with concepts of quality control as well as quality management.

Course Outcomes	After completing this course, the students will be able to: CO1: Understand basic of production process monitoring and apply concept of control charts on it. CO2: Apply the acceptance and continuous sampling plans in production process. CO3: Know and apply the concept of weighted control charts, six sigma, SO: 9000 series standards and Taguchi design. CO4: Understand the concepts of quality control, chance and assignable causes of variation, control charts for variables and attributes, producer's and consumer's risk - Acceptance sampling plans. CO5: Use important lifetime distributions such as for exponential, Weibull, gamma and lognormal distributions. CO6: Use of estimation in the reliability analysis.																																																								
Mapping between COs with PSOs	<table><tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td><td>PSO6</td><td>PSO7</td></tr><tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO6</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	CO1								CO2								CO3								CO4								CO5								CO6							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7																																																		
CO1																																																									
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CO4																																																									
CO5																																																									
CO6																																																									
Pre-requisite	Basics of quality control management and reliability analysis																																																								

Course Content	UNIT I: ● The meaning of Quality & Quality improvement ● Introduction of statistical quality control ● Statistical process control ➤ Introduction ➤ Measure of location and variability ➤ Process of control charts for variables & attribute ➤ Process of control limits ➤ Out of control criteria ● Process and measurement system capability analysis UNIT II: ● Cumulative sum chart ● Statistical product control ➤ Introduction ➤ Standard plans for attributes ➤ Plan for acceptance sampling by measurement. UNIT III: ● Total Quality Management ➤ Meaning and important concepts ➤ Importance of quality management ➤ Total quality management models ➤ Six sigma and Quality management ➤ Kaizen process ➤ Strategic quality planning and total quality management ➤ The cost of quality ➤ Productivity ➤ ISO 9001. UNIT IV: ● Reliability ➤ Basic concepts and distributions for product life, failure rate. ➤ Hazard function, Reliability function for Exponential, Normal, Lognormal, Weibull and Gamma Distributions. ➤ Analysis of Complete Data. ➤ Linear analysis and maximum likelihood analysis of censored data for exponential distribution only. ➤ System reliability.

Reference Books	1. Hopper A.G.: “Basic Statistical Quality Control”; McGraw Hill, London. 2. Gupta R.C.: “Statistical Quality Control”; Khanna Publishers, New Delhi. 3. Ryan T.P.: “Statistical Methods for Quality Improvement”; John Wiley & Sons. 4. Omachonu V.K. and Ross J.E.: “Principles of Total Quality”; S.Chand & Co., New Delhi. 12 5. Sinha S.K.: “Reliability and Life Testing”; Wiley Eastern Ltd., New Delhi. 6. Bazovksy I.: “Reliability Theory and Practice”; Prentice Hall International Series in Engineering. 7. Grant E. L. and Leavenworth R.: “Statistical Quality Control”; Tata Mc Graw Hill Publishing Co. Ltd., New Delhi. 8. Irving W.B.: “Elementary Statistical Quality Control”; Marcel Dekker, Inc., New York. 9. Douglas C. Montgomery: Introduction to statistical quality control
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Course: 105: INTRODUCTION TO MS-OFFICE AND INTERNET

	MAS-105								
Course Title	INTRODUCTION TO MS-OFFICE AND INTERNET								
Credit	4								
Teaching per Week	4 Hrs								
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)								
Effective From	June 2007								
Purpose of Course	The purpose of the course is to learn the development, processing and analysis of various documents that are useful in commercial on daily basis to fulfil routine task and students will able to understand basic concept of website designing.								
Course Objective	To make students acquainted with word processing, spreadsheet, presentation, concept of internet and website designing.								
Course Outcomes	After completing this course, the students will be able to: CO1: Understand and prepare various types of documentation and apply formatting features using Word Processing application software. CO2: Develop an excellent Spread Sheet which includes analysing and processing of data, various statistical reports and charts and other processes related to real life examples. CO3: Expertise in preparation of Presentation by Power Point tool and its features. CO4: Develop understanding of browser, server, various internet protocols and utilities. CO5: Able to develop basic website designing using dreamweaver.								
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	
	CO1								
	CO2								
	CO3								
	CO4								
	CO5								
Pre-requisite	Concept of computer is required.								
Course Content	UNIT-I: - WINWORD ➤ Typing, Editing, Proofing & Reviewing ➤ Formatting Text & Paragraphs ➤ Automatic Formatting and Styles ➤ Working with Tables ➤ Graphics and Frames ➤ Mail Merge ➤ Automating Your Work & Printing Documents UNIT-II: - EXCEL ➤ Working & Editing in Worksheets ➤ Creating Formats & Links								

	➤ Formatting a Worksheet & Creating Graphic Objects ➤ Creating Charts (Graphs), formatting and analyzing data ➤ Organizing Data in a List (Data Management) ➤ Sharing & Importing Data ➤ Printing UNIT-III: • POWER POINT PRESENTATION ➤ Preparation of Slides, ➤ Inserting Elements into Slides, ➤ Inserting Animation ➤ Preparing Slideshows. UNIT-IV: • Introduction to Internet ➤ Internet Protocols: http, ftp, TCP/IP, etc. ➤ Internet Utilities: e-mail, chat, searching, etc. • Web Browsers • Web Server • HTML ➤ HTML Tags • Dreamweaver
Reference Books	1. Dienes: Work 6 for windows quick & easy reference - Mansfield - BPB ISBN: 8170292972, ISBN-13: 9788170292975 2. Layman Hart (1995):WordPerfect 6.0 For Windows/book And Quick Reference, ISBN: 0130346535, ISBN-13: 9780130346537 3. Ron Mansfield(1994):Mastering Word 6 for windows- Mansfield – BPB, ISBN: 8170292980, ISBN-13: 9788170292982 4. Townsend :Mastering Excel - 4 For Windows, - Townsend – BPB, SBN:8170292301, ISBN-13: 9788170292302 5. Mansfield R. (1994): Mastering Word 6 for windows, BPB, ISBN: 8170292980, ISBN- 13: 9788170292982 6. Mastering Excel 4 for windows - Townsend - BPB, ISBN: 8170292301, ISBN-13: 9788170292302 7. Chester T.(1994): Mastering Excel 4 for windows - BPB, ISBN: 8170294762, ISBN-13: 9788170294764 8. Shelley O*hara Janice A. Snyder Christopher `Van Buren(1994):Excel Version 5 For Windows Quick Reference , ISBN: 1565294580, ISBN-13: 9781565294585
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Course: MAS-106: PRACTICAL – I (BASED ON PAPER – 101, 102, 103)

Course Code	MAS-106
Course Title	PRACTICAL – I (BASED ON PAPER – 101, 102, 103)

Credit	2							
Teaching per Week	4 Hrs							
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)							
Effective From	June 2007							
Purpose of Course	The purpose of the course concerns itself with the collection, processing, and computing problems of specific data. It helps students to understand and compute mathematical examples, probability distribution and sampling problems using MS office tool excel.							
Course Objective	To make students acquainted to solve real life problems using MS office tool excel.							
Course Outcomes	After completing this course, the students will be able to: CO1: Solve the real life problems of various basic mathematics and process the data using excel. CO2: Develop thinking skills of calculus. CO3: Calculate the Probability, expected value and the moments. CO4: Fit the distributions to a real life data using Excel. CO5: Analyze real life data of various sampling techniques. CO6: Formulates and calculates the estimators of population mean, population total, population ratio of two variables, the percentage and the total number of units in the population that possess some characteristic.							
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
	CO1							
	CO2							
	CO3							
	CO4							
	CO5							
	CO6							
Pre-requisite	Basics knowledge of computer, Basics of mathematics and Statistics.							
Course Content	Based on theory paper MAS-101 to MAS-103							
Reference Books	Reference book mention in theory paper MAS-101 to MAS-103							
Teaching Methodology	Class work, Lab work, Discussion, Self-Study, practical session, live demo, hands on training.							
Evaluation Method	30% Internal assessment based on class attendance, journal, internal practical examination, VIVA etc. 70% External based on semester end University examination							

Course: MAS-107: PRACTICAL – II (BASED ON PAPER – 104, 105)

Course Code	MAS-107
Course Title	PRACTICAL – II (BASED ON PAPER – 104, 105)
Credit	2

Teaching per Week	4 Hrs								
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)								
Effective From	June 2007								
Purpose of Course	The purpose of the course concerns itself with the collection, processing, and computing problems of specific data. It helps students to understand and compute industrial statistics data using MS office tool excel.								
Course Objective	To make students acquainted to solve real life problems using MS office tool excel.								
Course Outcomes	After completing this course, the students will be able to: CO1: Solve the real life problems of different variable and attribute charts using excel. CO2: Solve the real life problems of different acceptance sampling plans using excel. CO3: Identify the different components of the Excel worksheet CO4: Construct formulas to manipulate numeric data in an Excel Worksheet CO5: Access and manipulate data using the database functions of Excel.								
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	
	CO1								
	CO2								
	CO3								
	CO4								
	CO5								
Pre-requisite	Concept of basic knowledge of SQC, MS. Office and internet.								
Course Content	Based on theory paper MAS-104 and MAS-105								
Reference Books	Reference book mention in theory paper MAS-104 and MAS-105								
Teaching Methodology	Class work, Lab work, Discussion, Self-Study, practical session, live demo, hands on training.								
Evaluation Method	30% Internal assessment based on class attendance, journal, internal practical examination, VIVA etc. 70% External based on semester end University examination								
Course Code	MAS-107								
Course Title	PRACTICAL – II (BASED ON PAPER – 104, 105)								
Credit	2								
Teaching	4 Hrs								

per Week										
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)									
Effective From	June 2007									
Purpose of Course	The purpose of the course concerns itself with the collection, processing, and computing problems of specific data. It helps students to understand and compute industrial statistics data using MS office tool excel.									
Course Objective	To make students acquainted to solve real life problems using MS office tool excel.									
Course Outcomes	After completing this course, the students will be able to: CO1: Solve the real life problems of different variable and attribute charts using excel. CO2: Solve the real life problems of different acceptance sampling plans using excel. CO3: Identify the different components of the Excel worksheet CO4: Construct formulas to manipulate numeric data in an Excel Worksheet CO5: Access and manipulate data using the database functions of Excel.									
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7		
	CO1									
	CO2									
	CO3									
	CO4									
	CO5									
Pre-requisite	Concept of basic knowledge of SQC, MS. Office and internet.									
Course Content	Based on theory paper MAS-104 and MAS-105									
Reference Books	Reference book mention in theory paper MAS-104 and MAS-105									
Teaching Methodol	Class work, Lab work, Discussion, Self-Study, practical session, live demo, hands on									

ogy	training.
Evaluation Method	30% Internal assessment based on class attendance, journal, internal practical examination, VIVA etc. 70% External based on semester end University examination

Course: MAS-201: STATISTICAL INFERENCE – I

Course Code	MAS-201
Course Title	STATISTICAL INFERENCE – I
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Effective From	2008
Purpose of Course	The purpose of the course concerns itself with point estimation, types of estimation and interval estimation. From this paper the students are expected to build a foundation on inferential statistics which is the basis of higher level mathematical statistics.
Course Objective	To make students acquainted with estimation and decision theory.
Course Outcomes	After completing this course, the students will be able to: CO1: Understand the concept of estimator with different properties CO2: Demonstrate and understanding the concept of unbiasedness and biasedness CO3: Become aware of statements of different theorem based on estimators and applies it in suitable situations. CO4: Describe the concept of BAN, MVUE, MVBUE, and UMVUE. CO5: Have the knowledge methods of obtaining minimum variance unbiased estimators. CO6: Learn the methods for interval estimation for small and large size confidence interval

Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
	CO1							
	CO2							
	CO3							
	CO4							
	CO5							
	CO6							
Pre-requisite	Basic concept of estimation and decision theory							

Course Content	UNIT I: Estimation & Properties of Point estimator: Theoretical finite and infinite population, parameter, parametric space, statistic, estimation of a parameter, Problem of Criterion of selecting a good estimator, Properties of closeness, Unbiasedness, Consistency, Efficiency and Sufficiency. Jointly sufficient statistics, Statement and application of factorization theorem. Minimal sufficient statistics, Complete sufficient statistics, BAN estimator. UNIT II: - Minimum variance unbiased estimator, Lower bound of variance of an estimator, Statements & application of Cramer- Rao inequality, condition of existence of uniformly minimum variance bound unbiased estimator, difference between MVUE and MVBUE. Uniformly minimum variance unbiased estimator, statement and applications of Rao-Blackwell theorem and Lehmann-scheffe theorem, Location and scale invariance estimator and parameter. Pitman's estimator for location and scale parameter. UNIT III: Methods of estimation: (i) Method of maximum likelihood, Properties of maximum likelihood estimator, (ii) Method of moments, (iii) Method of scoring, (iv) Method of minimum chi-square, (v) Method of modified minimum chi-square, (vi) Method of least squares. Interval Estimation: Introduction to confidence interval, Definition of confidence interval, Pivotal quantity, Pivotal quantity method. (i) Confidence interval for mean and variance when sampling is done from normal population. (ii) Confidence interval for large samples. UNIT IV: Elementary Decision Theory: Decision problem, basic components and spaces associated with the decision problem, Decision rules, Risk function, Minimax-decision rule, prior and posterior distribution, Bayes risk, Bayes Rule, Value of information.

Reference Books	1. Mood A.M., Graybill F.A. and Boes D.C. (2001) : “An Introduction to Theory of Statistics”; McGraw Hill and Tata McGraw Hill, ISBN: 0070445206, ISBN-13: 9780070445208, 978-0070445208 2. Goon A. M., Gupta M. K. and Dasgupta B. (2000) : “An Outline of Statistical Theory” Vol.1, 2; The World Press Private Limited, ISBN: 8187567260 ISBN-13: 9788187567264, 978-8187567264 3. Rohatgi V.K. (1976): “An Introduction to Probability Theory and Mathematical Statistics”; John Wiley& Sons Incorporated, ISBN-10:0471731358,ISBN-13:9780471731351 4. Mukhopadhyay, P. (1996): “Mathematical Statistics”; New Central Book Agency, Calcutta. 5. Mukhopadhyay Parimal (2000): “Topics in Survey Sampling”, Springer-verlag, ISBN: 0387951083, ISBN-13:9780387951089, 978-0387951089. 6. Rao C. R. (2001) : “Linear Statistical Inference and its Applications”; 2nd Edition, Wiley-Interscience,. ISBN-10: 0471218758, ISBN-13: 978-0471218753 7. Casella G. and Berger R. L. (2001): “Statistical Inference”; 2nd Revised edition Duxbury Press. ISBN-10: 0534243126 , ISBN-13: 978-0534243128 8. Zaven A. Karian and Edward J. Dudewicz (2010): “Handbook of Fitting Statistical Distributions with R”; Chapman and Hall/CRC, ISBN: 9781584887119, ISBN10: 1584887117 9. Zaven A. Karian and Edward J. Dudewicz (2000): “Fitting Statistical Distributions: The Generalized Lambda Distribution and Generalized Bootstrap Methods”; Chapman and Hall/CRC, ISBN: 9781584880691, ISBN10: 1584880694 10. Mukhopadhyay Nitis (2006) : “Introductory Statistical Inference”; Chapman and Hall/CRC, ISBN: 9781574446135, ISBN10: 1574446134
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Course: MAS-202: STATISTICAL INFERENCE – II

Course Code	MAS-202							
Course Title	STATISTICAL INFERENCE – II							
Credit	4							
Teaching per Week	4 Hrs							
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)							
Effective From	2008							
Purpose of Course	The purpose of the course is to define steps of testing of hypothesis, to develop scientific view develop test statistic and to test the significance of means, variances and proportions, to differentiate between large and small sample tests, test the goodness of fit and differentiate between parametric and non parametric tests							
Course Objective	To make students acquainted with testing of hypothesis and draw inferences							
Course Outcomes	After completing this course, the students will be able to: CO1: Get the knowledge about formulating and testing a hypothesis, using critical values to draw conclusions and determining probability of making errors in hypothesis tests. CO2: Get the knowledge about large sample tests and its applications CO3: Get the knowledge about small sample tests, Chi-square test, t-test and F-test. CO4: Understand and analyze various methods of Non-parametric tests CO5: Get the knowledge to discriminate parametric and non parametric test CO6: Understand the situation for applying suitable test.							
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
	CO1							
	CO2							
	CO3							
	CO4							
	CO5							
	CO6							
Pre-requisite	Basics concept of testing of hypothesis and decision theory							
Course Content	UNIT I: Testing of Hypotheses: Concepts of hypothesis, statistical hypothesis, simple and composite hypothesis, Null and Alternative hypothesis. One sided and two sided hypothesis. Test of hypothesis, critical region or region of rejection, acceptance region. Types of errors. Sizes of the errors, Level of significance, Size of the test, power function of the test, Two-tail and one tail tests, most powerful test, Likelihood Ratio Test & Test of significance as its particular case. UNIT II: Parametric tests: - Large sample test for mean, variance, proportion and correlation - Small sample tests: χ^2, t, F & Z-transformation							

	iii) ANOVA UNIT III: • Nonparametric tests: Sign, Median, Run, Mann Whitney, Wilcoxon, K-S tests, K-W.Test. UNIT IV: • SPRT: Wald's sequential probability ratio test, its properties and applications.
Reference Books	1. Mood A.M., Graybill F.A. and Boes D.C. (2001) : “An Introduction to Theory of Statistics”; McGraw Hill and Tata McGraw Hill, ISBN: 0070445206, ISBN-13: 9780070445208, 978-0070445208 2. Goon A. M., Gupta M. K. and Dasgupta B. (2000) : “An Outline of Statistical Theory” Vol.1, 2; The World Press Private Limited, ISBN: 8187567260 ISBN-13: 9788187567264, 978-8187567264 3. Lehmann, E.L.(1986): “Testing Statistical Hypothesis”; John Wiley & Sons, New York. 4. Lehmann. E.L. and Joseph P. Romano (2005): “Testing Statistical Hypothesis”; 3rd Edition, Springer, ISBN 0-387-98864-5. 5. Gibbons, J. D. (1985): “Nonparametric Statistical Inference”, 2nd Edition, Marcel Dekker, New York. 6. Gibbons J.D. and Pratt J.W. (1981): “Concepts of Nonparametric Theory”; Springer-Verlag, ISBN: 0387905820, ISBN-13: 9780387905822, 978-0387905822. 7. Rohatgi V.K. (1976): “An Introduction to Probability Theory and Mathematical Statistics”; John Wiley& Sons Incorporated, ISBN-10:0471731358,ISBN-13:9780471731351 8. Mukhopadhyay, P. (1996): “Mathematical Statistics”; New Central Book Agency, Calcutta. 9. Mukhopadhyay Parimal (2000): “Topics in Survey Sampling”, Springer-verlag, ISBN: 0387951083, ISBN-13:9780387951089, 978-0387951089 10. Rao C. R. (2001) : “Linear Statistical Inference and its Applications”; 2nd Edition, Wiley-Interscience,. ISBN-10: 0471218758, ISBN-13: 978-0471218753 11. Daniel W.W. (1990):“Applied Nonparametric Statistics”; PWS-KENT publishing Co., Boston. 12. Daniel W.W. (1989): “Applied Nonparametric Statistics”; 2nd Edition, Wadsworth Publishing Company, Belmont, California, U.S.A., ISBN-10: 0534919766, ISBN-13: 978-0534919764 13. Wald A. (2004):“Sequential Analysis”; Dover Pubns, ISBN: 0486439127, ISBN-13: 9780486439129, 978-0486439129 14. Wald A. (1947): “Sequential Analysis”; John Wiley and Sons, New York. 15. Conover, W. J. (1980): “Practical Nonparametrics Statistics”, John Wiley & Sons, Inc., New York. 16. Peter Sprent, Nigel C. Smeeton (2007): “Applied Nonparametric Statistical Methods”; 4th Edition, Taylor & Francis Ltd, ISBN: 9781584887010, ISBN 10: 158488701X 17. Gibbons J. D., Subhabrata Chakraborti (2003): “Nonparametric Statistical Inference”; 4th Revised Edition, CRC Press (Taylor & Francis Ltd), ISBN: 9780824740528, ISBN 10: 0824740521. 18. David J. Sheskin (2007) : “Handbook of Parametric and Nonparametric Statistical Procedures”; 19. David J. Sheskin (2007) : “Handbook of Parametric and Nonparametric Statistical Procedures”; Chapman & Hall; 4th Edition, ISBN:

	• Comparisons of several multivariate means: multivariable analysis of variances. UNIT III: • Partial correlation and multiple correlations. • Multiple linear regression model, least square estimation, inference. UNIT IV: • Concept and application of (i) Factor analysis (ii) Principal Component analysis and (iii) Canonical Correlation analysis. • Discrimination and classification: Separation and classification of populations, classification of multivariate populations. Fisher's discriminant function, Classification of several populations. Fisher's method of discriminating among several populations.
Reference Books	1. Anderson T. W. (2003): "An Introduction to Multivariate Statistical Analysis"; 3rd Edition, Wiley-interscience, ISBN: 0471360910, ISBN-13: 9780471360919 2. Johnson R.A. and Wichern D.W. (2008) : "Applied Multivariate Statistical Analysis"; Pearson Education(singapore) Pte. Ltd., ISBN: 8131722228, ISBN-13: 9788131722220 3. Stephen E. Fienberg, Jobson J. D., Ingram Olkin (1994): "Applied Multivariate Data Analysis: Volume Ii: Categorical and Multivariate Methods"; Springer, ISBN: 0387978046, ISBN-13: 9780387978048, 978-0387978048 4. Khirsagar A.M. (1972): Multivariate Analysis. Marcel Dekker, New York. 5. Kent J. T. , J. M. Bibby, K. V. Mardia (1980) : "Multivariate Analysis (probability And Mathematical Statistics)"; Academic Press, ISBN: 0124712525, ISBN-13: 9780124712522 6. Morrison D.F. (1990): "Multivariate Statistical Methods"; Mcgraw-hill Professional, ISBN: 0071008152, ISBN-13: 9780071008150, 978-0071008150 7. Morrison D.F. (2004): "Multivariate Statistical Methods"; Thomson Brooks/cole, ISBN: 0534387780, ISBN-13: 9780534387785 8. George A. Marcoulides, Scott L. Hershberger and Marcoulide (1997) : "Multivariate Statistical Methods: A First Course"; Lawrence Erlbaum Associates, ISBN: 080582572X, ISBN-13: 9780805825725 9. Muirhead R.J. (2005): "Aspects of Multivariate Statistical Theory"; Wiley-interscience, ISBN: 0471769851, ISBN-13: 9780471769859 10. Seber G.A.F. (1984): "Multivariate Observations"; John Wiley & Sons Inc., ISBN 10: 047188104X , ISBN 13: 9780471881049 11. Gnanadesikan R. (1997): "Methods For Statistical Data Analysis Of Multivariate Observations"; Wiley-interscience, ISBN: 0471161195, ISBN-13: 9780471161196 12. Srivastava and Khatri (1979): "An Introduction to Multivariate Statistics"; North Holland, New York. 13. Srivastava M.S. (2002): "Methods of Multivariate Statistics"; John Wiley and Sons Inc., New York. 14. Dillon W.R. and Goldstein M. (1984): "Multivariate Analysis: Methods

Course Content	UNIT I: • Concept and need of multivariate analysis, Concept of multinomial distribution and multivariate Normal distribution – its properties (without proof). UNIT II: • Concept of Hotelling T₂ distribution (without derivation) & its applications. • Comparisons of several multivariate means: multivariable analysis of variances. UNIT III: • Partial correlation and multiple correlations. • Multiple linear regression model, least square estimation, inference. UNIT IV: • Concept and application of (i) Factor analysis (ii) Principal Component analysis and (iii) Canonical Correlation analysis. • Discrimination and classification: Separation and classification of populations, classification of multivariate populations. Fisher's discriminant function, Classification of several populations. Fisher's method of discriminating among several populations.
Reference Books	17. Anderson T. W. (2003): “An Introduction to Multivariate Statistical Analysis”; 3rd Edition, Wiley-interscience, ISBN: 0471360910, ISBN-13: 9780471360919 18. Johnson R.A. and Wichern D.W. (2008) : “Applied Multivariate Statistical Analysis”; Pearson Education(singapore) Pte. Ltd., ISBN: 8131722228, ISBN-13: 9788131722220 19. Stephen E. Fienberg, Jobson J. D., Ingram Olkin (1994): “Applied Multivariate Data Analysis: Volume Ii: Categorical and Multivariate Methods”; Springer, ISBN: 0387978046, ISBN-13: 9780387978048, 978-0387978048 20. Khirsagar A.M. (1972): Multivariate Analysis. Marcel Dekker, New York. 21. Kent J. T. , J. M. Bibby, K. V. Mardia (1980) : “Multivariate Analysis (probability And Mathematical Statistics)”; Academic Press, ISBN: 0124712525, ISBN-13: 9780124712522 22. Morrison D.F. (1990): “Multivariate Statistical Methods”; Mcgraw-hill Professional, ISBN: 0071008152, ISBN-13: 9780071008150, 978-0071008150 23. Morrison D.F. (2004): “Multivariate Statistical Methods”; Thomson Brooks/cole, ISBN: 0534387780, ISBN-13: 9780534387785 24. George A. Marcoulides, Scott L. Hershberger and Marcoulide (1997) : “Multivariate Statistical Methods: A

	First Course”; Lawrence Erlbaum Associates, ISBN: 080582572X, ISBN-13: 9780805825725 25. Muirhead R.J. (2005): “Aspects of Multivariate Statistical Theory”; Wiley-interscience, ISBN: 0471769851, ISBN-13: 9780471769859 26. Seber G.A.F. (1984): “Multivariate Observations”; John Wiley & Sons Inc., ISBN 10: 047188104X , ISBN 13: 9780471881049 27. Gnanadesikan R. (1997): “Methods For Statistical Data Analysis Of Multivariate Observations”; Wiley-interscience, ISBN: 0471161195, ISBN-13: 9780471161196 28. Srivastava and Khatri (1979): “An Introduction to Multivariate Statistics”; North Holland, New York. 29. Srivastava M.S. (2002): "Methods of Multivariate Statistics"; John Wiley and Sons Inc., New York. 30. Dillon W.R. and Goldstein M. (1984): "Multivariate Analysis: Methods and Applications"; John Wiley and Sons Inc., New York. ISBN: 0471083178, ISBN-13: 9780471083177 31. Rohatgi V. K., A. K. Md. Ehsanes Saleh (2008): “An Introduction To Probability And Statistics”; 2nd Ed, Wiley, ISBN: 8126519266, ISBN-13: 9788126519262 32. Wolfgang Hardle, Zdenek Hlavka (2007): “Multivariate Statistics: Exercises And Solutions”; Springer Verlag, ISBN: 0387707840, ISBN-13: 9780387707846
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Course: MAS-204: ACTUARIAL STATISTICS

Course Code	MAS-204
Course Title	ACTUARIAL STATISTICS
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Effective From	2008
Purpose of Course	To learn the life tables used in insurance products. • To learn the concept of interest, different life insurance products, life annuities, net premiums. • To motivate students to prepare for exams required for employment in the actuarial science profession.
Course Objective	To make students acquainted with actuarial science and implementation of statistics in actuarial science
Course Outcomes	After completing this course, the students will be able to: CO1: Understand the utility theory, insurance products and life tables. CO2: Understand the concept of interest.

	CO3: Understand the concept of life insurance and the existing insurance products of different insurance company. CO4: Have the knowledge of life annuities, net premium and net premium reserves.							
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
	CO1							
	CO2							
	CO3							
	CO4							
Pre-requisite	Basics of actuarial statistics and insurance policy planning							
Course Content	UNIT I: - Basics of Probability & Interest: Theory of Interest, Variable interest rates, continuous time payment streams. - Interest & Mortality: Annuities, Loan Amortization and Mortgage Refinancing, Mortality and Analytical models. UNIT II: - Life Tables: Concepts of Life Tables, Assumptions related to life tables, columns of life tables, Complete and Abridged life tables, Construction of life tables, Estimation from life table data UNIT III: - Expected present values of payments, Continuous contracts & residual life, Premium calculations, m-payment net single premiums - Population functions and indicator notations, Stationary population concepts UNIT IV: - Risk models: Proportional Hazard models, excess risk models, Multiple decrement models, death rate estimators, causes specific life insurance premiums							
Reference Books	- Barclay G.W. (1970). Techniques of Population Analysis. John Wiley, New York. - Borowiak, D.S., and A. F. Shapiro. (2013). Financial and Actuarial Statistics: An Introduction, Second Edition. CRC Press. - Donald, D.W.A. (1970). Compound interest and annuities, Second Edition, The Institute of Actuaries and the Faculty of Actuaries at the University Press. - Spurgeon, E.T. (2011), Life Contingencies, Third Edition, Cambridge University Press. - Eric V. Slud (2001): Actuarial Mathematics and Life Table Statistics (Mathematics Department, University of Maryland)							
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment							
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination							

Course: 205: COMPUTER PROGRAMMING LANGUAGE – ‘C’

Course Code	MAS-205
Course Title	COMPUTER PROGRAMMING LANGUAGE – ‘C’
Credit	4

Teaching per Week	4 Hrs							
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)							
Effective From	2008							
Purpose of Course	The purpose of the course is to make the student capable of implementing the concepts, methods, and debugging tools of programming and learn their implementation.							
Course Objective	To make students acquainted with knowledge of programming using C language.							
Course Outcomes	After completing this course, the students will be able to: CO1: Understand the basic concepts and fundamentals of programming such as algorithm and flowchart. CO2: Understand the basic C fundamentals such as data types, operators etc. CO3: Design programs involving control statements such as conditional and unconditional statements. CO4: Implement advanced programming approach such as modular programming along with parameter passing techniques. CO5: Understand the concept of different data structures such as array, structure and union. CO6: Develop the programs that deal with various operations on data files.							
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
	CO1							
	CO2							
	CO3							
	CO4							
	CO5							
	CO6							
Pre-requisite	Basic knowledge of computer and typing skill is essential.							
Course Content	UNIT I: • Introduction ➤ Algorithms and Flowchart ➤ Types of Language ➤ Introduction to C Language • C Fundamentals ➤ Identifiers ➤ Data Types ➤ Constants and Variables ➤ Arrays • Operators and Expressions ➤ Arithmetic Operators ➤ Unary Operators ➤ Relations Operators ➤ Logical Operators ➤ Assignment Operators ➤ Conditional Operators ➤ Library Functions ➤ Expressions ➤ Evaluation of Expression							

	UNIT II: • Data Input and Output ➤ Single Character input and output ➤ The scanf function ➤ The printf function ➤ Gets and Puts functions • Control Statements ➤ The While Statement ➤ do-while statement ➤ for statement ➤ if - else statement ➤ switch statement ➤ break statement ➤ continue statement ➤ goto statement UNIT III: • Functions ➤ Introduction to functions ➤ Function definition ➤ Accessing function ➤ Passing arguments to function ➤ Recursive function • Data Files UNIT IV: • Arrays ➤ Defining an array ➤ Processing an array ➤ Multi dimensional arrays ➤ Passing array to a function ➤ Arrays and Strings • Structures and Unions ➤ Defining a structure ➤ Processing a structure ➤ Unions
Reference Books	1. Karnighan B. W. and Ritchie D. M. (1978) : “C programming Language”; Prentice Hall- Gale, ISBN: 0131101633, ISBN-13: 9780131101630 2. VijayMukhi: “The C Odyssey -vol. 6: Windows”; Bpb, ISBN:8170291682, ISBN-13: 9788170291688 3. Stephan G. Kochan (2001) : “Programming In C” ; CBS Publishers & Distributors, ISBN PB : CBS0000031 4. Stephen G. Kochan (2004): “Programming in C”; 3rd Edition, Sams, ISBN-10:0672326663, ISBN-13: 978-0672326660 5. Kelly Stan and Bootle (1988): “Mastering turbo C”; BPB Publications 6. Stan Kelly Bootle (1988): “Mastering Turbo C”; Wiley John & Sons Incorporated, ISBN-13: 9780895884626 , ISBN: 0895884623 7. Kanetkar Yashwant (2006) : “Let us C” ; 9th Edition , BPB, ISBN: 8183331637, ISBN-13: 9788183331630,

	8. E Balaguruswamy (2007) : “Programming In C#”; Tata McGraw Hill, ISBN: 0070667578 ISBN-13: 9780070667570, 978-0070667570 9. Robert Lafor (2001) : “Object - Oriented Programming in C” ; Sams , 4th Edition, ISBN: 0672323087, ISBN-13: 9780672323089, 978-0672323089 10. Robert Lafore (1995) : “Object Oriented Programming in C++”; Galgotia Publications.
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Course: MAS- 206: PRACTICAL – III (BASED ON PAPER – 201, 202, 203)

Course Code	MAS-206							
Course Title	PRACTICAL – III (BASED ON PAPER – 201, 202, 203)							
Credit	2							
Teaching per Week	4 Hrs							
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)							
Effective From	2008							
Purpose of Course	The purpose of the course is concerns itself with the collection, processing, and computing problems of specific data. It helps students to understand and compute problems of estimation, testing and multivariate techniques using MS office tool excel.							
Course Objective	To make students acquainted to solve real life problems using MS office tool excel.							
Course Outcomes	After completing this course, the students will be able to: CO1: Compute estimators of various distributions. CO2: Obtain estimators using estimation methods such as Maximum likelihood, method of moments, method of scoring, Properties of maximumlikelihood estimator. CO3: Understand and solve the problems of statistical inference, problem of testing of hypothesis for parametric and non parametric test using excel. CO4: Construct SPRT in case of Binomial, Poisson, and Normal Distribution using excel. CO5: Solve the problem of multivariate data using excel. CO6: Carry out and apply commonly used multivariate data analysis techniques, and interpretrresults							
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
	CO1							
	CO2							
	CO3							
	CO4							
	CO5							
	CO6							
Pre-requisite	Basics knowledge of estimation, testing of hypothesis and multivariate analysis.							

Course Content	Based on theory paper MAS-201 to MAS-203
Reference Books	Reference book mention in theory paper MAS-201 to MAS-203
Teaching Methodology	Class work, Lab work, Discussion, Self-Study, practical session, live demo, hands on training.
Evaluation Method	30% Internal assessment based on class attendance, journal, internal practical examination, VIVA etc. 70% External based on semester end University examination

Course: MAS- 207: PRACTICAL - IV (BASED ON PAPER – 204, 205)

Course Code	MAS-207							
Course Title	PRACTICAL - IV (BASED ON PAPER – 204, 205)							
Credit	2							
Teaching per Week	4 Hrs							
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)							
Effective From	2008							
Purpose of Course	The purpose of the course concerns itself with the collection, processing, and computing problems of specific data. It helps students to understand and compute problems of actuarial statistics and “C” programming language							
Course Objective	To make students acquainted to solve real life problems of actuarial statistics using excel and “C” programming language							
Course Outcomes	After completing this course, the students will be able to: CO1: Solve life table data using excel. CO2: Compute actuarial and financial mathematics data using excel. CO3: Develop thinking skills of interest theory, insurance policy and loan using practical knowledge. CO4: Perform statistical formula using C programming CO5: Develop theAbility to define and manage data structures based on problem subject domain, textual information, characters and strings, arrays of complex objects							
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
	CO1							
	CO2							
	CO3							
	CO4							
	CO5							
Pre-requisite	Basics knowledge of actuarial statistics, Programming language “C”							
Course Content	Based on theory paper MAS-204 and MAS-205							
Reference Books	Reference book mention in theory paper MAS-204 and MAS-205							
Teaching Methodology	Class work, Lab work, Discussion, Self-Study, practical session, live demo, hands on training.							
Evaluation Method	30% Internal assessment based on class attendance, journal, internal practical examination, VIVA etc. 70% External based on semester end University examination							

Course: MAS-301: STATISTICS FOR ECONOMICS

Course Code	MAS-301

Course Title	STATISTICS FOR ECONOMICS							
Credit	4							
Teaching per Week	4 Hrs							
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)							
Effective From	2008							
Purpose of Course	The purpose of the course concerns itself with the collection, processing, and analysis of specific economic data. It helps us understand and analyze economic theories and denote correlations between variables such as demand, supply, price, output etc.							
Course Objective	To make students acquainted with economic theory and time series analysis and index number.							
Course Outcomes	After completing this course, students will be able to: CO1: Understand and apply the concept of stationarity to the analysis of time series data in various contexts (such as actuarial studies, climatology, economics, finance, geography, meteorology, political science, and sociology); CO2: Run and interpret time-series models and regression models for time series CO3: Use the Box-Jenkins approach to model and forecast time-series data empirically; CO4: Develop fundamental research skills (such as data collection, data processing, and model estimation and interpretation) in applied time series analysis. CO5: Develop the concept of various method of generating indices and apply them to solve practical problem.							
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
	CO1							
	CO2							
	CO3							
	CO4							
	CO5							
Pre-requisite	Concept of economics time series and index number.							
Course Content	UNIT I: Analysis of Time Series : ➤ Definition and importance of time series analysis, Components of a Time series, Different methods for determination of trend, their merits and demerits, Methods for elimination of seasonal components, Determination of cyclic components, Variate difference method. ➤ Stationary Time series, Box-Jenkins Models, Introduction to Autoregressive (AR) Models, Moving Average (MA) Models, Mixed Autoregressive Moving Average (ARMA) Models, Autoregressive Integrated Moving Average (ARIMA) Models, Properties of these models, Forecasting Techniques. UNIT II: Index Numbers : ➤ Importance of Index Numbers, Various Formulae: Ratio of							

	Simple Aggregate, Ratio of Weighted Aggregate, Unweighted average of price relatives, Choice of base period, Different tests of a good index number, Cost of Living Index Number and Various Official Index Numbers, HDI (Human Development Index). UNIT III: • Demand Analysis : ➤ Concept related to demand and supply, price elasticities of demand and supply, Methods of determining demand and supply curves for cross section data and time series data, Leontief's method, Pigou's Method, Engels Curves, Pareto's Law of Income Distribution. UNIT IV: • Input-Output Analysis : Leontief's Static Model for Inter-industry relations. • Growth Models Concepts of multiplier and accelerator, Hicks-Smauelson's Model, Harrod-Domar and Solow's Growth Models
Reference Books	6. Croxton E.F., Cowden D.J. and Klein S. (1967): "Applied General Statistics"; III-Ed Prentice-Hall (Englewood Cliffs, N.J). 7. Karmel P.H. (1963): "Applied Statistics for Economics"; 2nd ed., Pitman (Melbourne) 8. Kendall M.(1976) : "Time Series", 2nd ed., Charles Giffin & Co., 9. Chatfield C. (1975): "Analysis of Time Series: Theory and Practice"; Chapman & Hall, London 10. Chatfield Chris(2003) : "The Analysis Of Time Series: An Introduction"; Sixth Edition, Chapman & Hall/crc, ISBN: 1584883170, ISBN-13: 9781584883173 11. Sen A.K. (1970): "Growth Economics" : Penguin Modern Economic Reading Edition. 12. Pillai S.(1973) : "Economic & Business Statistics"; Progressive Corporation Pvt. Ltd. 13. Mukhopadhyay P. (2009) : "Applied Statistics"; Books & Allied (p) Ltd , ISBN: 8187134380, ISBN-13: 9788187134381 14. Gupta S.C. and Kapoor V.K.(2006) : " Fundamentals of Applied Statistics"; Sultan Chand & Sons, ISBN: 8170141516, ISBN-13: 9788170141518
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Course: MAS- 304: INTRODUCTION TO STATISTICAL SOFTWARES

Course Code	MAS-304
Course Title	INTRODUCTION TO STATISTICAL SOFTWARES
Credit	4
Teaching per Week	4 Hrs

Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)							
Effective From	2008							
Purpose of Course	This is a course after studying which students can perform different statistical computations using statistical package and can think a career on data analysis and even get self-employed as a data analyst.							
Course Objective	To learn statistical techniques and their implementation using comprehensive SPSS software and R							
Course Outcomes	After completing this course, students will be able to: CO1: Get familiar with SPSS software and understand SPSS environment. CO2: Create and edit the data files, plot graphs using SPSS. CO3: Compute descriptive statistics using SPSS. CO4: Perform inferential statistical analysis through SPSS. CO5: Understand basics of R environment. CO6: Perform various operations on data in R. CO7: Do descriptive statistical analysis in R. CO8: Perform different computational facilities provided in the package.							
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
	CO1							
	CO2							
	CO3							
	CO4							
	CO5							
	CO6							
	CO7							
	CO8							
Pre-requisite	Basic concept of Programming language, excel, SPSS and R.							
Course Content	UNIT I: • SPSS: ➤ SPSS Introduction ➤ Starting SPSS ➤ Types of Data ➤ Levels of Measurement ➤ Missing Values ➤ Important Files // database files • Data Management ➤ Selecting Cases ➤ Standardizing Data ➤ Transformation of Data ➤ Split File ➤ Variable and Value Labels ➤ Recode Variables/Visual Binning ➤ Random Sample of the Data ➤ Creating a Population Variable ➤ Multi Response ➤ Time Saving Features / SPSS MACRO UNIT II: • Basic Data Analysis							

- Descriptive Statistics
- Frequency Tables/Cross Tabs
- Independent T test
- Paired T Test
- One-Way ANOVA
- Correlation / Regression

- **Interpret the Results**

Presentation with live data

UNIT III:

R:

- **Introduction to R**
 - Background and resources
 - Installing R.
 - R console.
 - R commander
 - Command and syntax
 - Packages and libraries
 - Help in R
 - Workspace in R
- **Data Structures**
 - Introduction to data structure
 - Vectors
 - Matrices
 - Arrays
 - Lists
 - Factors
 - Data frames
 - Importing and Exporting data
 - Data types
- **Frequencies & Descriptive Statistics**
 - Frequency
 - Measure of central tendency
 - Measure of Dispersion
 - Measure of skewness
 - Box and Whisker part
- **Data management**
 - Split
 - Find and replacement
 - Manipulations with alphabets
 - Evaluation of strings
 - Data frames.

UNIT IV:

- **Graphical Analysis**
 - Creating a simple graph
 - Modifying the points and line of graph
 - Modifying title and subtitle of a graph
 - Modifying axes of the graph
 - Adding additional elements to graph
 - Adding legend on a graph
 - Special graph
 - Multiple plots
- **Comparing Populations**

	➤ Cross tabulation ➤ One sample t test ➤ Independent sample t test ➤ Paired sample t test ➤ One way ANOVA • Bivariate Data Analysis ➤ Correlation ➤ Simple linear regression ➤ Multiple linear regression • Conditional executions and loops ➤ If loop ➤ While loop ➤ For loop
Reference Books	1. Miller R. L., Ciaran Acton and Fullerton D. A., John Malthy (2009), "SPSS for Social Scientists"; 2nd Edition, Palgrave Macmilan. ISBN: 9780230209930. 2. Wagner W. E. III (2006): "Using SPSS for Social Statistics and Research Methods"; SAGE Publications, ISBN-13: 9781412940771. 3. Einsprucho E. L.: "An Introductory Guide to SPSS for Windows"; ISBN:1-412904153. 4. Pandya K. and Bulsari S.: "Enjoy Statistics with SPSS for Windows"; Popular. 5. Gaur A. S. and Gaur S. S(2009).: "Statistical Methods for Practice and Research- A guide to data analysis using SPSS"; 2nd Ed., Sage Publications, New Delhi. 6. George: "SPSS For Windows: Step By Step"; 8th Ed., Pearson, ISBN: 8131724298, 9788131724293. 7. Sudha G. Purohit, Sharad D. Gore, and Shailaja R. Deshmukh (2008), "Statistics using R, Second edition", Narosa Publishing House, ISBN-978-81-8487-455-6 8. Dr. Mark Gardener (2015), "Beginning R: The statistical programming language", Wiley, ISBN-978-81-265-4120-1 9. Jared P. Lander (2014), "R for everyone advance analytics and graphics", Addison Wesley data & analytics series, Dorling Kindersley (India) Pvt. Ltd., ISBN-978-93-325-3924-2 10. Yanchang Zhao and Yonghua Cen (2014), "Data mining application with R", Elsevier, ISBN-978-93-5107-218-8 11. Nina Zumel and John Mount (2015), "Practical data science with R", Dreamtech Press, ISBN-978-93-5119-437-8 12. Paul D. Lewis (2010), "R for medicine and biology", Jones and Bartlett Publishers, ISBN-978-0-7637-5808-0.
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Course: MAS- 3052: OFFICIAL STATISTICS

Course Code	MAS-3052							
Course Title	OFFICIAL STATISTICS							
Credit	4							
Teaching per Week	4 Hrs							
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)							
Effective From	June 2020							
Purpose of Course	The purpose of this course is to understand official statistics and its role in framing policies in Economics and Business and the system of official statistics in India							
Course Objective	To make students competent in theories and practices of official statistics.							
Course Outcomes	After completing this course, students will be able to: CO1: Understand Indian Statistical systems, its role, functions and activities i.e. understand the role of MoSPI, CSO, NSSO, National Statistical Commission. CO2: Appreciate and use techniques of quantitative analysis in social work research CO3: Discuss the scope and contents of population census of India. CO4: Identify Statistics related to industries, foreign trade, balance of payment, cost of living inflation, educational and social statistics etc. CO5 : Understand economic development and national income estimation CO6: Discuss the measures of inequality in income and measures of incidence and intensity.							
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
	CO1							
	CO2							
	CO3							
	CO4							
	CO5							
	CO6							
Pre-requisite	Concept of economics, time series and index number, CSO, NSSO , MOSPI							
Course Content	UNIT I: - Statistical System in India: Central and State Government Organizations, Functions of Central Statistical Organization (CSO), National Sample Survey Organization (NSSO). UNIT II: - Official statistics: Meaning, methods of collection, limitations and reliability. Principal publications containing data on the topics such as population, agriculture, industry, trade, prices, labour and employment, transport and communications - Banking and finance. UNIT III: - National Income – Measures of national income -							

	Income, expenditure and production approaches - Applications in various sectors in India. UNIT IV: • Measurement of income inequality: Lorenz curves, Application of Pareto and Lognormal as income distribution. • Organization of large scale sample surveys. General and special data dissemination systems.
Reference Books	1. Bhaduri, A. (1990). Macroeconomics: The Dynamics of Commodity Production, Macmillan India Limited, New Delhi. 2. Branson, W. H. (1992). Macroeconomic Theory and Policy, Third Edition, Harper Collins Publishers India (P) Ltd., New Delhi. 3. C. S. O. (1990). Basic Statistics Relating to the Indian Economy. 4. C.S.O. (1995). Statistical System in India. 5. C. S. O. (1999). Guide to Official Statistics. 6. C. S. O. (2016). Guide to Official Statistics. 7. Goon A. M., Gupta M. K., and Dasgupta. B. (2001), Fundamentals of Statistics, Vol. 2, World Press, India. 8. Mukhopadhyay P. (2011). Applied Statistics, Second Edition, Books & Allied Ltd, India. 9. Asthana, B.N. and Srivastava, S.S.(1984): Applied Statistics of India, Chaitanya Publishing House, Allahabad.
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Course: MAS-401: DESIGN OF EXPERIMENTS

c	MAS-401
Course Title	DESIGN OF EXPERIMENTS
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Effective From	June 2020
Purpose of Course	The purpose of the course is to learn the applications of different designs in agriculture, medical and industry.
Course Objective	To make students acquainted with various techniques of design of experiment.
Course Outcomes	After completing this course, students will be able to: CO1: Understand the concept of design and conduct experiments efficiently and effectively CO2: Analyze the resulting data to obtain objective conclusions. Both design and statistical analysis issues are discussed. CO3: Develop the concept of various designs CRD, RBD, LSD,

	BIBD, Factorial and Confounded designs. CO4: Understand the difference between various designs of experiments. CO5: Particular attention will be paid to understanding the process of designing an experiment including factorial and confounding designs.							
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
	CO1							
	CO2							
	CO3							
	CO4							
	CO5							
Pre-requisite	Basic concept of experimental designs and drawing inferences							
Course Content	UNIT I: • Concept and history of Design of experiments. • The need for Designed experiments. • Elementary ideas of blocking and randomized block design. • Elementary idea of treatment structure and Basic principles of Design of experiments • Concept of complete and incomplete block designs. Completely Randomized Design(CRD), Randomized Block Design(RBD), Latin square design(LSD), their analysis with applications. Missing plot technique for RBD, LSD with their applications. UNIT II: • Concept of BIBD and its properties. Intra block analysis of BIBD, construction of BIBD, Missing plot technique for BIBD. UNIT III: • Analysis of Covariance: Analysis of covariance for CRD, RBD and LSD, Youden square design, Cross over design, split-plot designs. UNIT IV: • Factorial Experiments : Characterization of experiments, factorial experiments, factorial experiments with factors at two levels, grouping for interaction contrasts, confounding, confounding in more than two blocks, experiments with factors at three levels each, analysis of factorial experiments.							
Reference Books	1. Montgomery, D. C. (1997): "Design and Analysis of Experiments"; 4th edition, John Wiley & Sons, New York 2. Montgomery, D. C. (2006): "Design and Analysis of Experiments"; 5th Ed, Wiley (India), ISBN: 812651048X, ISBN-13: 9788126510481, 978-8126510481 3. R. Mead. (1990): "The Design of Experiments: Statistical Principles for Practical Application"; Cambridge Uni. Press. ISBN-10: 0521287626, ISBN-13: 978-0521287623 4. Cochran W.G. and Cox G.M. (2003): "Experimental Designs"; 2nd Edition, John Wiley (wie) ISBN: 9971513110, ISBN-13: 9789971513115, 978-9971513115. 5. Cochran W.G. and Cox G.M. (1957): "Experimental Designs"; 2nd Edition, John Wiley & Sons Inc., New York, ISBN: 0471162035.							

	ISBN-13: 9780471162032 6. Das, M.N. and Giri, N.C. (1986). Design and Analysis of Experiments. Wiley Eastern Ltd., New Delhi. 7. Das M.N. and Giri N.C.(1999) : “Design and Analysis of Experiments”; 2nd Edition, New Age International Publishers Ltd, ISBN: 0852269145, ISBN-13: 9780852269145. 8. Federer W.T. (1993) : “Statistical Design And Analysis For Intercropping Experiments”; Springer-verlag, ISBN: 0387979239, ISBN-13: 9780387979236, 978-0387979236 9. Federer, W. T. (1955): “Experimental Design: Theory and Application”; The Macmillan Co., New York. 10. Klaus Hinkelmann, Kempthorne Oscar (2005): “Design and Analysis of Experiments”; Wiley-interscience, ISBN: 0471551775, ISBN-13: 9780471551775 11. Kempthorne, O. (1952), The Design and Analysis of Experiments, John Wiley & Sons, New York 12. Fisher R. A. (2005): “Statistical Methods for Research Workers”; Cosmo Publications, ISBN: 8130701332, ISBN-13: 9788130701332, 978-8130701332 13. Panse, V.G. and Sukhatme, P.V. (1978): “Statistical methods for agricultural workers”; ICAR, New Delhi.
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Course: MAS-402: OPERATIONS RESERACH – II

c	MAS-402
Course Title	OPERATIONS RESERACH – II
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Effective From	2008
Purpose of Course	The purpose of the course concerns itself with studying analytical method of Operations research, problem-solving and decision-making that is useful in the management of organizations
Course Objective	To develop the optimization techniques that will be useful in the personal and professional life.
Course Outcomes	After completing this course, students will be able to: CO1: Understand basic concept of sensitivity analysis with changes in objective function, vector b and matrix A. Also discuss the cases for addition and deletion of variable and constrains with example CO2: Construct integer programming problems with different types to discuss the solution techniques. CO3: Select the best sequence through different machine to different jobs to minimize time CO4: Understand the concept of PERT/CPM and their real life

	application CO5: Be aware of the concept of replacement problems with fixed money and variable money effect. Comparison of group and individual policy CO6: Explain the concept of Goal programming problem, their formulation method and example							
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
	CO1							
	CO2							
	CO3							
	CO4							
	CO5							
	CO6							
Pre-requisite	Concept of liner algebra, basic mathematical operations							
Course Content	UNIT I: • Sensitivity Analysis: ➤ Basic concepts ➤ Changes in the coefficient of objective function ➤ Changes in the components of vector b and of Matrix A ➤ Addition / Deletion of variable in the problem ➤ Addition / Deletion of constraint in the problem UNIT II: • Integer Programming: ➤ Introduction ➤ All and mixed integer programming (IPP) problems ➤ Gomory's all-IPP algorithm ➤ The branch and bound technique ➤ Zero - one programming UNIT III: • PERT / CPM: ➤ Basic concepts . ➤ Construction and Time Calculation of the Network ➤ Determination of Float and of the Critical Path ➤ Crashing a Project ➤ Scheduling a Project ➤ Resource Analysis and Allocation ➤ Application of PERT/ CPM UNIT IV: • Replacement Theory: ➤ Types of Replacement Problem ➤ Replacement of Items that Deteriorate ➤ Replacement of Items that fails completely and that of Staff • Goal Programming: ➤ Definitions and Concepts ➤ Formulation of Goal Programming Problem (GPP) ➤ Solution of GPP by Graphical and Extended Simplex Methods							

Reference Books	1. K. Swarup, Gupta P.K. and Man Mohan(2008): “Operations Research”; S.Chand & Co., New Delhi, ISBN: 8180545350, ISBN-13: 9788180545351 2. G. Hadley (2002): “Linear Programming”; Narosa Book Distributors Pvt Ltd, ISBN: 8185015910, ISBN-13: 9788185015910 3. Murthy K.G.(1988): Linear complementarity, linear and nonlinear programming, Heldermann Verlag, ISBN: 3885384035, 9783885384038 4. Kasana H.S. and Kumar K.D.(2005) : “Introductory Operations Research: Theory & Applications”; Springer Verlag , ISBN: 8181282827, 9798181282827. 5. Kapoor V.K. (2006) : “Operations Research”; 7th Edition, Jain Book Depot, ISBN : 8170148286. 6. Sharma S.D.(2005):Operations Research”; 15th Ed., Kedar Nath Ram Nath & Co. Publishers, Meerut, 7. Hira,D.S., Gupta,P.K.(2007): OPERATIONS RESEARCH, S.Chand & Co., New Delh, ISBN: 81-219-0281-9
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Course: MAS-4032: BIO-STATISTICS AND CLINICAL RESEARCH

Course Code	MAS-4032
Course Title	BIO-STATISTICS AND CLINICAL RESEARCH
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Effective From	2008
Purpose of Course	The purpose of this course is to train students to utilise their knowledge of Statistics for the research related to health / biological/ medical fields.
Course Objective	Biostatistics is one area of Applied statistics that deals with drawing statistical inference from the research data related generated from planned experiments/trails for health / biological/ medical fields.
Course Outcomes	After successful completion of this course, student will be able to: CO1. Plan study design and do data analysis for the health / biological/ medical sciences. CO2. Understand how the basic principles of probability are useful for biostatistics. CO3. Do survival Analysis/ failure analysis for the health / biological/ medical sciences. CO4. Estimating the risk of one type of failure after removing others CO5. Evaluate, from simple datasets, evidence for linkage disequilibrium and disease associations using basic association tests CO6: planning, analysing and interpreting statistical out puts of different phases of clinical trials, including deciding sample size.

Mapping between COs with PSOs	<table><tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td><td>PSO6</td><td>PSO7</td><td></td></tr><tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO6</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7		CO1									CO2									CO3									CO4									CO5									CO6								
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Pre-requisite	Concept of descriptive statistics, inferential statistics, medical science.																																																															
Course Content	UNIT I: • Introduction to Bio-statistics, Sources of medical uncertainties, managing medical uncertainties. Applications and uses of Bio-statistics as a science. • Clinical trials: the need and ethics of clinical trials, bias and random error in clinical studies, conduct of clinical trials, overview of Phase I-IV trials, multi-center trials. Data management: data definitions, data collection systems for good clinical practice, protocol definition. UNIT II: • Design of clinical trials : parallel vs. cross-over designs, cross-sectional vs. longitude designs, review of factorial designs, objectives and endpoints of clinical trials, design of Phase I trials, design of single-stage and multi-stage Phase II trials, design and monitoring of Phase III trials with sequential stopping, design of bioequivalence trials. UNIT III: • Reporting and analysis: analysis of categorical outcomes from Phase I - III trials, analysis of survival data from clinical trials. Interim analysis method, motivating intent- to-treat analysis. UNIT IV: • Determining sample size. Surrogate endpoints: selection and design of trials with surrogate endpoints, analysis of surrogate endpoint data.																																																															
Reference Books	1. Prem Narayan, Bhatia & Malhotra (1979): Handbook of Statistical Genetics, IASRI, New Delhi. 2. Jain, J.R. (1982): Statistical techniques in quantitative genetics, Tata Mcgraw Hill. 3. Govindarajulu, Z. and Kargar, S. (2000): Statistical Techniques in Bioassay. 4. Finney, D.J (1971): Statistical Method In Bioassay, Griffin. 5. Finney, D.J (1971): Probit Analysis (3rd Edition), Griffin. 6. Weatherile, G.B. (1966): Sequential Methods in Statistics, Griffin. 7. Piantadosi, S. (1977): Clinical: A Methodologic Perspective. Wiley and Sons. 8. Jennison, C. and Turnbull, B.W (1999): Group Sequential Methods with Applications to Clinical Trials, CRC Press. 9. Flesis, J.L (1989): The Design and Analysis of Clinical Experiments. Wileyand Sons. 10. Marubeni, E. and Valsechhi, M.G (1994): Analyzing Survival Data From Clinical Trials and Observational Studies. Wiley and																																																															

	variables from failure rates. UNIT II: - Simulating multivariate distributions, MCMC methods and Gibbs sampler, simulating random fields, simulating stochastic process. Variance reduction technique: importance sampling for integration, control variates and antithetic variables. UNIT III: - Simulating a non-homogeneous Poisson process, Optimization using Monte Carlo methods, simulated annealing for optimization. Solving differential equations by Monte Carlo methods. UNIT IV: - Jackknife and Bootstrap: Bootstrap methods, re-sampling paradigms, bias and standard errors, Bootstrapping for estimation of sampling distribution. Confidence intervals, variance stabilizing transformation, bootstrapping in regression and sampling from finite populations.
Reference Books	1. Fishman, G.S. (1996) Monte Carlo: Concepts, Algorithms and Applications. (Springer). 2. Rubinstein, R.Y. (1981); Simulation and the Monte Carlo Method. (Wiley). 3. Ripley, B.D. (1987) Stochastic Simulations (Wiley). 4. Ross, S. M. (2002) Simulation (Third Edition) (Academic). 5. Efron, B. and Tibshirani, R.J. (1993); An introduction to the Bootstrap. 6. Davison, A.C. and Hinkley, D.V. (1997) Bootstrap methods and their applications (Chapman and Hall). 7. Shojan and Tu, D (1995); The Jackknife and the Bootstrap. Springer Verlag.
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination

Course: Project and Seminar

Course Code	
Course Title	Project and Seminar
Credit	8
Teaching per Week	4 Hrs per week per group
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Effective From	2008
Purpose of Course	The purpose of the course concerns to allow the students to apply the different statistical procedure learned by them during the PG Program to solve real life problems. The students pick up a research problem, set the objectives, collect necessary data, clean the data, analyze it using appropriate statistical tool, reach to conclusion and prepare a report on it.
Course Objective	The objective of this course is to train the students to undertake projects in

	randomly selected group. The projects shall enable the students to take up their own statistical study and to understand the application of statistical methods that they learned during the course.							
Course Outcomes	CO1: Students select the topic from the course into some theme of practical use. CO2: Search primary or secondary dataset and collect the data for analysis. CO3: Students shall conduct their own independent statistical research, from start to finish. CO4: Apply the statistical techniques in the project which they had learned in the theory. CO5: They are expected to use statistical software for computational purpose. CO6: Represent their work through power point presentation and submit hard copy. CO7: For the project each group shall work under the supervision of a faculty member. CO8: Demonstrate capacity to lead and manage change through collaboration with others							
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
	CO1							
	CO2							
	CO3							
	CO4							
	CO5							
	CO6							
Pre-requisite	Basic concept of testing of hypothesis, time series analysis, econometrics, statistics for economics, softwares.							
Course Content	Based on all theory papers included in whole syllabus							
Reference Books	All reference book included in whole syllabus							
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and Project review							
Evaluation Method	30% internal assessment based on presentation and submission of project report and 70% during the end semester examination students shall present the same, whereby they shall be evaluated by an external examiner.							

Course: 3051: DATABASE MANAGEMENT SYSTEMS

Course Code	MAS-3051
Course Title	DATABASE MANAGEMENT SYSTEMS
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Effective From	June 2020
Purpose of Course	The purpose of the course is to prepare the students to be capable of doing any kind of data management that will further help them to perform various activity of data science. The core objective of this course is to identify different database systems, their models and to

	perform various data management task such as retrieval, insertion and removal of data using it's tool.							
Course Objective	To make students familiar with database management theory and give practical exposure to manage data using query language.							
Course Outcomes	After completing this course, students will be able to: CO1: Understand and apply the concept of database management system by comparing them with traditional data management techniques; CO2: Perform data definition, data manipulation, data control and transaction control using Query language CO3: Learn fundamental data models and its application in real world domain. CO4: Extend the procedural structural query language using various concept such as Procedures, Functions, Cursor and Triggers							
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
	CO1							
	CO2							
	CO3							
	CO4							
Pre-requisite	Fundamental of computer programming							
Course Content	UNIT I: • Overview of Database Management System ➤ Introduction to Database Languages ➤ Advantages of DBMS over file processing systems. • Relational Database Management System ➤ Entity relationship model ➤ Mapping constraints ➤ Primary Keys ➤ Foreign Keys ➤ Structural Constraints ➤ ER notations & ER model ➤ Enhanced Entity Relationship Model UNIT II: • Database System ➤ Database Structure ➤ Levels of abstraction in DBMS ➤ View of data ➤ Role of Database users and administrators ➤ Database Structure: DDL, DML, DCL,TCL UNIT III: • Types of Data Models ➤ Hierarchical databases ➤ Network databases ➤ Relational databases ➤ Object oriented databases UNIT IV: • PL/SQL ➤ Stored Procedure ➤ Concepts Procedure, Functions, Cursors ,Triggers							
Reference Books	1. An Introduction to Database System- C. J. Date-Narosa							

Course Content	UNIT I: • Introduction to Data Mining ➢ Process of data mining ➢ Types of data used for data mining ➢ Application of data mining UNIT II: • Supervised Learning ➢ Exploratory Data Analysis (EDA) ➢ Multiple Regression/Stepwise Regression ➢ Logistic Regression/Multi-Nomial regression ➢ K-nearest neighbors (KNN) ➢ Linear Discriminant Analysis (LDA) ➢ Quadratic Discriminant Analysis (QDA) ➢ Bayes classifier ➢ Nearest neighbor classifier ➢ Tree based methods like boosting or random forest UNIT III: • Unsupervised Learning ➢ Clustering procedures- k-means hierarchical ➢ Self-organizing map ➢ EM algorithm ➢ Feature selection: principal component analysis ➢ Association rules UNIT IV: • Optimization ➢ Neural Network ➢ Genetic Algorithm • Graphical evaluation of classification, Association rules • Imputation of missing data
Reference Books	1. Jiawei Han, Micheline Kamber(2006) : "Data Mining"; II-Ed., Morgan Kaufmann Publishers, ISBN: 1558609016, 9781558609013 2. Hillol Kargupta, Jiawei Han, Philip S. Yu(2008): Next Generation of Data Mining, CRC Press, ISBN: 1420085867, 9781420085860 3. Margaret H. Dunham: "Data Mining - Introductory and Advance Topics"; Pearson Edu., ISBN: 8177587854, 9788177587852
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 70% External based on semester end University examination