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યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.
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—: એકેડેમિક કાઉન્સિલ :—
—: કાર્યસૂચિ – ૨ :—

તા. : ૨૫–૦૬–૨૦૨૧
વાર : શુક્રવાર **સમય : બપોરે ૧: ૦૦ કલાકે**

(૯) એકેડેમિક કાઉન્સિલની **તા.૧૯/૦૬/૨૦૨૧** ની સભાની કાર્યવાહીની નોંધને બહાલી આપવા બાબત.
(નોંધ : પ્રસ્તુત એકેડેમિક કાઉન્સિલની સભાની કાર્યવાહી એકેડેમિક કાઉન્સિલનાં સભ્યશ્રીઓને તા.૧૯/૦૬/૨૦૨૧ ના પત્રક્રમાંક : એ/એ.કા./કા.વા./૮૩૦૩/૨૦૨૧ થી મોકલી આપવામાં આવી છે.)

(૧૦) આરોગ્ય તબીબી સેવાઓ અને તબીબી શિક્ષણના તા. ૧૬/૦૬/૨૦૨૧ ના પત્રક્રમાંક : એમસીજી / ઓફલાઈન / શિક્ષણ / શરૂકરવા / આઈ / ૨૧ ના પત્રમાં જણાવ્યા મુજબ મેડીકલ / ડેન્ટલ / ફીઝીયોથેરાપી / નર્સિંગ / ઓપ્ટોમેટ્રીના અભ્યાસક્રમના મોટાભાગના વિદ્યાર્થીઓ વેકસીનેટ થઈ ગયા હોય ટીચીંગની ગુણવત્તા જળવાઈ રહે તે હેતુસર Covid appropriate Behavior (CAB) અને Infection Control & Prevention ની તકેદારી સાથે મેડીકલ/ડેન્ટલ/ફીઝીયોથેરાપી/નર્સીંગ/ ઓપ્ટોમેટ્રીના યુ.જી. તથા પી.જી. વિદ્યાર્થીઓને ઓફલાઈન શિક્ષણ શરૂ કરવા અંગે ચર્ચા વિચારણા કરવા બાબત.

(બિડાણ : ૫)
(એકેડેમિક વિભાગ)

(૧૧) આયુષ, ગુજરાત રાજય, ગાંધીનગરનો પત્રક્રમાંક : યનવ–૧/૧૩૧૭૪–૨૧૪/૨૦૨૧/ગ, તા. ૦૬/૦૬/૨૦૨૧ ના પત્રમાં જણાવ્યા પ્રમાણે હોમિયોપેથી/આયુર્વેદ યુ.જી. તથા પી.જી વિદ્યાર્થીઓને ઓફલાઈન શિક્ષણ શરૂ કરવા અંગે ચર્ચા વિચારણા કરવા બાબત.

(બિડાણ : ૬)
(એકેડેમિક વિભાગ)

(૧૨) એજયુકેશન ડિપાર્ટમેન્ટના પ્રિન્સીપાલ સેક્રેટરીના તા. ૦૨/૦૬/૨૦૨૧ ના પત્રક્રમાંક : D.O.No. NEP/1221/Edu Policy (P.F) /KH ૫૨ ચર્ચા વિચારણા કરવા બાબત.

(બિડાણ : ૭)
(એકેડેમિક વિભાગ)

(૧૩) તબીબી અધિક્ષકશ્રી, નવી સિવીલ હોસ્પિટલ સુરતના તા. ૪–૬–૨૦૨૧ના પત્ર ક્રમાંક : નસિહોસુ / કોવિડ–૧૯ / ૧૮૯૦૧ / ૨૦૨૧ ના પત્રથી હાલમાં Fellowship in Fetal Medicine અને Fellowship in Basic Fetal Medicine & Advanced Obstetric Ultrasonography કોર્ષ ચાલુ હોય ઓબ્સ એન્ડ ગાયનેકોલોજી વિભાગમાંથી જેમણે ડીગ્રી અથવા ડિપ્લોમાંની પદવી એનાયત થયેલ હોય તે વિદ્યાથીઓને Fetal Medicine માં પીએચ. ડી. સંશોધન અભ્યાસની તક મળે તે હેતુથી શરૂ કરવાની દરખાસ્ત સંબધકર્તા વિભાગના વડાશ્રી અને બોર્ડ ઓફ સ્ટડીઝના ચેરમેનશ્રીની ભલામણ સાથે મળેલ છે. જે ભલામણ સંદર્ભમાં માન. કુલપતિશ્રીના આદેશ મુજબ તબીબી વિદ્યાશાખાના સિનિયર સભ્યશ્રીનો અભિપ્રાય મેળવતા તેમના દ્વારા નીચે મુજબની ભલામણ કરેલ છે. અનુસ્નાતક શિક્ષણ મંડળની તા. ૧૦–૬–૨૦૨૧ની સભાએ

તેના ઠરાવ ક્રમાંક (૧૯) અન્વયે તબીબી વિદ્યાશાખા અંતર્ગત Fetal Medicine માં પીએચ.ડી. સંશોધન અભ્યાસ શરૂ કરવાની ભલામણનો સ્વીકાર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે, જે ભલામણ પર વિચારણા કરવા બાબત.

<u>વિદ્યાશાખાના સિનિયર સભ્ય ડૉ. કે. એન. ભટ્ટનો અભિપ્રાય :</u>

Fetal Medicine માં પીએચ. ડી. સંશોધન અભ્યાસમાં ઓબ્સ. એન્ડ ગાયનેક અથવા રેડીયોલોજી અનુસ્નાતક અભ્યાસ અને Fetal Medicine fellowship અથવા Fetal Medicine certificate course કરનારને પ્રાધાન્ય આપવા સાથે Ph. D. સંશોધન અભ્યાસ શરૂ કરવા ભલામણ છે.

<u>અનુસ્નાતક શિક્ષણ મંડળની તા. ૧૦–૬–૨૦૨૧, ઠરાવ ક્રમાંક (૧૯)</u>

:: આથી ઠરાવવામાં આવે છે કે, તબીબી વિદ્યાશાખામાં Fetal Medicine માં પીએચ.ડી. સંશોધન અભ્યાસ શરૂ કરવાની દરખાસ્ત સ્વીકારી એકેડેમિક કાઉન્સિલને ભલામણ કરવી.

(બિડાણ : ૮)
(અનુસ્નાતક વિભાગ)

(૧૪) યુનિવર્સિટી દ્વારા લેવામાં આવતી વિવિધ પરીક્ષાઓની ઉત્તરવહીઓના મૂલ્યાંકન માટે હાલમાં સ્નાતકના પ્રથમ વર્ષ અને દ્વિતિય વર્ષ તેમજ અનુસ્નાતકના સેમેસ્ટર–૧ અને ૨ નું મૂલ્યાંકન માટે ઉત્તરવહીઓ કોલેજોને મોકલવામાં આવે છે. જ્યારે સ્નાતકના ટી.વાય.અને અનુસ્નાતકના સેમેસ્ટર–૩ અને ૪ નું યુનિવર્સિટી ખાતે કેન્દ્રસ્થ મૂલ્યાંકન કરાવવામાં આવે છે. હવે પછીના સમય દરમ્યાન લેવાનાર યુનિવર્સિટીની તમામ પરીક્ષાઓની ઉત્તરવહીઓનું મૂલ્યાંકન ઓનલાઈન કરાવવા માટે માન.કુલપતિશ્રી દ્વારા સૂચન કરેલ છે. જે પર વિચારણા કરવા બાબત.

(પરીક્ષા/એ.સી.ડી.સી. વિભાગ)

(૧૫) શૈક્ષણિક વર્ષ : ૨૦૨૧–૨૨ થી અમલમાં આવનાર S.Y.B.Sc. Sem-III, & IV, Mathematics વિષયનો અભ્યાસક્રમ અંગે ગણિતશાસ્ત્ર વિષયની અભ્યાસસમિતિની તા.૧૪/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ૨ અન્વયે નીચે મુજબ કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૧૯ અન્વયે મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે. જે ભલામણ પર વિચારણા કરવા બાબત.

<u>ગણિતશાસ્ત્ર વિષયની અભ્યાસસમિતિની તા.૧૪/૦૬/૨૦૨૧ની સભાનાં ભલામણ ક્રમાંકઃ૨</u>

:: આથી ઠરાવવામાં આવે છે કે, શૈક્ષણિક વર્ષ : ૨૦૨૧–૨૨ થી અમલમાં આવનાર S.Y.B.Sc. Sem-III & IV ગણિતશાસ્ત્ર વિષયનો અભ્યાસક્રમ જે પેટાસમિતિએ બનાવ્યો હતો તે સર્વાનુમતે મંજૂર કરવામાં આવ્યો, જે મંજૂર કરવા વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

<u>વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૧૯</u>

:: આથી ઠરાવવામાં આવે છે કે, ગણિતશાસ્ત્ર વિષયની અભ્યાસસમિતિની તા.૧૪/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ૨અન્વયે મંજૂર કરેલ શૈક્ષણિક વર્ષ : ૨૦૨૧–૨૨ થી અમલમાં આવનાર S.Y.B.Sc. Sem-III, &IV, Mathematics વિષયનો અભ્યાસક્રમ મંજુર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

(બિડાણ : ૯)
(એકેડેમિક વિભાગ)

(૧૬) એમ.એસસી. સેમ–૪ ની ડેઝર્ટેશનની પરીક્ષા લેવા બાબતે ચર્ચા કરતા વનસ્પતિશાસ્ત્ર (બોટની) વિષયની અભ્યાસસમિતિની તા.૧૪/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૩ અન્વયે નીચે મુજબ કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૧૮ અન્વયે મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે. જે ભલામણ પર વિચારણા કરવા બાબત.

વનસ્પતિશાસ્ત્ર (બોટની) વિષયની અભ્યાસસમિતિની તા.૧૪/૦૬/૨૦૨૧ની સભાનાં ભલામણ ક્રમાંકઃ ૩

:: આથી ઠરાવવામાં આવે છે કે,એમ.એસસી. સેમ–૪ ની ડેઝર્ટેશનની પરીક્ષા ગત વર્ષ કોરોના કાળને કારણે ઓનલાઈન વાઈવા લેવામાં આવ્યા હતા તે જ મુજબ આ વર્ષે પણ ઓનલાઈન વાઈવા દ્વારા જ લેવાની વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૧૮

:: આથી ઠરાવવામાં આવે છે કે,વનસ્પતિશાસ્ત્ર (બોટની) વિષયની અભ્યાસસમિતિની તા.૧૪/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૩ અન્વયે મંજૂર કરેલએમ.એસસી. સેમ–૪ ની ડેઝર્ટેશનની પરીક્ષા ઓનલાઈન વાઈવા લેવા મંજુર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

(એકેડેમિક વિભાગ)

(૧૭) ટી.વાય.બીએસ.સી. રસાયણશાસ્ત્ર સેમેસ્ટર–૫ ના અભ્યાસક્રમ અંગે ચર્ચા કરતા રસાયણશાસ્ત્ર વિષયની અભ્યાસસમિતિની તા.૧૧/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ૨ અન્વયે નીચે મુજબ કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૧૭ અન્વયે મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે. જે ભલામણ પર વિચારણા કરવા બાબત.

રસાયણશાસ્ત્ર વિષયની અભ્યાસસમિતિની તા.૧૧/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ૨

:: આથી ઠરાવવામાં આવે છે કે, જુન–૨૦૨૧–૨૨ થી અમલમાં આવનાર ટી.વાય. બી.એસસી. રસાયણશાસ્ત્ર સેમેસ્ટર–૫ નાં અભ્યાસક્રમને સર્વાનુમતે મંજુર કરી તે મંજુર કરવા વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૧૭

:: આથી ઠરાવવામાં આવે છે કે, રસાયણશાસ્ત્ર વિષયની અભ્યાસસમિતિની તા.૧૧/૦૬/૨૦૨૧ ની સભાનાં ઠરાવ ક્રમાંકઃ૨ અન્વયે મંજૂર કરેલ જુન–૨૦૨૧–૨૨ થી અમલમાં આવનાર ટી.વાય. બી.એસસી. રસાયણશાસ્ત્ર સેમેસ્ટર–૫ નાં અભ્યાસક્રમ મંજુર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

(બિડાણ : ૧૦)
(એકેડેમિક વિભાગ)

(૧૮) T.Y. B.Sc. Health Science Sem-V &VI, Generic elective-086 નો અભ્યાસક્રમ અંગે ચર્ચા કરતા બાયોસાયન્સ વિષયની અભ્યાસસમિતિની તા.૦૯/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ૩ અન્વયે નીચે મુજબ કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૧૪ અન્વયે મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે. જે ભલામણ પર વિચારણા કરવા બાબત.

બાયોસાયન્સ વિષયની અભ્યાસસમિતિની તા.૦૯/૦૬/૨૦૨૧ની સભાનાં ભલામણ ક્રમાંકઃ૩

:: આથી ઠરાવવામાં આવે છે કે, શૈક્ષણિક વર્ષ ૨૦૨૧–૨૨ થી અમલમાં આવનાર T.Y. B.Sc. Health Science Sem-V &VI, Generic elective-086 નો અભ્યાસક્રમ મંજૂર કરી તે મંજૂર કરવા વિજ્ઞાન ભલામણ કરવામાં આવે છે.

વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૧૪

:: આથી ઠરાવવામાં આવે છે કે, બાયોસાયન્સ વિષયની અભ્યાસસમિતિની તા.૦૯/૦૬/૨૦૨૧ની સભાનાં ભલામણ ક્રમાંકઃ૩ અન્વયે મંજૂર કરેલ શૈક્ષણિક વર્ષ ૨૦૨૧–૨૨ થી અમલમાં આવનાર T.Y. B.Sc.Health Science Sem-V &VI, Generic elective-086 નો અભ્યાસક્રમ મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

(બિડાણ : ૧૧)
(એકેડેમિક વિભાગ)

(૧૯) T.Y. B.Sc. Bio-Science Sem-V & VI નો અભ્યાસક્રમ બાબતે ચર્ચા કરતા બાયોસાયન્સ વિષયની અભ્યાસસમિતિની તા.૦૯/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ૨ અન્વયે નીચે મુજબ કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૧૩ અન્વયે મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે. જે ભલામણ પર વિચારણા કરવા બાબત.

બાયોસાયન્સ વિષયની અભ્યાસસમિતિની તા.૦૯/૦૬/૨૦૨૧ની સભાનાં ભલામણ ક્રમાંકઃ૨

:: આથી ઠરાવવામાં આવે છે કે, શૈક્ષણિક વર્ષ ૨૦૨૧–૨૨ થી અમલમાં આવનાર T.Y. B.Sc. Bio-Science Sem-V & VI નો અભ્યાસક્રમ મંજૂર કરી તે મંજૂર કરવા વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૧૩

:: આથી ઠરાવવામાં આવે છે કે, બાયોસાયન્સ વિષયની અભ્યાસસમિતિની તા.૦૯/૦૬/૨૦૨૧ની સભાનાં ભલામણ ક્રમાંકઃ૨ અન્વયે મંજૂર કરેલ શૈક્ષણિક વર્ષ ૨૦૨૧–૨૨ થી અમલમાં આવનાર T.Y. B.Sc. Bio-Science Sem-V &VI નો અભ્યાસક્રમ મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

(બિડાણ : ૧૨)
(એકેડેમિક વિભાગ)

(૨૦) શૈક્ષણિક વર્ષ ૨૦૨૧–૨૨ થી અમલમાં આવનાર T.Y.B.Sc.(Zoology)ના સિલેબસ બનાવવા બાબતે ઝૂઓલોજી વિષયની અભ્યાસસમિતિની તા.૨૨/૦૩/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૨ અન્વયે નીચે મુજબ કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ૩ અન્વયે મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે. જે ભલામણ પર વિચારણા કરવા બાબત.

ઝૂઓલોજી વિષયની અભ્યાસસમિતિની તા.૨૨/૦૩/૨૦૨૧ની સભાનાં ભલામણ ક્રમાંકઃ ૨

:: આથી સર્વાનુમતે ઠરાવવામાં આવે છે કે, શૈક્ષણિક વર્ષ ૨૦૨૧–૨૨ થી અમલમાં આવનાર T.Y.B.Sc. Sem-5 & 6 નો પ્રાણીશાસ્ત્ર વિષયનો અભ્યાસક્રમ મંજૂર કરી તે મંજૂર કરવા વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ૩

:: આથી ઠરાવવામાં આવે છે કે, ઝૂઓલોજી વિષયની અભ્યાસસમિતિ તા.૨૨/૩/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૨ અન્વયે મંજૂર કરેલ શૈક્ષણિક વર્ષ ૨૦૨૧–૨૨ થી અમલમાં આવનાર T.Y.B.Sc. Sem-5 & 6 નો પ્રાણીશાસ્ત્ર વિષયનો અભ્યાસક્રમ સ્વીકારી મંજૂર કરવામાં આવે છે. અને તે મંજૂર કરવા એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

(બિડાણ : ૧૩)
(એકેડેમિક વિભાગ)

(૨૧) F.Y.B.Sc. Sem-1 & 2 તથા S.Y.B.Sc. Sem-3 & 4 ના અભ્યાસક્રમ અંગે ચર્ચા કરતા ઝૂઓલોજી વિષયની અભ્યાસસમિતિની તા.૨૨/૦૩/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૩ અન્વયે નીચે મુજબ કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ૪ અન્વયે મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે. જે ભલામણ પર વિચારણા કરવા બાબત.

ઝૂઓલોજી વિષયની અભ્યાસસમિતિની તા.૨૨/૦૩/૨૦૨૧ની સભાનાં ભલામણ ક્રમાંકઃ ૩

:: આથી સર્વાનુમતે ઠરાવવામાં આવે છે કે, F.Y.B.Sc. Sem-1 & 2 તથા S.Y.B.Sc. Sem-3 & 4 માં ચર્ચાને અંતે આંશિક સુધારા કરવામાં આવ્યા છે.જે શૈક્ષિક વર્ષ ૨૦૨૧–૨૨ થી અમલમાં આવે તે રીતે મંજૂર કરવા વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ૪

:: આથી ઠરાવવામાં આવે છે કે, ઝૂઓલોજી વિષયની અભ્યાસસમિતિની તા.૨૨/૦૩/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૩ અન્વયે મંજૂર કરેલ F.Y.B.Sc.Sem-1 & 2 તથા S.Y.B.Sc. Sem-3 & 4 નો અભ્યાસક્રમ આંશિક સુધારા સહિત મંજૂર કરી શૈક્ષણિક વર્ષ ૨૦૨૧–૨૨ થી અમલમાં આવે તે રીતે મંજૂર કરવા એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવેલ છે.

(બિડાણ : ૧૪)
(એકેડેમિક વિભાગ)

(૨૨) M.Sc.Biotechnology 5 Year Integrated માં સેમેસ્ટર ૧૦ માં BT-4003 Review of Research Publication માટે ૧૦ પેપર નક્કી કરવા અંગે બી.એસસી. એન્ડ એમ.એસસી. બાયોટેકનોલોજી વિષયની નિયૂક્ત એડહોક બોર્ડની તા.૨૬/૦૩/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૨ અન્વયે નીચે મુજબ કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૫ અન્વયે મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે. જે ભલામણ પર વિચારણા કરવા બાબત.

બી.એસસી. એન્ડ એમ.એસસી. બાયોટેકનોલોજી વિષયની નિયૂક્ત એડહોક બોર્ડની તા.૨૬/૩/૨૦૨૧ની સભાનાં ભલામણ ક્રમાંકઃ ૨

:: આથી ઠરાવવામાં આવે છે કે, સેમેસ્ટર ૧૦ માં BT-4003 Review of Research Publication માટે ૧૦ પેપર મંજૂર કરવામાં આવ્યા અને તે મંજૂર કરવા વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૫

:: આથી ઠરાવવામાં આવે છે કે, બી.એસસી. એન્ડ એમ.એસસી. બાયોટેકનોલોજી વિષયની નિયૂક્ત એડહોક બોર્ડની તા.૨૬/૩/૨૦૨૧નીસભાનાં ઠરાવ ક્રમાંકઃ ૨ અન્વયે કરેલ ભલામણ સ્વીકારી એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

(બિડાણ :૧૫)
(એકેડેમિક વિભાગ)

(૨૩) PG DMLT નો રિવાઈઝડ અભ્યાસક્રમ અને પેપર નામમાં સુધારા અંગે ચર્ચા કરતા મેડીકલ ટેકનોલોજી વિષયની અભ્યાસસમિતિની તા.૦૫/૧૧/૨૦૨૦ ની સભાનાં ઠરાવ ક્રમાંકઃ ૫ અન્વયે નીચે મુજબ કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૧૧ અન્વયે મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે. જે ભલામણ પર વિચારણા કરવા બાબત.

મેડીકલ ટેકનોલોજી વિષયની અભ્યાસસમિતિની તા.૦૫/૧૧/૨૦૨૦ ની સભાનાં ભલામણ ક્રમાંકઃ ૫

:: આથી ઠરાવવામાં આવે છે કે, શૈક્ષણિક વર્ષ ૨૦૨૧–૨૨ થી અમલમાં આવનાર PG DMLT નો રિવાઈઝડ અભ્યાસક્રમ અને પેપર નામમાં સુધારા મંજૂર કરી વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૧૧

:: આથી ઠરાવવામાં આવે છે કે, મેડીકલ ટેકનોલોજી વિષયની અભ્યાસસમિતિની તા.૦૫/૧૧/૨૦૨૦ ની સભાનાં ઠરાવ ક્રમાંકઃ ૫ અન્વયે મંજૂર કરેલ શૈક્ષણિક વર્ષ ૨૦૨૧–૨૨ થી અમલમાં આવનાર PG DMLT નો રિવાઈઝડ અભ્યાસક્રમ અને પેપર નામમાં સુધારા મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

(બિડાણ : ૧૬)

(એકેડેમિક વિભાગ)

(૨૪) PG DMLT Course માં B.Sc. Environmental Science વિષયની એલીજીબીલટી અંગે ચર્ચા કરતા મેડીકલ ટેકનોલોજી વિષયની અભ્યાસસમિતિની તા.૦૫/૧૧/૨૦૨૦ ની સભાનાં ઠરાવ ક્રમાંકઃ ૪ અન્વયે નીચે મુજબ કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૧૦ અન્વયે મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે. જે ભલામણ પર વિચારણા કરવા બાબત.

મેડીકલ ટેકનોલોજી વિષયની અભ્યાસસમિતિની તા.૦૫/૧૧/૨૦૨૦ ની સભાનાં ભલામણ ક્રમાંકઃ ૪

:: આથી ઠરાવવામાં આવે છે કે, PG DMLT Course માં B.Sc. Environmental Science વિષયની એલીજીબીલટી શૈક્ષણિક વર્ષ ૨૦૨૧–૨૨ થી અમલમાં આવનાર નીચે મુજબ છે. જે સર્વાનુમતે મંજૂર કરી વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

Eligibility:-

Candidate should have a B.Sc. degree of Veer Narmad South Gujarat University, Surat with (A) or (B) or equivalent qualification of other recognized University.

(A) Microbiology, Chemistry (Biology at F.Y. B.Sc. level), Botany, Zoology, Medical Technology, MLT, Environment , Biochemistry, Biosciences, Life sciences or Biotechnology as the principal subjects.

OR

(B) M.B.B.S, BDS,BAMS, BHMS, B.Sc. Nursing, B.Sc. Optometry,B.Pharmacy, B.Physiotherapy.

વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૧૦

:: આથી ઠરાવવામાં આવે છે કે, મેડીકલ ટેકનોલોજી વિષયની અભ્યાસસમિતિની તા.૦૫/૧૧/૨૦૨૦ ની સભાનાં ઠરાવ ક્રમાંકઃ ૪ અન્વયે મંજૂર કરેલ શૈક્ષણિક વર્ષ ૨૦૨૧–૨૨ થી અમલમાં આવનાર PG DMLT Course માં B.Sc. Environmental Science વિષયની ઉપર મુજબની એલીજીબીલટી મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

(એકેડેમિક વિભાગ)

(૨૫) શૈક્ષણિક વર્ષ ૨૦૨૧–૨૨ અમલમાં આવનાર બી.એસસી.સેમેસ્ટર–૩ અને ૪ તથા એમ.એસસી.સેમેસ્ટર–૩ અને ૪ (માઈક્રોબાયોલોજી) વિષયનાં અભ્યાસક્રમ અંગે ચર્ચા કરતા માઈક્રોબાયોલોજી વિષયની અભ્યાસસમિતિની તા.૧૫/૦૩/૨૦૨૧ ની સભાનાં ઠરાવ ક્રમાંકઃ ૨ અન્વયે નીચે મુજબ કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૬ અન્વયે મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે. જે ભલામણ પર વિચારણા કરવા બાબત.

માઈક્રોબાયોલોજી વિષયની અભ્યાસસમિતિની તા.૧૫/૦૩/૨૦૨૧ ની સભાનાં ભલામણ ક્રમાંકઃ૨

:: આથી ઠરાવવામાં આવે છે કે, શૈક્ષણિક વર્ષ ૨૦૨૧–૨૨ અમલમાં આવનાર બી.એસસી. એન્ડ એમ.એસસી. (માઈક્રોબાયોલોજી) સેમેસ્ટર–૩ અને ૪ નાં અભ્યાસક્રમ સર્વાનુમતે મંજૂર કરી તે મંજુર કરવા વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

<u>વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૬</u>

:: આથી ઠરાવવામાં આવે છે કે, માઈક્રોબાયોલોજી વિષયની અભ્યાસસમિતિની તા.૧૫/૦૩/૨૦૨૧ ની સભાનાં ઠરાવ ક્રમાંકઃ૨ અન્વયે મંજૂર કરેલ શૈક્ષણિક વર્ષ ૨૦૨૧–૨૨ અમલમાં આવનાર બી.એસસી. & એમ.એસસી.માઈક્રોબાયોલોજી સેમેસ્ટર–૩ અને ૪ નાં અભ્યાસક્રમ મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

(બિડાણ : ૧૭)
(એકેડેમિક વિભાગ)

(૨૬) બી.એસસી.મેડીકલ ટેકનોલોજીની માર્કિંગ સ્કીમ અંગે ચર્ચા કરતા મેડીકલ ટેકનોલોજી વિષયની અભ્યાસસમિતિની તા.૦૫/૧૧/૨૦૨૦ ની સભાનાં ઠરાવ ક્રમાંકઃ ૨ અન્વયે નીચે મુજબ કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૯ અન્વયે મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે. જે ભલામણ પર વિચારણા કરવા બાબત.

<u>મેડીકલ ટેકનોલોજી વિષયની અભ્યાસસમિતિની તા.૦૫/૧૧/૨૦૨૦ ની સભાનાં ભલામણ ક્રમાંકઃ ૨</u>

:: આથી ઠરાવવામાં આવે છે કે, શૈક્ષણિક વર્ષ ૨૦૨૧–૨૨ થી અમલમાં આવનાર બી.એસસી. મેડીકલ ટેકનોલોજીની માર્કિંગ સ્કીમ સર્વાનુમતે મંજૂર કરી વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

<u>વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૯</u>

:: આથી ઠરાવવામાં આવે છે કે, મેડીકલ ટેકનોલોજી વિષયની અભ્યાસસમિતિ તા.૦૫/૧૧/૨૦૨૦ ની સભાનાં ઠરાવ ક્રમાંકઃ ૨ અન્વયે મંજૂર કરેલશૈક્ષણિક વર્ષ ૨૦૨૧–૨૨ થી અમલમાં આવનાર બી.એસસી.મેડીકલ ટેકનોલોજીની માર્કિંગ સ્કીમ મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

(બિડાણ : ૧૮)
(એકેડેમિક વિભાગ)

(૨૭) વિજ્ઞાન વિદ્યાશાખાની તા.૦૨/૦૫/૨૦૧૯ રોજ મળેલ સભાનાં ઠરાવ ક્રમાંકઃ૧૫ અને ૩૬ અન્વયે પ્રાણીશાસ્ત્ર અલગ RAC બનાવવાની રજૂઆત કરવામાં આવી હતી. પ્રસ્તૃત બાબતનાં અનુસંધાનમાં RAC ભેગી કરવા માટે તથા દરેક વિષયની અલગ અલગ ડીગ્રી મળી શકે તે માટે સાત સભ્યોની પેટાસમિતિ બનાવવામાં આવી હતી જે પેટાસમિતિની સભા તા.૦૧/૦૮/૨૦૧૯ ના રોજ મળી હતી જેને વિજ્ઞાન વિદ્યાશાખામાં રજૂ કરવા જણાવેલ હોય જે અંગે વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ૮ અન્વયે નીચે મુજબ ભલામણ કરેલ છે જે અંગે વિચારણા કરવા બાબત.

<u>વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ૮</u>

:: આથી સર્વાનુમતે ઠરાવવામાં આવે છે કે, ઝુઓલોજી, બોટની અને માઈક્રોબાયોજીની RAC અલગ અલગ રાખવા એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

(એકેડેમિક વિભાગ)

(૨૮) શૈક્ષણિક વર્ષ ૨૦૨૧–૨૨ અમલમાં આવનાર T.Y.B.Sc. (Physics) Sem-5 & Sem-6 ના અભ્યાસક્રમ અંગે ચર્ચા કરતા ભૌતિકશાસ્ત્ર વિષયની અભ્યાસસમિતિની તા.૧૦/૦૫/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૨ અન્વયે નીચે મુજબ કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૭ અન્વયે મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે. જે ભલામણ પર વિચારણા કરવા બાબત.

<u>ભૌતિકશાસ્ત્ર વિષયની અભ્યાસસ્મતિની તા.૧૦/૦૫/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૨</u>

:: આથી ઠરાવવામાં આવે છે કે, શૈક્ષણિક વર્ષ ૨૦૨૧–૨૨, જૂન–૨૦૨૧ થી અમલમાં આવનાર T.Y.B.Sc. (Physics) Sem-5 & Sem-6 નો પેટાસમિતિએ તૈયાર કરેલ અભ્યાસક્રમ સર્વાનુમતે મંજૂર કરી વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

<u>વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૭</u>

:: આથી ઠરાવવામાં આવે છે કે, ભૌતિકશાસ્ત્ર વિષયની અભ્યાસસ્મતિની તા.૧૦/૦૫/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૨ અન્વયે મંજૂર કરેલશૈક્ષણિક વર્ષ ૨૦૨૧–૨૨, જૂન–૨૦૨૧ થી અમલ માં આવનાર T.Y.B.Sc. (Physics) Sem-5 & Sem-6 નો પેટાસમિતિએ તૈયાર કરેલ અભ્યાસક્રમ મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

(બિડાણ : ૧૯)

(એકેડેમિક વિભાગ)

(૨૯) વિજ્ઞાન વિદ્યાશાખાનાં ડીનશ્રીનાં તા.૧૭/૦૬/૨૦૨૧નાં પત્રમાં જણાવ્યા મુજબ ગાઈડશીપ આપવા બાબતે વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ૨૫ અન્વયે નીચે મુજબ એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે. જે ભલામણ પર વિચારણા કરવા બાબત.

<u>વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ૨૫</u>

:: આથી ઠરાવવામાં આવે છે કે, વનસ્પતિશાસ્ત્ર, પ્રાણીશાસ્ત્ર, મેડીકલ ટેકનોલોજી, બાયોટેકનોલોજી, માઈક્રોબાયોલોજીના ગાઈડને બાયોસાયન્સમાં ગાઈડશીપ આપવી તથા બાયોસાયન્સ વિષયના ગાઈડશ્રીઓને તેમના જે તે વિષયમાં પણ ગાઈડશીપ આપવા એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

(એકેડેમિક વિભાગ)

(૩૦) B.Sc. Medical Technology ના બદલે નામ બદલીને B.Sc. Medical Laboratory Technology કરવા બાબતે ચર્ચા કરતા મેડીકલ ટેકનોલોજી વિષયની અભ્યાસસમિતિની તા.૦૯/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ૪ અન્વયે નીચે મુજબ કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૨૨ અન્વયે મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે. જે ભલામણ પર વિચારણા કરવા બાબત.

<u>મેડીકલ ટેકનોલોજી વિષયની અભ્યાસસમિતિની તા.૦૯/૦૬/૨૦૨૧ની સભાનાં ભલામણ ક્રમાંક : ૪</u>

:: આથી ઠરાવવામાં આવે છે કે, B.Sc. Medical Technology એ પેથોલોજી લેબોરેટરીનો કોર્ષ છે પરંતુ પેથોલોજી લેબોરેટરીમાં જયારે સરકારી ભરતીની જાહેરાત આવે છે ત્યારે આ કોર્ષને લાયકાતમાં ગણતા નથી તદ્ઉપરાંત M.Sc. પણ Medical Laboratory Technology હોઈ B.Sc. તથા M.Sc. ના વિષયમાં સંગતતા જળવાઈ રહે તેથી B.Sc. Medical Technology કોર્ષનું નામ બદલીને B.Sc. Medical Laboratory Technology કરવા વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

<u>વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૨૨</u>

:: આથી ઠરાવવામાં આવે છે કે, મેડીકલ ટેકનોલોજી વિષયની અભ્યાસસમિતિની તા.૦૯/૦૬/૨૦૨૧ની સભાનાં ભલામણ ક્રમાંકઃ૪ અન્વયે કરેલ ભલામણ સ્વીકારી તે મંજૂર કરવા એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

(એકેડેમિક વિભાગ)

(૩૧) B.Sc. Medical Technology થયેલ વિદ્યાર્થીની માર્કશીટમાં પેપર નંબરના બદલે પેપરનું નામ આવે તે અંગે મેડીકલ ટેકનોલોજી વિષયની અભ્યાસસમિતિની તા.૦૯/૦૬/૨૦૨૧ની સભાનાંઠરાવ ક્રમાંકઃ૩ અન્વયે નીચે મુજબ કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૨૧ અન્વયે મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે. જે ભલામણ પર વિચારણા કરવા બાબત.

<u>મેડીકલ ટેકનોલોજી વિષયની અભ્યાસસમિતિની તા.૦૯/૦૬/૨૦૨૧ની સભાનાં ભલામણ ક્રમાંકઃ૩</u>

:: આથી ઠરાવવામાં આવે છે કે, B.Sc. Medical Technology થયેલ વિદ્યાર્થી વિદેશમાં, બીજા રાજયો કે યુનિવર્સિટીમાં આગળ સ્ટડી માટે જાય છે તો તેઓની માર્કશીટમાં વિષયના નામો ના બદલે વિષયનાં નંબર આવે છે જેનાથી ખુબ અગવડતા અનુભવે છે જેથી માર્કશીટમાં વિષયોના નામો આવે એ માટે વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

<u>વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૨૧</u>

:: આથી ઠરાવવામાં આવે છે કે,મેડીકલ ટેકનોલોજી વિષયની અભ્યાસસમિતિની તા.૦૯/૦૬/૨૦૨૧ની સભાનાં ભલામણ ક્રમાંકઃ૩ અન્વયે કરેલ ભલામણ સ્વીકારી તે મંજૂર કરવા એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

(એકેડેમિક વિભાગ)

(૩૨) B.Sc.-Medical Technology અને M.Sc.-Medical Technology તેમજ PGDMLT માં પ્રેકટીકલ પરીક્ષાનાં Cost of Material અંગે ચર્ચા કરતા મેડીકલ ટેકનોલોજી વિષયની અભ્યાસસમિતિની તા.૦૯/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ૨ અન્વયે નીચે મુજબ કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૨૦ અન્વયે મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે. જે ભલામણ પર વિચારણા કરવા બાબત.

<u>મેડીકલ ટેકનોલોજી વિષયની અભ્યાસસમિતિની તા.૦૯/૦૬/૨૦૨૧ની સભાનાં ભલામણ ક્રમાંક : ૨</u>

:: આથી ઠરાવવામાં આવે છે કે, B. Sc-Medical Technology અને M. Sc-Medical Technology તેમજ PGDMLT માં પ્રેકટીકલ પરીક્ષામાં વિદ્યાર્થી દીઠ જે Cost of Material અપાય છે. એ ઘણુ ઓછું છે. જે રિવાઈઝડ કરવા વિનંતી.

Cost of Material to be claimed for Practical Examination-Medical Technology

F.Y. B. Sc	-	50/- Per Student
S.Y. B. Sc	-	100/- Per Student
T.Y. B. Sc	-	150/- Per Student
PGDMLT	-	100/- Student / Paper (100/Per Student for each four papers)
M. Sc	-	200/- Per Student

<u>વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૨૦</u>

:: આથી ઠરાવવામાં આવે છે કે, મેડીકલ ટેકનોલોજી વિષયની અભ્યાસસમિતિની તા.૦૯/૦૬/૨૦૨૧ની સભાનાં ભલામણ ક્રમાંકઃ૨ અન્વયે કરેલ ભલામણ સ્વીકારી તે મંજૂર કરવા એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

(એકેડેમિક વિભાગ)

(૩૩) બાયોસાયન્સ અભ્યાસસમિતિનાં ચેરમેનશ્રીની તા.૧૭/૦૬/૨૦૨૧નાં રોજ પત્રમાં જણાવ્યા મુજબ બી.એસસી. બાયોસાયન્સની ડીગ્રીના બદલે B.Sc. Bio-Science (Microbiology) ની ડીગ્રી આપવા અંગે વિચારણા કરતા વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૨૪ અન્વયે નીચે મુજબ એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે. જે ભલામણ પર વિચારણા કરવા બાબત.

<u>વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૨૪</u>

:: આથી ઠરાવવામાં આવે છે કે, બી.એસસી. બાયોસાયન્સની ડીગ્રી આપવામાં આવે છે તેની જગ્યાએ નીચેનાં મુદાઓ ધ્યાનમાં લઈ B.Sc. Bio-Science (Microbiology) ની ડીગ્રી આપવા એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

૧. ઓગસ્ટ–૨૦૧૯ની પ્રાણીશાસ્ત્ર વિષયની અલગRAC તથા અન્ય મુદાઓ માટેની પેટાસમિતિ દ્વારા ભલામણ કરવામાં આવેલ છે જ.

૨. UGC ના Specification of Degree ના માર્ચ–૨૦૧૪ માં પ્રકાશિત થયેલ ભારત સરકારના ગેઝેટ મુજબની સ્પષ્ટ જોગવાઈ કરવામાં આવેલ છે
Guiding Principles (Page No.2993)
General Instruction (Page No.2993) માં નં.૪ અને નં. ૫

૩. B.Sc.-Bio-Science ના નવા અભ્યાસક્રમના પેપરો અને કોર્ષ–કન્ટેન્ટને આધારે.

૪. UG/PG માં એકસરખી ડિગ્રી આપવા બાબત Higher Education Dept. ગુજરાત સરકારના સૂચનો/ભલામણો પ્રમાણે.

૫. BOS ની Bio-Science ની તા.૦૯/૦૬/૨૦૨૧ની મિટિંગની મિનિટનાં ઠરાવ નં.૫ (બ) પ્રમાણે.

(એકેડેમિક વિભાગ)

(૩૪) સંસ્કૃત વિષયમાં બી.એ.સેમ–૧ થી એમ.એ.સેમ–૪ માં અંગ્રેજી મિડીયમ દૂર કરવા બાબતે સંસ્કૃત વિષયની અભ્યાસસમિતિની તા.૧૪/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ૩ અન્વયે નીચે મુજબ કરેલ ભલામણ વિનયન વિદ્યાશાખાની મંજૂરીને અપેક્ષાએ વિનયન વિદ્યાશાખાવતી વિનયન વિદ્યાશાખાનાં અધ્યક્ષશ્રીએ મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે. જે ભલામણ પર વિચારણા કરવા બાબત.

<u>સંસ્કૃત વિષયની અભ્યાસસમિતિની તા.૧૪/૦૬/૨૦૨૧ની સભાનાં ભલામણ ક્રમાંકઃ૩</u>

:: આથી ઠરાવવામાં આવે છે કે, સંસ્કૃત વિષયમાં બી.એ.સેમ–૧ થી એમ.એ.સેમ–૪ ના સંસ્કૃત વિષયના દરેક પ્રશ્નપત્રમાં જયાં અંગ્રેજી મિડીયમમાં ઉત્તર આપનારા વિદ્યાર્થી ન હોય ત્યાં દરેક પ્રશ્નપત્રમાં અંગ્રેજી વર્ઝન દુર કરવા માટે સંસ્કૃત બોર્ડના સભ્યો ફેકલ્ટીને વિનંતી કરે છે.
એમ.એ. સેમ–૨ પેપર–૬ માં શૈક્ષણિક વર્ષ : ૨૦૨૧ પૂરતું ઉત્તરામચરિતનોઅભ્યાસ ચલાવવાનો બોર્ડમાં સર્વાનુમતે નકકી કરવામાં આવે છે.

(એકેડેમિક વિભાગ)

(૩૫) અર્થશાસ્ત્ર વિષયની અભ્યાસસમિતિનાં ચેરમેનશ્રીએ તા.૧૭/૦૬/૨૦૨૧નાં પત્રથી 'જ્ઞાન સંગમ' ન્યૂસિલેબસ ફોર ન્યૂ ઈન્ડિયા અંતર્ગત અર્થશાસ્ત્ર વિષયની અભ્યાસક્રમ શૈક્ષણિક વર્ષ ૨૦૨૧–૨૨ થી અમલમાં આવનાર અર્થશાસ્ત્ર વિષયનાં બી.એ.સેમે.૧ અને ૨ ના અભ્યાસક્રમ અંગે યુનિવર્સિટી કાર્યાલયનાં પરિપત્ર ક્રમાંક : એકે./પરિપત્ર/૫૭૯૩/૨૦૨૦, તા. ૧૫–૦૭–૨૦૨૦ થી પરિપત્રિત કરવામાં આવેલ જે અભ્યાસક્રમ હાલમાં કોવિડ–૧૯ કોરોના મહામારીના બીજા વેવમાં ઉપસ્થિત થયેલ પરિસ્થિતિ જોતાં વિદ્યાર્થીઓના હિતને કેન્દ્રમાં રાખી આ વર્ષ ૨૦૨૧–૨૨ માટે આ નવો અભ્યાસક્રમ મુલતવી રાખીને જૂનો અભ્યાસક્રમ યથાવત રાખવા બોર્ડનાં ચેરમેનશ્રીએ ભલામણ કરેલ જે ભલામણ વિનયન વિદ્યાશાખાની મંજૂરીને અપેક્ષાએ વિનયન વિદ્યાશાખાવતી વિનયન વિદ્યાશાખાનાં અધ્યક્ષશ્રીએ મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે જે ભલામણ પર વિચારણા કરવા બાબત.

(એકેડેમિક વિભાગ)

(૩૬) શૈક્ષણિક વર્ષ ૨૦૨૧–૨૨ થી અમલમાં આવનાર એસ.વાય.બી.એ.સેમ–૩ અને ૪ સંસ્કૃતના પ્રવર્તમાન અભ્યાસક્રમમાં સુધારા વધારા કરવા બાબતે સંસ્કૃત વિષયની અભ્યાસસમિતિની તા.૧૪/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ૨ અન્વયે નીચે મુજબ કરેલ ભલામણ વિનયન વિદ્યાશાખાની મંજૂરીને અપેક્ષાએ વિનયન વિદ્યાશાખાવતી વિનયન વિદ્યાશાખાનાં અધ્યક્ષશ્રીએ મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરેલ છે. જે ભલામણ પર વિચારણા કરવા બાબત.

<u>સંસ્કૃત વિષયની અભ્યાસસમિતિની તા.૧૪/૦૬/૨૦૨૧ની સભાનાં ભલામણ ક્રમાંકઃ૨</u>

:: આથી ઠરાવવામાં આવે છે કે, શૈક્ષણિક વર્ષ ૨૦૨૧–૨૨ થી અમલમાં આવનાર " જ્ઞાન સંગમ "ન્યુ સિલેબસ ફોર ન્યુ ઈન્ડિયા" અંતર્ગત સંસ્કૃત વિષયના એસ.વાય.બી.એ.સેમ–૩ અને ૪ નો અભ્યાસક્રમ તથા પ્રશ્નપત્રનું પ્રારૂપ સર્વાનુમતે મંજુર કરવામાં આવ્યું અને તે મંજુર કરવા વિનયન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

(બિડાણ : ૨૦)
(એકેડેમિક વિભાગ)

(૩૭) **(માનનીય કુલપતિશ્રીનાં પગલાંની નોંધની બાબત)**

યુનિવર્સિટી સંલગ્ન કોલેજોમાં શૈક્ષણિક કર્મચારીઓની ભરતી માટે પસંદગી સમિતિ પર માનનીય કુલપતિશ્રી દ્વારા વિષય નિષ્ણાંતોની નિયુકતી કરવામાં આવે છે. જે સંદર્ભે વિવિધ વિદ્યાશાખાઓના ડીનશ્રીઓ અને વિભાગીય વડાશ્રીઓ પાસેથી પ્રાપ્ત થયેલ તજજ્ઞોની યાદી માનનીય કુલપતિશ્રી દ્વારા ગ્રાહ્ય રાખી પસંદગી સમિતિ માટે વિષય નિષ્ણાંતોની યાદીમાં સમાવેશ કરવા અંગેના માનનીય કુલપતિશ્રીના પગલાંની નોંધ લેવા બાબત.

(બિડાણ : ૨૧)
(સિન્ડિકેટ વિભાગ)

(૩૮) અધ્યક્ષશ્રીની મંજૂરીથી જે બાબત રજૂ થાય તે.

ક્રમાંક : એ/એ.કા./કા.સૂ./ ૮૩૯૨/૨૦૨૧
તા. ૨૧/૦૬/૨૦૨૧

ઈ.ચા. કુલસચિવ

પ્રતિ,

એકેડેમિક કાઉન્સિલના સર્વે સભ્યશ્રીઓ....

A/P.G

12/08/2021

એકેડેમિક કાઉન્સિલ તા. ૨૫/૦૬/૨૦૨૧
બાબત : ૧૦ બિડાણ : ૫

૨૯૪૩૯-૭૦

ક્રમાંક: મેમસીજી/ઓફ લાઇન/શિક્ષણ/શરૂ કરવા/આઇ/૨૧
આરોગ્ય તબીબી સેવાઓ અને તબીબી શિક્ષણ
(તબીબી શિક્ષણ)ના કમિશનરશ્રીની કચેરી,
૪, ડી.જીવરાજ મહેતા ભવન,
ગાંધીનગર,
તા.૧૬/૦૬/૨૦૨૧

પ્રતિ,
ડીનશ્રી,
સરકારી મેડીકલ કોલેજો,
અમદાવાદ,વડોદરા,સુરત,રાજકોટ,જામનગર,ભાવનગર,
ડીનશ્રી, તમામ જી.એમ.ઇ.આર.એસ. અને સ્વ નિર્ભર મેડીકલ કોલેજો,
ડીનશ્રી, તમામ સરકારી/સ્વ-નિર્ભર ડેન્ટલ કોલેજો,
પ્રિન્સીપાલશ્રી, તમામ સરકારી/સ્વ-નિર્ભર ફીઝીયોથેરાપી કોલેજો,
પ્રિન્સીપાલશ્રી, સરકારી નર્સીંગ કોલેજ,
અમદાવાદ/વડોદરા/સુરત/જામનગર/રાજકોટ/ભાવનગર/પાટણ/સિધ્ધપુર

વિષયઃ- ઓફ લાઇન અભ્યાસક્રમ શરૂ કરવા બાબત...

ઉપરોકત વિષય અન્વયે જણાવવાનું કે, કોવિડ-૧૯ ની પરિસ્થિતિને ધ્યાને લઇ રાજયના તમામ અભ્યાસક્રમો ઓન લાઇન ચલાવવામાં આવે છે પરંતુ વિધાર્થીઓ હાલમાં પ્રેકટીકલ કાર્ય તથા કોવિડ ડયુટીમાં સંકળાયેલા છે ફકત ટીચીંગ કાર્ય જ ઓન લાઇન થાય છે.

મેડીકલ/ડેન્ટલ/ફીઝીયોથેરાપી/નર્સીંગ/ઓપ્ટોમેટ્રીના અભ્યાસકમોના મોટાભાગના વિધાર્થીઓ તથા સ્ટાફ વેકસીનેટ થઇ ગયેલ છે તથા જે વિધાર્થીઓને વેકસીન લેવાની બાકી હોય તે તમામને વેકસીનેટ કરવાની કાર્યવાહી કરવા જણાવવામાં આવે છે.

આમ ટીચીંગની ગુણવત્તા જળવાઇ રહે તે હેતુસર Covid Appropriate Behaviour (CAB) અને Infection Cantrol & Prevention ની તકેદારી સાથે મેડીકલ/ડેન્ટલ/ફીઝીયોથેરાપી/નર્સીંગ/ઓપ્ટોમેટ્રીના યુ.જી. તથા પી.જી. વિધાર્થીઓને ઓફ લાઇન શિક્ષણ તાત્કાલિક અસરથી શરૂ કરવા જણાવવામાં આવે છે.

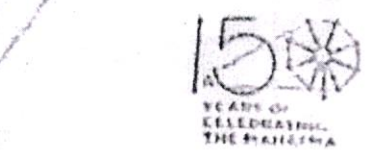
કમિશનર
આરોગ્ય, તબીબી સેવાઓ અને તબીબી શિક્ષણ
(તબીબી શિક્ષણ), ગાંધીનગર

નકલ રવાના : (૧) સી.ઠ.ઓ.શ્રી, જી.એમ.ઇ.આર.એસ. ગાંધીનગર
(૨) અધિક નિયામકશ્રી, ડેન્ટલ, સરકારી ડેન્ટલ કોલેજ, અમદાવાદ
(૩) અધિક નિયામકશ્રી, તબીબી સેવાઓ, બ્લોક નં.૫, જુના સચિવાલય, ગાંધીનગર
તા.૨ જરૂરી કાર્યવાહી સારૂ.

નકલ સાદર રવાના : માન.અગ્ર સચિવશ્રી, આરોગ્ય અને પરીવાર કલ્યાણ વિભાગ, નવા સચિવાલય, ગાંધીનગર

એકેડેમિક કાઉન્સિલ તા.૨૧/૬/-૨૦૨૧
બાબત.....૧૧.....વિદ્યાપરિષદ.....૬.....

ઈ-મેઈલ



નં.ધનવ-૧/૧૩૧૩૬-૨૧૬/૨૦૨૧/ગ
નિયામકશ્રી, આયુષની કચેરી, બ્લૉક નં.૧/૨ માળ,
ડૉ.જીવરાજ મહેતા ભવન, ગાંધીનગર
તા.૨૩/૦૬/૨૦૨૧

વિષય:- ઓફલાઈન અભ્યાસક્રમ શરૂ કરવા બાબત .

ઉપરોકત વિષય અન્વયે જણાવવાનું કે, કોવિડ-૧૯ ની પરિસ્થિતીને ધ્યાને લઈ રાજયના તમામ અભ્યાસક્રમો ઓનલાઈન ચલાવવામાં આવે છે. આયુર્વેદ/હોમિયોપેથીના અભ્યાસક્રમોના મોટાભાગના વિદ્યાર્થીઓ તથા સ્ટાફ વેકિસનેટ થઈ ગયેલ છે તથા જે વિદ્યાર્થીઓને વેકિસન લેવાની બાકી હોય તે તમામને વેકિસનેટ કરવાની કાર્યવાહી કરવા જણાવવામાં આવે છે.

વિદ્યાર્થીઓને પ્રેકટીકલ તથા ટીચીંગની ગુણવત્તા જળવાય રહે હેતુસર Covid Apropriate Bahaviour (CAB) અને Infection Cantrol & Prevention ની તકેદારી સાથે આયુર્વેદ/હોમિયોપેથી યુ.જી. તથા પી.જી. વિદ્યાર્થીઓને ઓફલાઈન શિક્ષણ તાત્કાલિક અસરથી શરૂ કરવા જણાવવામાં આવે છે.

નિયામક
આયુષ
ગુજરાત રાજય, ગાંધીનગર

પ્રતિ,
આચાર્યશ્રી,

- સરકારી/સ્વ-નિર્ભર/ગ્રાન્ટ-ઈન-એઈડ આયુર્વેદ કોલેજ (તમામ)
- સરકારી/સ્વ-નિર્ભર/ગ્રાન્ટ-ઈન-એઈડ હોમિયોપેથી કોલેજ (તમામ)

નકલ સાદર રવાના જાણ સારૂ:
માન.નાયબ સચિવશ્રી, (આયુષ) આ.પ.ક.વિભાગ, નવા સચિવાલય, ગાંધીનગર

S.N.K.H.M.C., Vyara
Inward No.: 6453
Date : 18/6/21
Sine :

એકેડેમિક કાઉન્સિલ તા. ૨૫/૦૬/૨૦૨૧
બાબત : ૧૨ બિડાણ : ૭

Anju Sharma, IAS
Principal Secretary
Education Department

सत्यमेव जयते

Education Department
Government of Gujarat
Block No. 5, 8th Floor,
Sardar Bhavan, New Sachivalaya,
Gandhinagar-382 010

Date : **June 02, 2021**

D.O. No. NEP/1221/EduPolicy(P.F)/KH

Dear Dr. Chavda

Multidisciplinary higher education is a key theme in the National Education Policy 2020 and need to be promoted at all levels. Students need to be encouraged to take electives in other discipline. Hence, in every University, It is required to implement a framework of credit transfer by identifying the colleges that can be constituted as a cluster within which multidisciplinary courses can be offered to students. The guidelines of UGC for CBCS as attached may be used in this regard to work out the number and credit completion of such courses. I would therefore request you to consider this in your academic council and inform the department of the steps taken in this regard.

Regards

(Anju Sharma)

AS Khers 17/06/2021

Dr. Kishorsinh N. Chavda,
Vice Chancellor,
Veer Narmad South Gujarat University, Surat.

Tel : 079-23251306, 23251308 Fax : 079-23254697 E-mail : secedu@gujarat.gov.in

એકેડેમિક કાઉન્સિલ તા.૨૫/૦૬/-૨૦૨૧
બાબત ૧૩ ..... વિસ્તરણપરિશિષ્ટ ૮

Re-Accredited by NAAC with 'A' Grade
VEER NARMAD SOUTH GUJARAT UNIVERSITY
University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.
વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.
Tel : +91 - 261 - 2227141 to 2227146, Toll Free : 1800 2333 011, Fax : +91 - 261 - 2227312
E-mail : info@vnsgu.ac.in, Website : www.vnsgu.ac.in

ક્રમાંક : પીજી / ફેલોશિપ /૭૫૬૭/ ૨૦૨૧ તા. ૫–૬–૨૦૨૧

પ્રતિ
ડૉ. કે. એન. ભટ્ટ
પ્રોફેસર અને વડાશ્રી, જનરલ મેડીશીન વિભાગ
ગવર્નમેન્ટ મેડીકલ કોલેજ, મજૂરાગેટ,
સુરત.

વિષય : ફિટલ મેડીસિન વિષયમાં પીએચ. ડી. સંશોધન અભ્યાસ શરૂ કરવા અંગે અભિપ્રાય આપવા બાબત.

મહાશય,

સવિનય જણાવવાનુંકે તબીબી અધિક્ષકશ્રી, નવી સિવીલ હોસ્પિટલ સુરતના તા. ૪–૬–૨૦૨૧ના પત્ર ક્રમાંક નસિહોસુ / કોવિડ–૧૯ / ૧૮૯૦૧ / ૨૦૨૧ ના પત્રથી હાલમાં Fellowship in Fetal Medicine અને Fellowship in Basic Fetal Medicine & Advanced Obstetric Ultrasonography કોર્ષ ચાલુ હોય ઓબ્સ એન્ડ ગાયનેકોલોજી વિભાગમાંથી જેમણે ડીગ્રી અથવા ડિપ્લોમાંની પદવી એનાયત થયેલ હોય તે વિધાર્થીઓને Fetal Medicine માં પીએચ. ડી. સંશોધન અભ્યાસની તક મળે તે હેતુથી શરૂ કરવાની દરખાસ્ત સંબધકર્તા વિભાગના વડાશ્રી અને બોર્ડ ઓફ સ્ટડીઝના ચેરમેનશ્રી દ્વારા મળેલ છે. જે અવલોકને લઈ સદરહુ દરખાસ્ત બાબતે માન. કુલપતિશ્રી ના આદેશાનુસાર આપશ્રીને વિધાશાખાના સિનિયર સભ્ય તરીકે અભિપ્રાય આપવાની જાણ કરવામાં આવે છે.

આભાર સહ,

Fetal medicine ની ph.D સંશોધન અભ્યાસ ઓબ્સ એન્ડ ગાયનેક અથવા રેડીયોલોજી અનુસ્નાક અભ્યાસ ક્રમનો Fetal medicine Fellowship અથવા fetal medicine certificate course ક્રમારનો પ્રાધાન્ય આપવા સાથે ph. D. સંશોધન અભ્યાસ શરૂ કરવા ભલામણ છે.

ભવદિય

ઈ. ચા. કુલસચિવ

Dr. K. N. Bhatt
Dt. 5/6/2021

સત્યમેવ જયતે
Government of Gujarat

તબીબી અધિક્ષકશ્રીની કચેરી
નવી સીવીલ હોસ્પિટલ
મજુરાગેટ સુરત

Website:www.nchsurat.org E-mail:ms.health.surat2@gmail.comફેક્સ નં.૦૨૬૧-૨૨૪૧૩૨૪, ટેલીફોન નં.૦૨૬૧૨૨૦૮૩૦૧/૩૩૭

નં.નસિહોસુ/કોવિડ-૧૯/ /૨૦૨૧ તા. ૪/૦૬/૨૦૨૧

18901

પ્રતિ,

રજીસ્ટ્રારશ્રી
વી.એન.એસ.જી.યુ.
સુરત

વિષય:- ફિટલ મેડીસિન વિષયમાં પી.એચ.ડી શરૂ કરવા બાબત..
સંદર્ભ:- પ્રા.અને વડાશ્રી રેડિયોલોજી વિભાગના પત્ર નં.એમસીએસ/રેડિયોલોજી/૩૩૬/૨૦૨૧ તા.૦૩/૦૬/૨૦૨૧

શ્રીમાન,

સવિનય ઉપરોકત વિષય અન્વયે જણાવવાનું કે, સંદર્ભમાં દર્શાવેલ પત્રથી Fellowship in Fetal Medicine અને Fellowship in Basic Fetal Medicine & Advanced Obstetric Ultrasonography નો કોર્ષ હાલમાં કાર્યરત હોય, રેડીયોલોજી અથવા ઓબ્સ અને ગાયનેકોલોજી વિભાગમાંથી જેમણે ડીગ્રી અથવા ડીપ્લોમા ની પદવી એનાયત થઈ હોય એવા વિધાર્થીઓને લાભ મળે એ હેતુસર પી.એચ.ડી શરૂ કરવા બાબતની અરજી આ સાથે સામેલ રાખી મોકલવામાં આવે છે જેથી આગળની ઘટીત કાર્યવાહી થવા આપશ્રીને વિનંતી.

આપનો વિશ્વાસુ

તબીબી અધિક્ષકશ્રી
નવી સિવિલ હોસ્પિટલ
સુરત

તા:03/06/2021

પ્રતિ,
રજીસ્ટ્રારશ્રી
વી.એન.એસ.જી.યુ,
સુરત

(યોગ્ય રાહ દ્વારા)

વિષય: ફીટલ મેડીસિન વિષયમાં પી.એચ.ડી શરુ કરવા બાબત

સાહેબશ્રી,

ઉપરોક્ત વિષય અન્વયે આપશ્રી સાહેબને જણાવવાનું કે Fellowship in Fetal Medicine અને Fellowship in Basic Fetal Medicine & Advanced Obstetric Ultrasonography નો કોર્ષ હાલમાં કાર્યરત છે. જેમાં આજ દીન સુધી 9 અને 1 વિધ્યાર્થીઓએ અનુકમે ઉપરોક્ત કોર્ષ પુર્ણ કરેલ છે અને હાલમાં 3 અને 1 વિધ્યાર્થીઓ અનુકમે ઉપરોક્ત કોર્ષમાં છે. આજ દીન સુધી ફીટલ મેડીસીન માં 11 રીસર્ચ પેપર પબ્લિકેશન થયેલ છે અને 7 કોંન્ફોરંસ માં પેપર રજુ થયેલ છે. આ જોતા આ વિષય માં રીસર્ચ ના ઘણા સ્કોપ છે જે જોતા ફીટલ મેડીસીનમાં જો પી.એચ.ડી શરુ કરવામાં આવે તો રેડીયોલોજી અથવા ઓબ્સ અને ગાયનેકોલોજી વિભાગમાંથી જેમણે ડીગ્રી અથવા ડીપ્લોમા ની પદવી એનાયત થઇ હોય એવા વિધ્યાર્થીઓ ને લાભ મળી શકે એ હેતુ થી વહેલી તકે પી.એચ.ડી શરુ કરવા આપશ્રી સાહેબ ને નમ્ર અરજ.

આભાર સહ,

પ્રાધ્યાપક અને વડા,
ઓબ્સ અને ગાયનેકોલોજી વિભાગ, સ.ત.મ,સુરત
(ચેરમેન, બોર્ડ ઓફ સ્ટડીસ, એમ.સી.એચ બોર્ડ)
VNSGU, Surat

પ્રાધ્યાપક અને વડા,
રેડીયોલોજી વિભાગ, સ.ત.મ,સુરત
(ચેરમેન, બોર્ડ ઓફ સ્ટડીસ, મેડીસીન બોર્ડ)
VNSGU, Surat

નં.એમસીએસ/રેડીયોલોજી/ 335 /2021
રેડીયોલોજી વિભાગ વિભાગ, સ.ત.મ,સુરત,
તા: તા:03/06/2021

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B. Sc. (MATHEMATICS) Semester: III, IV
Effective from June 2021

B. Sc.	Paper	Name of the Paper	Hours	Credit	Marks
Semester III	**MTH-301**	Mathematics-V	3	3	**70** (20 Internal + 50 External)
	MTH-302	Mathematics-VI	3	3	
	MTH-303	Mathematics-VII	3	3	
	EG-3001	Mathematical Methods	2	2	
	EG-3002	Group of Symmetries – I	2	2	
Semester IV	**MTH-401**	Mathematics-VIII	3	3	
	MTH-402	Mathematics-IX	3	3	
	MTH-403	Mathematics-X	3	3	
	EG-4001	Mathematical Modeling	2	2	
	EG-4002	Group of Symmetries – II	2	2	

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B. Sc. (MATHEMATICS)
SEMESTER - III
MTH-
(Mathematics-V)
Effective from June 2021
Marks:70 (20 internal + 50 external)
(3 Hours / Week – Credits: 3)

Unit I:
Limits and Continuity of a function of two variables, Partial Differentiation, Total Differential, Composite function, Homogeneous functions.

Unit II:
Euler's theorem for Homogeneous functions, Taylor's theorem for functions of two variables, Maclaurian's expansions in power series, Jacobian.

Unit III:
Maxima-Minima for functions of two variables: Necessary and sufficient conditions for extreme points.

Unit IV:
Vector point function, Differentiation of a Vector point function, Gradient, Divergence and Curl and their properties, Line Integral.

The course is covered by the following reference books:

1. Shantinarayan, P. K. Mittal : A course of Mathematical Analysis, S. Chand and Co., New Delhi.
2. Hari Kishan : Vector Algebra and Calculus, Atlantic Pub. & Distributors(P) Ltd., New Delhi.
3. T. M. Apostol : Mathematical Analysis, Narosa Publishing House, New Delhi.
4. S. C. Malik : Mathematical Analysis, Wiley-Eastern Ltd, New Delhi.
5. N. P. Bhamore & et el : Mathematics Paper III–IV, Popular Prakashan, Surat.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B. Sc. (MATHEMATICS)
SEMESTER - III
MTH-
(Mathematics-VI)*
Effective from June 2021
Marks:70 (20 internal + 50 external)
(3 Hours / Week - Credits: 3)

Unit I:
Error estimation: Errors and their computations, A general error formula.

Unit II:
Numerical Solutions of Algebraic and Transcendental Equations: Bisection Method, Method of False position, Iteration Method, Newton-Raphson's Method.

Unit III:
Forward Differences, Backward Differences, Central Differences, Symbolic relation and separation of symbols, Differences of Polynomials.

Unit IV:
Newton's Forward and Backward Formulae, Gauss' Interpolation formulae.

The course is covered by the following reference books :

1. S. S. Sastry : Introductory methods of Numerical Analysis, Prentice-Hall of India Pvt. Ltd.; 5th Edition.
2. M. K. Jain, Iyenger, Jain : Numerical Methods for Scientific and Engineering Computations, New Age International Ltd.
3. Goel, Mittal : Numerical Analysis, Pragati Prakashan, Meerut.
4. Kaiser A. Kunz : Numerical Analysis, Mc Graw Hill Book Co., London.
5. James I. Buchanan, Peter R. Turner : Numerical Methods and Analysis, Mc Graw Hill Book Co., London.
6. P. C. Biswal:NumericalAnalysis,Prentice-HallofIndia, 2008.
7. H. C. Saxena: Finite Differences and Numerical Analysis, S. Chandand Co., 2005.

* Use of Scientific non – programmable calculator is allowed.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B. Sc. (MATHEMATICS)
SEMESTER - III
MTH-
(Mathematics-VII)
Effective from June 2021
Marks:70 (20 internal + 50 external)
(3 Hours / Week - Credits: 3)

Unit I:
Linear Differential Equations with variable coefficients, Homogeneous Differential Equations, Legendre's Differential Equation.

Unit II:
Second order Differential Equations: Solution in terms of known Integral, Solution by method of removal of first order derivatives, Method of Changing Independent Variable.

Unit III:
Formation of Partial Differential Equation, Solution of Partial Differential Equations, Equations solvable by direct integral.

Unit IV:
Partial Differential Equations of first order, Nonlinear Partial Differential Equations of first order, Some special methods.

The course is covered by the following reference books :

1. D. A. Murray: An Introductory Course in Differential Equations, Orient Longmans, Bombay.
2. I. N. Sneddon: Elements of Partial Differential Equations, McGraw Hill Book Company.
3. B. S. Grewal: Higher Engineering Mathematics, Khanna Publishers, New Delhi.
4. Gorakh prasad : Differential Equations, Pothishala Pvt. Ltd., Allahabad.
5. M. D. Rai Singhania : Differential Equations, S. Chand & Co., New Delhi.
6. Nita H. Shah : Ordinary and Partial Differential Equations : Theory and Applications, PHI Learning Pvt. Ltd, New Delhi.
7. N. P. Bhamore & et el. : Mathematics Paper III–IV, Popular Prakashan, Surat.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B. Sc. (MATHEMATICS)
SEMESTER -III
Elective Generic
EG-3001
(Mathematical Methods)*
Effective from June 2021
Marks:70 (20 internal + 50 external)
(2 Hours / Week - Credits: 2)

Unit I:
Notations of finite difference calculus, Operators , , , , Relations between different operators and their prosperities, Relation between difference and differential operators, Method of constructing difference tables, Finding the missing terms.

Unit II:
Factorial notation, Expression of polynomials in factorial notation by using finite differences, Method of unknown coefficients.

Unit III:
Difference equations: Order and degree of a difference equation, Solution of difference equations, Homogeneous difference equations with constant coefficients.

The course is covered by the following reference books :

1. S.S. Sastry : Introductory methods of Numerical Analysis, Prentice-Hall of India Pvt. Ltd.; 4th Edition.
2. M. K. Jain, Iyenger, Jain: Numerical Methods for Scientific and Engineering Computations, New Age International Ltd.
3. Goel, Mittal : Numerical Analysis, Pragati Prakashan, Meerut.
4. Kaiser A. Kunz : Numerical Analysis, McGraw Hill Book Co., London.
5. James I. Buchanan, Peter R. Turner : Numerical Methods & Analysis, McGraw Hill Book Co., London.

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B. Sc. (MATHEMATICS)
SEMESTER – III
Elective Generic
EG-3002
(Group of Symmetries-I)
Effective from June 2021
Marks:70 (20 internal + 50 external)
(2 Hours / Week - Credits: 2)

Unit I:
Definition of a group and its elementary properties, Order of a group, Order of an element of a group, Group multiplication tables, Examples of groups including finite groups and infinite groups, Abelian groups, Cyclic groups.

Unit II:
Subgroup, Condition that a subset is a subgroup, Examples of subgroups, Basic concept of symmetry, Symmetry elements and symmetry operations in a space, Identity symmetry operation.

Unit III:
Symmetry planes and reflection symmetry, Inversion centre and inversion symmetry, Rotation axes and rotation symmetry, Improper axes and improper rotation symmetry, Product of symmetry operations.

The course is covered by the following reference books:

1. F. A. Cotton: Chemical application of group theory, Wiley Inter Science, Wiley Eastern Ltd., New Delhi.
2. G. Davidson: Intro. Group Theory for Chemists, Applied Science Publisher.
3. I. N. Herstein: Topics in Algebra, Wiley Eastern Ltd., New Delhi.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B. Sc. (MATHEMATICS)
SEMESTER -IV
MTH-
(Mathematics-VIII)
Effective from June 2021
Marks:70 (20 internal + 50 external)
(3 Hours / Week - Credits: 3)

Unit I:
Beta-Gamma functions: Relation between Beta and Gamma functions, Properties, Applications of Beta-Gamma function.

Unit II:
Double and Triple Integrals: Change of order of Double integrals, Area.

Unit III:
Laplace Transforms: Laplace Transform of elementary functions, Properties of Laplace Transform, Differentiation and Integration of Laplace Transform, Laplace Transform of derivatives and integrals.

Unit IV:
Inverse of Laplace Transform: Method of Partial fractions, Properties of inverse Laplace Transform.

The course is covered by the following reference books:

1. David V. Widder : Advanced Calculus, PHI Learning Pvt. Ltd, New Delhi
2. Kreysig: Advanced Engineering Mathematics, John Wiley, New York, 1999.
3. Shantinarayan, P. K. Mittal : A course of Mathematical Analysis, S. Chand and Co., New Delhi.
4. N. P. Bhamore & et al : Mathematics Paper III-IV, Popular Prakashan, Surat.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B. Sc. (MATHEMATICS)
SEMESTER -IV
MTH-
(Mathematics-IX)*
Effective from June 2021
Marks:70 (20 internal + 50 external)
(3 Hours / Week - Credits: 3)

Unit I:
Finite difference with unequal interval, Lagrange's Interpolation Formula, Divided Differences, Newton's General Interpolation Formula.

Unit II:
Numerical Differentiation: 1^{st} and 2^{nd} order derivatives based on Newton's forward and backward difference interpolation formulae.

Unit III:
Numerical Integration: General Integration formula, Trapezoidal Rule, Simpson's 1/3-Rule, Simpson's 3/8-Rule.

Unit IV:
Solution of Ordinary Differential Equations by Taylor's series method, Picard's approximation method, Euler's method.

The course is covered by the following reference books:

1. S. S. Sastry : Introductory methods of Numerical Analysis, Prentice-Hall of India Pvt. Ltd.; 4^{th} Edition.
2. M. K. Jain, Iyenger, Jain: Numerical Methods for Scientific and Engineering Computations, New Age International Ltd.
3. Goel, Mittal : Numerical Analysis, Pragati Prakashan, Meerut.
4. Kaiser A. Kunz : Numerical Analysis, McGraw Hill Book Co., London.
5. James I. Buchanan, Peter R. Turner: Numerical Methods and Analysis, McGraw Hill Book Co., London.

* Use of Scientific non – programmable calculator is permitted.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B. Sc. (MATHEMATICS)
SEMESTER -IV
MTH-403403
(Mathematics-X)
Effective from June 2021
Marks:70 (20 internal + 50 external)
(3 Hours / Week - Credits: 3)

Unit I:
Sets and elements, Operations on sets, Functions, Real-valued functions.

Unit II:
Countable & Uncountable sets, Greatest lower bound and least upper bound.

Unit III:
Sequences of real numbers, Sub-sequences, limit of a sequence, Convergent sequences, Divergent sequences.

Unit IV:
Divisors, Greatest common divisor, Least Common multiple, Prime numbers, Fundamental theorem of Arithmetic, Congruence relation, Equivalence classes.

The course is covered by the following reference books :

1. R. R. Goldberg : Methods of Real Analysis, Oxford & TBH Pub. Co.
2. I. N. Herstein : Topics in Algebra, Wiley Eastern Ltd., New Delhi, 2006.
3. I. H. Sheth : Abstract Algebra, Nirav Prakashan, Ahmedabad.
4. T. M. Apostol : Mathematical Analysis, Narosa Publishing House, New Delhi.
5. S. C. Malik : Mathematical Analysis, Wiley-Eastern Ltd, New Delhi.
6. Shantinarayan : Modern Algebra, S. Chand and Co., New Delhi.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B. Sc. (MATHEMATICS)
SEMESTER -IV
Elective Generic
EG-4001
(Mathematical Modeling)*
Effective from June 2021
Marks:70 (20 internal + 50 external)
(2 Hours / Week - Credits: 2)

Unit I:
Mathematical modelling through ordinary differential equation of first order, Linear growth models; Linear decay models, Models for growth of Science and scientists.

Unit II:
Non-linear growth and decay models, Model of Logistic law of population, Spread of technological innovation, Spread of infectious diseases.

Unit III:
Mathematical models of geometrical problems through ordinary differential equation of first order, Simple geometrical problems, Orthogonal trajectories.

The course is covered by the following reference books :

1. J. N. Kapoor: Mathematical Modelling, New Age International Publishers, New Delhi.
2. Kreysig: Advanced Engineering Mathematics, John Wiley, New York, 1999.
3. J. K. Sharma: OR Theory & Applications, Mac Milian India Ltd., 1998.
4. G. Hadley: Linear Programming, Narosa Publishing House, New Delhi,1995.
5. G. Paria : Linear Programming, Transportation, Assignment, Game, Books & Allied Pvt. Ltd. Calcutta.

* Use of Scientific non – programmable calculator is allowed.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B. Sc. (MATHEMATICS)
SEMESTER – IV
Elective Generic
EG-4002
(Group of Symmetries-II)
Effective from June 2021
Marks:70 (20 internal + 50 external)
(2 Hours / Week - Credits : 2)

Unit I:
Formation of groups of symmetries (in space) of the following Plane figures (regarded as rigid objects):
1. An isosceles triangle (cyclic group C_2 of order 2)
2. An equilateral triangle (the group S_3 of order 6)
3. A rectangle (the group V_4)
4. A square (the group D_4)

Unit II:
Formation of groups of symmetries of the following Chemical Molecules (Configuration of atoms).
1. H_2O (the group V_4)
2. H_2O_2
3. Trans- $N_2 - F_2$ (the group V_4)
4. NH_3, PCl_3, $CHCl_3$(the group S_3)

Unit III:
Concept of isomorphism of groups, Isomorphism of multiplicative group with the group C_2 of the symmetries of an isosceles triangle, Isomorphism of multiplicative group with the group $V_4$of the symmetries of a rectangle, Isomorphism of group V_4 of the symmetries of a rectangle with the group of symmetries of H_2O, Isomorphism of group S_3 of the symmetries of an equilateral triangle with the group of symmetries of NH_3, PCl_3, $CHCl_3$.

The course is covered by the following reference books:

1. F. A. Cotton: Chemical application of group theory, Wiley Inter Science Wiley Eastern Ltd., New Delhi.
2. G. Davidson: Intro. Group Theory for Chemists, Applied Science Publisher.
3. I. N. Herstein: Topics in Algebra, Wiley Eastern Ltd., New Delhi, 2006.

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VEER NARMAD SOUTH GUJARAT UNIVERSITY
Third Year B. Sc. Semester -V
Chemistry Paper – VI (Inorganic Chemistry)
Proposed syllabus from June 2021

50 Marks (External) **Total: 30 Hrs**
20 Marks (Internal) **Time: 2 Hrs. (Uni. Exam)**

UNIT – I

Topic –1: Quantum Mechanics: **5 Hrs**

Postulates of Quantum mechanics, particles in three dimensional box, Schrodinger's wave equation in polar coordinates, its separation in to R, θ and ϕ. Discussion of solution of Schrodinger's equation for the rigid rotator.

Topic –2: Boron Hydride: **5 Hrs**

Boron hydride and its classification, Wade's Rule, preparation, properties, structure and bonding in diborane, tetra borane (10), penta borane (9), penta borane (11), hexaborane (10) and dodeca borane (12) anion.

UNIT – II

Topic –1: Thermodynamic and Kinetic Aspects of metal complexes: **5 Hrs**

A brief out line of thermodynamic stability of metal complexes and factors affecting stability of metal complexes. Lability and inertness. Factors affecting lability of metal complexes. Labile and inert complexes on the basis of reaction rate, VBT and CFT.

Topic –2: Bonding in Transition Metal Complexes: **5 Hrs**

Jahn Teller Theorem , Distortation in octahedral complexes. Ligand Field Theory. Molecular energy level diagram and magnetic properties for $[CoF_6]^{3-}$, $[Co(NH_3)_6]^{3-}$, $[FeF_6]^{3-}$, $[Fe(CN)_6]^{3-}$, π- bonding in octahedral complexes.

UNIT – III

Topic –1: Metal Carbonyls: **5 Hrs**

Definition, classification, nature of bonding in metal carbonyls, structure and IR spectra in $Ni(CO)_4$;$Fe(CO)_5$, $Fe_2(CO)_9$,$Mn_2(CO)_{10}$, $Cr(CO)_6$, $Co_2(CO)_8$.

Topic –2: Corrosion and its Protection: **5 Hrs**

Definition and importance of corrosion, Types of corrosion: uniform, pitting, inter crystalline and stress cracking corrosion, electro-chemical theory of corrosion. Protection methods: Coating, Inhibitors (Organic, Inorganic, anodic, cathodic), anodic and cathodic protection.

Reference Books:

1) Introduction to quantum chemistry, by A. K. Chandra,Tata Mc.Graw Hill,Delhi.
2) Quantum mechanics in chemistry by M. H. Hanna
3) Theoretical Inorganic chemistry by Day & Selbin , Affiliated East West Publ. Pvt. Ltd.
4) Advanced Inorganic Chemistry by Cotton and Wilkinson, John Wiley.
   Uni. Chemistry by B. H. Mohan
5) Structural Inorganic chemistry by A. F. Wells.
6) Chemical Bonding - an introduction By Rawal, Patel & Patel.
7) Environmental Chemistry by Amritha anand and Sugumar.
8) Basic Inorganic Chemistry by Cotton and Wilkinson
9) A Text book of Inorganic Chemistry by P.L.Soni
10) Introduction to Inorganic Chemistry by Durrant and Durrant
11) Modern Co-ordination Chemistry by R. Lewis and R.G. Wilkinson.
12) Inorganic Chemistry- Principles of structure and reactivity by J.E. Huhhey and E.A. Keiter.
13) Application of Group Theory to Chemistry by P.K.Bhattacharya., Himalaya Publishing House, Mumbai.
14) Quantum Rasayan, University Granth Nirman Board (Gujarat).
15) Environmental Chemistry by A.K. De.
16) The corrosion and oxidation of metals by Evans U.R. (1961), Arnold, London.
17) Corrosion, Causes and Prevention, Speller. F.,Mc Grqw Hill,New york.
18) Dhatvik Ksharan, Part-I & II by M.N. Desai, Uni. Granth Nirman Board (Gujarat).
19) Corrosion and Corrosion Control, Uhlig H., Wiley.
20) Corrosion Engineering by Fontana M.G. and Green N.D., Mc Graw Hi.

VEER NARMAD SOUTH GUJARAT UNIVERSITY
Third Year B. Sc. Semester -V
Chemistry Paper – VII (Organic Chemistry)
Proposed syllabus from June 2021

50 Marks (External) **Total: 30 Hrs**
20 Marks (Internal) **Time: 2 Hrs. (Uni. Exam)**

UNIT – I

(A) Reaction Mechanism: **7 Hrs**

(a) Different types of mechanism for Esterification and Hydrolysis: B_{AC}^2, A_{AC}^2, A_{AC}^1, A_{AL}^1

(b) Mechanism of formation and hydrolysis of amides.

(c) Pyrolytic elimination : Cope and Chugaev reaction.

(d) Organic Name Reaction: Knoevenagel Reaction, Reformatsky Reaction, Claisen Condensation Reaction.

(B) Aromaticity: **3 Hrs**

Introduction to Aromaticity, Huckel's Rule, Aromatic Character of Arenes, Definition & Examples of Aromatic, Non-Aromatic, Anti-Aromatic Compounds (Benzenoids and Non-Benzenoids).

UNIT – II

(A) Alkaloids: **5 Hrs**

The occurrence, Classification, General methods to determine their structure, Analytical and Synthetic evidence to prove the structure of Nicotine and Papavarine.

(B) Vitamins and Hormons: **5 Hrs**

General Introduction, Classification, Structural determinations and Synthesis of Pyridoxine, Vitamin – C, Thyroxine and Adrenalene.

UNIT – III

(A) Synthetic Drugs: **5 Hrs**

Classification, based on pharmacological action, synthesis and uses of Amylnitrate, **Chloroquine**, Pyrimethamine, **Sulpha Pyrimidine**, Diazepam, Lidocaine, Chlorpropamide, Dapsone, Isoniazide, 5-Fluoro Uracil.

(B) Polypeptides: **5Hrs**

Definition & only Structures of Amino acid (in Tabular form) , Synthesis of peptide by Merry Field Method, End group analysis, N-terminal determination, Sanger's method, Edman method, C-terminal determination by generation of amino alcohol and using digestive enzymes. End group analysis, selective hydrolysis of peptides classical levels of protein structure, Protein denaturation.

Reference Books:

1) Mechanism and Structure in organic chemistry-Goulde. S.
2) Reaction mechanism in organic chemistry by Mukhargy & Singh
3) Principles of reaction mechanism in organic chemistry by Dharmaraha & Chawla
4) Organic reaction mechanism by Bansal Tata Mac. Hill
5) Organic Chemistry (Vol I & II) 6 th Edn, I. L. Finar.
6) Organic Chemistry by Hendrickson, Cram & Hammond
7) Organic Chemistry by Brown R. F.
8) Organic Chemistry by Solomon W. Graham
9) Principles of Organic Synthesis- R. O. C. Norman
10) Basic Principles of Organic chemistry, by R. Y. Caserio, W. A. Benjamin
11) May's Chemistry of synthetic Drugs by Dyson.
12) Chemistry of drugs , Ener and Caldwell
13) Synthetic drugs by Tyagi and Yadav.
14) Synthetic Organic Chemistry by O. P. Agarwal
15) Organic Chemistry by Morrison and Boyd.
16) Chemistry of organic Natural Product Vol. I & II by O. P. Agarwal.
17) Chemistry of synthetic drugs by Trivedi
18) Principles of Medicinal Chemistry Vol. I & II by S. S. Kadam, K. R. Mahadik, K. G. Bothara (Nirali Prakashan)
19) Medicinal Chemsitry By Asuthosh kar 4/e
20) Organic reactions & their mechanism by P. S. Kalsi, New age international publishers
21) **Organic Name Reactions by Gautam Brahmachari, Narosa Publishing House, New Delhi.**
22) **Organic Chemistry, 8th edition by Paula Yurkanis Bruice, University of California, Santa Barbara.**

VEER NARMAD SOUTH GUJARAT UNIVERSITY
Third Year B. Sc. Semester -V
Chemistry Paper – VIII (Physical Chemistry)
Proposed syllabus from June 2021

50 Marks (External) **Total: 30 Hrs**
20 Marks (Internal) **Time: 2 Hrs. (Uni. Exam)**

UNIT – I

A - OPEN SYSTEM THERMODYNAMICS 5 Hrs

Partial molal free energy, (chemical potential), Derivation of Gibb's Duhem Equation, chemical potential in case of a system of ideal gases. Concept of fugacity, Fugacity function, Fugacity at low pressures, Physical significance of fugacity, Graphical method for determination of fugacity, Lewis fugacity rule. Activity and activity coefficient (Only concept). Standard state, Standard state of Solid, Liquid and Gas, Numerical problems**.**

B - THE THIRD LAW OF THERMODYNAMICS 5 Hrs

The Nernst Heat Theorem (NHT), limitations of NHT, Statement of The third law of Thermodynamics, Consequence of third law of thermodynamics, Determination of absolute entropy of gases and liquids and solid, Applications of third law of thermodynamics, Concept of residual entropy, Exceptions to the third law of thermodynamics, Numerical problems.

UNIT-II

A - BASICS OF ELECTRODICS 4 Hrs

Concept of Oxidation and Reduction, Electrochemical series (Reduction series), definition of electrode, half-cell and cell, single electrode potential, sign of electrode potential, standard electrode potential (oxidation and reduction potential), Electrochemical process, Galvanic cell with example of Daniel cell, EMF of a cell and its measurements, Standard Weston cell, Different types of reversible electrodes, Determination of single electrode potential, Calculation of standard EMF of cell and Determination of cell reaction, Standard Hydrogen Electrode, Calomel electrode and Ag –AgCl electrode. Numerical problems.

B-CLASIFICATION OF ELECTROCHEMICAL CELL AND THERMODYNAMICS 6 Hrs

Chemical and concentration cell, electrode and electrolyte concentration cell, liquid junction potential (LJP), salt bridge in elimination of LJP, concentration cell with and without transference [with derivation of equation for emf of cell and LJP]

Free energy change and Electrical energy, Prediction of spontaneity of cell reaction, Relation of standard free energy change with equilibrium constant, Temperature coefficient of EMF of a cell, Entropy change and Enthalpy change of cell reaction. Numerical problems.

UNIT – III

NUCLEAR CHEMISTRY **10 Hrs**

Stable and unstable isotopes, separation of isotopes by different methods, gaseous diffusion, thermal diffusion, distillation, chemical exchange methods, Bainbridge velocity focusing mass spectrograph, Dempster's direction focusing mass spectrograph.

Particle accelerators : Linear accelerator, Cyclotron, Discovery of artificial disintegration, Classification of nuclear reaction based on overall energy transformations and - particles used as projectiles, Merits and demerits of different projectiles, Numerical problems

REFERENCE BOOKS:

1) Elements of physical chemistry by Glasstone and Lewis
2) Physical chemistry by G.M. Barrow
3) Physical chemistry by W. Moore
4) Physical chemistry by Atkins
5) Physical chemistry by G.K.Vemulapalli
6) Physical chemistry by B.K.Sharma
7) Physical chemistry by Gurdeep raj
8) Physical chemistry by Puri, Pathania, Sharma
9) Essential of Physical chemistry by Bahl and Bahl
10) Physical chemistry by Negi and Anand
11) Physical chemistry by K.L. KapoorVol 1-5.
12) Physical chemistry by Baliga,Dhavale and ZaveriVol 1-3.
13) Physical chemistry by Dr. S. Pahari
14) Nuclear chemistry by Arnikar
15) Electro chemistry by S. Glasstone
16) Electrochemistry by B.K.Sharma
17) Modern Electrochemistry by J'omBockris and Redd
18) Physical Chemistry by D.N. Bajpai.

VEER NARMAD SOUTH GUJARAT UNIVERSITY
Third Year B. Sc. Semester -V
Chemistry Paper – IX (Industrial Chemistry)
Proposed syllabus from June 2021

50 Marks (External) **Total: 30 Hrs**
20 Marks (Internal) **Time: 2 Hrs. (Uni. Exam)**

UNIT-I

(A) Manufacture with flowsheet & uses of **6 Hrs**

Acrylonitrile (Sohio Process), Bisphenol-A, Styrene, **Industrial manufacture and uses of Polyolifines: Poly ethylene (HDPE & LDPE) and Polypropylene**.

(B) Fluorocarbons **4 Hrs**

Nomenclature of chloro fluoro derivatives of Methane & Ethane, **General methods of preparation, Properties** and Uses of Fluoro carbons, Manufacture of Freon-12 from fluorspar, Manufacture of Freon-12 from Vinylidine fluoride. Pollution hazards of Fluoro carbons.

UNIT-II

Unit Processes in Organic Chemistry **10 Hrs**

(A)Nitration

Definition, Nitrating agent, Reaction mechanism of Nitration. Nitration of Acetylene, Benzene, **Toluene** and Naphthalene.
Artificial perfumes: Musk xylene, Musk ketone, Musk ambrette.
Explosives: Trinitrophenol, Trinitrotoluene, Trinitro glycerine, Emitol.

(B) Amination

Definition, Amination by reduction: Metal - Acid reduction **(strong and weak)**, Metal - Alkali reduction **(strong and weak)**, Catalytic reduction, Sulphide reduction.
Amination by ammonolysis : Amination of Chlorobenzene, Phenol & Benzene sulphonic acid.
Importance of amination in the manufacture of Bismark Brown G dye from m-phenylene diamine, Synthetic fibre (Nylon 6,6) from HMDA, Methyl Red Indicator from Anthranilic acid, Cyclonite explosive from Hexamethylene tetramine.

(C) Sulphonation - Definition, Sulphonating agents, Mechanism of sulphonation. Sulphonation of Benzene, Toluene and **Anthracene, Preparation of Phenol and Resorcinol from benzene**.
Importance of Sulphonation reaction in industry in the manufacture of Saccharine, Chloramine T and Alizarine Red S.

UNIT-III

Metallurgy of different metals (occurrence, extraction, properties and uses) 10 Hrs

(A) (1) Tungsten (2) Molybdenum (3) Chromium (4) Aluminium

(B) Some small scale preparation of

(1) Safety matches

(2) Naphthalene balls

(3) Wax candles

(4) Shoe polish

(5) Writing/ fountain pen ink

(6) Chalk crayons

(7) Plaster of paris.

Reference books:

1) Shreve Chemical Process Industries 5 ed. George. T. Austin . Mag. Hill. Book Agency
2) Reigel's Industrial Chemistry Ed. By James A. Kent.
3) Unit Process in Organic Synthesis by D. H. Groggins.
4) The Chemical Process Industries by R. Norris Shreve; McGraw-Hill Book Company,Ltd.
5) An Introduction to Industrial Chemistry by Peter Wiseman , Applied Science Pub. Ltd. London.
6) Industrial Chemistry by Clerk Ranken; Andesite Press.
7) Industrial Chemistry by B. K. Sharma Goel Pub.
8) Quantitative Analysis by R.A.Day & A L Underwood, 6th ed. Pub. Prentice Hall of India ltd.
9) Vogel's Text Book Inorganic Quantitative Analysis, 6 th ed.

VEER NARMAD SOUTH GUJARAT UNIVERSITY
Third Year B. Sc. Semester -V
Chemistry Paper – X (Analytical Chemistry)
Proposed syllabus from June 2021

50 Marks (External) **Total: 30 Hrs**
20 Marks (Internal) **Time: 2 Hrs. (Uni. Exam)**

UNIT-I

(A)INTRODUTION TO ANALYTICAL CHEMISTRY: 03Hrs

Chemical and Instrumental Analysis (advantages and disadvantages) Overview of methods used in Quantitative analysis (classification of classical and instrumental analysis), Factors affecting the choice of analytical methods (in brief), **Step in quantitative analysis (Flow diagram), Analytical methods on the basis of Sample size (in brief), Sampling methods. Sampling in different physical states**

(B)TREATMENT OF ANALYTICAL DATA

Significant figures and rules of computation. **07 Hrs**

Error Definition, Types of errors: Determinates errors, indeterminate errors, constant and proportional errors. Define and explain the following terms – Accuracy and Precision, mean, median, deviation, average deviation, standard deviation, variance, coefficient of variation, relative mean deviation, range, absolute errors, relative errors. Minimization of determinates errors, Normal error curve. Rejection of result from a set of results, 2.5 d rule, 4.0 d rule and Q-test. (Problems based on above topics)

UNIT-II

GRAVIMETRIC ANALYSIS : 10 Hrs

Factors affecting solubility of precipitates. (1) Common ion (2) Diverse ions (3) pH (4) Hydrolysis (5) Complex formation (With Numerical problems) The precipitation process,. Nucleation growth. Von Weimarn's theory of relative super saturation . Digestion of precipitates Factor affecting quality of precipitate: Co-precipitation and post precipitation Precipitation from homogeneous solution with illustration of Barium and Aluminum. Thermogravimetry, general principle,

General applications of TGA : Determination of purity and thermal stability of primary and secondary standards, determination of correct drying temperature, determination of curie point, automatic determination of mixtures, analysis of alloys, Specific application in analysis of (1) CaC_2O_4, H_2O (2) MgC_2O_4 , $2H_2O$ [No instrumentation].

UNIT-III **10 Hrs**

TITRIMETRIC ANALYSIS :

(A) ACID BASE TITRATION : **05 Hrs**

Different terms for titrant, titrand, analyte, end point and equivalence point. Theory of acid base indicators. Indicator range. Selection of proper indicators Calculation of pH at different stages of titrations of monobasic and dibasic acid with strong base Construction of titration curve, Titration of carbonate mixture and **amino acids.** Problems

(B) COMPLEXOMETRIC TITRATIONS:

05 Hrs

EDTA titration, Absolute and conditional stability constant, Distribution of various species of EDTA as function of pH. Absolute and conditional stability constants. Derivation of factors : α 4 for effect of pH, β4 for the effect of auxiliary complexing agent. Construction of Titration curves: Theory of metallochromic indicators, Masking, Demasking and kinetic masking. Types of EDTA titrations. Problems

Reference Books:

1) Quantitative Analysis by R. A. Day & A. L. Underwood, 6 th ed. Pub. Prentice Hall of India ltd.
2) Vogel's Text Book Inorganic Quantitative Analysis, 6 th ed.
3) Analytical Chemistry (Principles & Technique) by Lary G. Hargis.
4) Fundamental of Analytical Chemistry by Skoog D. A. & West D. M.
5) Holler F.J.Instrumental Methods of Analysis by B. K. Sharma
6) Instrumental analysis by R.D.Braun Mc Graw Hill.
7) Analytical Chemistry by Gary Christian Instrumental methods of chemical analysis Dr.H.Kaur. Pragati prakashan Meerut.
8) College Analytical Chemistry by Mangaonkar, Teckchandani, Sathe, Ghalsasi, Jain (Himalaya Publication House)

VEER NARMAD SOUTH GUJARAT UNIVERSITY
Third Year B. Sc. Semester -V
Chemistry Paper – XI (General Chemistry)
Proposed syllabus from June 2021

50 Marks (External) **Total: 30 Hrs**
20 Marks (Internal) **Time: 2 Hrs. (Uni. Exam)**

UNIT – I

IR SPECTROSCOPY 10 Hrs.

IR absorption spectroscopy: Terms, Instrumentation, Molecular vibrations, Hook's law, Selection rules, Intensity and position of IR bands. Measurement of IR spectrum, Finger print region, Characteristics absorption of various functional groups. Application of IR spectra. Factors influencing IR vibrational frequency.

UNIT- II

[A] LABORATORY HYGENE AND SAFETY 03 Hrs.

1. Handling of chemicals [Carcinogenic chemical, Toxic and poisonous chemicals], List of Hazardous chemicals.
2. General procedure for avoiding accidents [Apron, Safety goggles, Gloves pipetting process]
3. First aid technique [Organic substance in skin, Acid on clothing, Burns in eyes, Inhalation of toxic vapors etc…]
4. Colour codes and symbols for safety in chemical plants (i) classification of colour codes and symbols (ii) colour codes for gas cylinders and (iii) colour codes for pipelines.

[B] CHEMISTRY OF COSMETICS AND PERFUMES 07 Hrs.

A general study including preparation and uses of the following: Hair dye, hair spray, shampoo, suntan lotions, face powder, lipsticks, talcum powder, nail enamel, creams (cold, vanishing and shaving creams), antiperspirants and artificial flavours. Essential oils and their importance in cosmetic industries with reference to Eugenol, Geraniol, sandalwood oil, eucalyptus, rose oil, 2-phenyl ethyl alcohol, Jasmone, Civetone, Muscone.

UNIT- III **10 Hrs.**

UNITS OF SOLUTION AND STANDARD SOLUTION

Definitions of terms: Solute, Solvent, and Solution Composition of solution- normal solution, molar solution, molal solution, mole fraction, % solution, saturated, unsaturated and supersaturated solution and solubility. Effect of temp. on various units of concentration. Inter conversion of one unit into another unit. Preparation of solutions of some primary standard substances (e.g. Oxalic acid, succinic acid, KHP, $K_2Cr_2O_7$, As_2O_3)

Standardisation of the following solution using primary standard solutions/ standardised solution.

1. NaOH/KOH
2. I_2 solution
3. $KMnO_4$
4. Acids
5. $Na_2S_2O_3$ solution.

Reference books:

1) Elementary Organic Spectroscopy by Y.L.Sharma.
2) Organic Spectroscopy by K.K.Sharma.
3) Quantitative analysis by R.A. Day and A.L. Underwood.
4) Elements of Analytical Chemistry by R. Gopalan ; P. S. Subramanian and K. Rengarajan.
5) Vogel's qualitative inorganic analysis.
6) Vogel's qualitative organic analysis.
7) Industrial safety management, by L.M. Desmukh, Tata Mc Graw Hill, New Delhi, 2006. **(UNIT-II-[A]-4.)**
8) Industrial safety, Health & Environment management, Sunil S. Rao, R.K. Jain. Khanna Publishers, New Delhi, 2006. **(UNIT-II-[A]-4.)**
9) E. Stocchi: Industrial Chemistry, Vol -I, Ellis Horwood Ltd. UK. **(UNIT-II-[B])**
10) P.C. Jain, M. Jain: Engineering Chemistry, Dhanpat Rai & Sons, Delhi. **(UNIT-II-[B])**
11) Sharma, B.K. & Gaur, H. Industrial Chemistry, Goel Publishing House, Meerut (1996). **(UNIT-II-[B])**

VEER NARMAD SOUTH GUJARAT UNIVERSITY
Third Year B. Sc. Semester -V
General elective subject (Petrochemicals)
Proposed syllabus from June 2021

50 Marks (External) **Total: 30 Hrs**
20 Marks (Internal) **Time: 2 Hrs. (Uni. Exam)**

UNIT – I

Topic-1: Source of Petrochemicals: **4 Hrs**

(a) Natural gas: Composition, Natural gas as Petrochemical feed stock.

(a) Crude oil: Composition, Distillation and Refining, Utilization of various fractions (oil product)

Topic-2: Classification of Petrochemicals: **6 Hrs**

First, Second and Third generation petrochemicals.

Conversion process: Cracking reforming, Isomerisation, Hydrogenation, Alkylation and Hydrodealkylation, Dehydrocyclisation of petroleum products, Polymerization of gaseous hydrocarbons.

UNIT – II

Topic-1: **5 Hrs**

Petrochemicals obtained from **C1** cut of petroleum manufacture and application of Methanol, Synthesis gas, Ammonia, HCN, Formaldehyde, Hexamethylene tetramine, Chlorinated methanes, Perchloro ethylene.

Topic-2: **5 Hrs**

Synthesis and uses of H-acid, J-acid, Neville Winther's acid, DASDA, **Procion Red, Cellitone Scarlet-B, Indanthrene Khakhi GG, Blankophor B, Sulphamylon, Chloramphenicol**

UNIT – III

Topic-1: **7 Hrs**

Petrochemicals obtained from **C2** cut of petroleum [Ethylene and Acetylene]

Manufacture and industrial applications of chemicals obtained from Ethylene: Ethanol, Acetaldehyde (Wacker-Chemie process), Ethylene Oxide, Ethylene Glycol, Ethanolamines, Acrylonitrile, Styrene, Vinyl acetate. Manufacture and industrial applications of chemicals obtained from Acetylene, Acrylic acid, Acrylonitrile, Vinylchloride, Vinylacetate, Acetaldehyde, Chloroprene, Trichloethylene, Methyl vinyl ether.

Topic-2: **3 Hrs**

Industrial Fuels: Natural fuels, Synthetic fuels, Hydrogen- Fuel of tomorrow, Fuel for rocket (Hydrazine)

Reference Books:

1) Introduction to petrochemicals by Sukumar Maiti oxford and IBH pubs co. New Delhi.
2) A text on petrochemicals by Dr. B. K. Bhaskar Rao, Khanna pubs. New Delhi.
3) Chemicals from petroleum by A. L. Wadams (ELBS and John Murray London)
4) Petrochemicals by S. L. Venkatewarn (Colour pubs. Pvt. Ltd. Bombay)
5) Petrochemicals digest by MGK Manon (Asia Publishing house Bombay)
6) Hand book of industrial chemicals Vol-I by K. M. Shah (Multi tech publishing co. 15 Yogesh, Hingwala lane, Ghatkoper (E) Bombay-400077)
7) Industrial chemistry including chemical engineering by B. K. Sharma, Goel pubs house, Meerut.
8) Hand Book of Synthetic Dyes and Pigments (Vol. II) By K. M. Shah, Multi-tech Publishing Co.
9) Synthetic dyes by G. R. Chatwal, Himalaya Publishers.
10) Synthetic Drugs by G. R. Chatwal, Himalaya Publishers.

VEER NARMAD SOUTH GUJARAT UNIVERSITY
Third Year B. Sc. Semester -V
General elective subject (Dyes)
Proposed syllabus from June 2021

50 Marks (External) **Total: 30 Hrs**
20 Marks (Internal) **Time: 2 Hrs. (Uni. Exam)**

UNIT-I

Topic –1: Dyes intermediates: 4 Hrs

Name and structure of Benzene, naphthalene and anthraquinone intermediates useful in the dyestuff industry, synthesis of 4-amino-2-methoxy toluene, 2,3-diamino anthraquinone, Chromotropic acid, Bromamine acid.

Topic –2: Diazotisation and coupling: (Azo dyes) 6 Hrs

Definition and mechanism of diazotization, common method of diazotization, common and special coupling components, laws of coupling reaction with phenols and amines of benzene and naphthalene series, monoazo dyes, synthesis of Direct Black EW, Orange - II, Orange – IV, Orange – III, Eriochrome Black – A.

UNIT – II

Topic –1: Disperse Dyes: 5 Hrs

Definition, classification of disperse dyes with examples, application of disperse dyes, synthesis of Cellitone Scarlet B, Dispersol Blue, Golden Yellow VIII.

Topic –2: Dyes and pigments: 5 Hrs

Relation between colour and chemical constitution with reference to Witt's theory, definition of dyes & pigments, difference between dyes & pigments.

Classification of dyes based on,

(a) Chemical constitution with illustrative example.

(b) Methods of application to fibres, synthesis of Pigment Yellow G, Benzidine Orange, Pigments Orange VI.

UNIT – III

Vat dyes: 10 Hrs

(a) Definition and general account of vat dyes, Indigo obtained from natural source, Synthesis of Indigo by Heumann process and Sandmeyer process. Halogen derivatives of Indigo (Brilliant Indigo – 4B, Brilliant Indigo-4G, 5,5- dibromoindigo Vat Blue -35) Synthesis of thioindigo by anthranilic acid, halogen derivatives of Thioindigo, Indanthrene Red Violet RRN.

(b) Anthraquinone Vat dyes: Bohn's discovery of Anthraquinone Vat dyes, classification with reference to anthraquinone derivatives synthesis of Caledon Jade Green XBN, Indanthrene Yellow 5GK, Indanthrene Brilliant Scarlet –RK.

Reference books:

1) Synthetic organic chemistry by O.P. Agrawal
2) The chemistry of synthetic dyes and pigments by H. A. Lubes
3) Chemistry of synthetic dyes VOL I to VII by K. Venkatraman
4) An introduction to synthetic dyes by D. W. Ranghekar & P. P. Singh
5) A hand book of synthetic dyes and their application by C. T. Bhastana, V. H.Raichura & Others.
6) Chemistry of dyes & Principles of dyeing Vol II by V. A. Shehai
7) Chemistry of synthetic dyes by I. G. Vashi
8) Chemistry of dyes and pigments by K. M. Shah
9) Synthetic dyes by G. R. Chatwal
10) Synthetic dyes and pigments by E. N. Abrahart.
11) High tech Dyes by Smith.

VEER NARMAD SOUTH GUJARAT UNIVERSITY
Third Year B. Sc. Semester -V
General elective subject (Drugs)
Proposed syllabus from June 2021

50 Marks (External) **Total: 30 Hrs**
20 Marks (Internal) **Time: 2 Hrs. (Uni. Exam)**

UNIT-I

Topic – 1: Drugs: Classifications-Terminology 05 Hrs

Definition of the term drug. Drugs obtained from plants. Different class of the drugs. Explanation of the following terms: Agonist, Antagonist, Receptors, Pharmacophore, Pro-drug, Soft-drug, CNS depressants, CNS stimulants, Mode of action. Brief accounts of the following agents giving the name and structures of two important drugs in each case (1) Antifungal agents (2) Antiviral agents (3) Anti-cancer or Cytotoxic drugs (4) Non-Steroidal Anti-Inflammatory Drugs (NSAIDS).

Topic – 2: Micro-organism and Diseases 05 Hrs

Brief account of microbes: Bacteria, Fungi, Protozoa, Virus. Classification of the bacteria based on shape, Gram staining and Ziehl–Neelsen staining. Names of at least two diseases in case of each of the following types of infection and also the name of microbes responsible for the same: (1) Respiratory tract infections (2) Gastro intestinal tract infections (3) Urinary tract infections (4) Urethritis and sexually transmitted diseases (5) Skin and soft tissue infections (6) Cardio vascular system infections (7) Central nervous system infections. Name of important drug for each of the following diseases: (1) Typhoid (2) Dysentery (3) Pneumonia (4) Meningitis (5) Gastroenteritis (6) Actinomycosis.

UNIT-II

Topic – 1: Antibiotics 05 Hrs

Definition. History of discovery of penicillin. Structural variations in penicillin. Broad spectrum antibiotics and their therapeutic uses. Sources, Structural formula and Therapeutic uses of Streptomycin, Tetracycline, Doxycycline, Cycloserine, Chloramphenicol and Some recent antibiotics. Synthesis of Ampicillin.

Topic – 2: Sulfa drugs 05 Hrs

History of discovery and development of sulfa drugs. Structural variations among sulfonamides. Mode of action of Sulfonamides. Therapeutics uses and antimicrobials activity of sulfonamides. Synthesis and uses of Sulpfadimidine, Sulfaguanidine, Sulfisoxazole (Sulfafurazole), Sulfacetamide, Succinyl sulfathiazole, Sulfanilamide, Sulfadiazine, Sulfapyridine.

UNIT-III

Topic – 1: Coagulants and Anti coagulants 05 Hrs

Definition, Fibrin-Fibrinogen, thrombin prothrombin role of calcium in blood clotting. Classification and structural variations. Blood coagulants, Vitamin K group as blood coagulants. Synthesis and uses of Warfarin, Dicoumarol, Bromindone.

Topic – 2: Analgesics 05 Hrs

Definition, classification and structural variations. Synthesis and uses of Meperidine (Pethidine), Ibuprofen, Aspirin, Meclofenamate sodium, Oxyphenbutazone, Paracetamol, Novalgin.

Reference Books:

1) May's Chemistry of synthetic Drugs by Dyson.
2) Chemistry of drugs, Ener and Caldwell.
3) Synthetic drugs by Tyagi and Yadav.
4) Synthetic Drugs by G. R. Chatwal, Himalaya Publishers.
5) The Organic Chemistry of Drug Synthesis by Daniel Lednicer & L.A.Mitscher.
6) Drugs by V.K.Ahluwalia Pub. Ane Books Pvt. Ltd.
7) Medicinal Chemistry by Balkishan Razdan, Pub. CBS Publishers.
8) Pharmaceutical Organic Chemistry by S.K.Dewan, Pub. Narosa.
9) Medicinal Chemistry - a Molecular and Biochemical Approach, by Thomas Nogrady & Donald F Weaver.
10) Pharmaceutical Organic Chemistry by Shyam Singh Pub. Himalaya Publishers.
11) Medicinal Chemistry by G Patrick. Pub. Viva Books.
12) Burger's Medicinal Chemistry & Drug Discovery. Ed. by D. J. Abraham.

VEER NARMAD SOUTH GUJARAT UNIVERSITY
Third Year B. Sc. Semester -V
Chemistry Practical
Proposed syllabus from June 2021

120 Marks (External) **Total: 30 Hrs**
60 Marks (Internal) **Time: 7 Hrs. (Uni. Exam) Two days**

1. INORGANIC QUALITATIVE ANALYSIS

LIST OF INORGANIC CHEMICALS USED FOR INORGANIC QUALITATIVE ANALYSIS

CHLORIDES- Cu^{+2}, Cd^{+2}, Fe^{+3}, Mn^{+2}, Co^{+2}, Ni^{+2}, Ca^{+2}, Ba^{+2}, Sr^{+2}, Na^{+1}, K^{+1}, NH_4^{+1}.
BROMIDES- Sr^{+2}, Na^{+1}, K^{+1}, NH_4^{+1}
IODIDE – K^{+1}
NITRITE – Na^{+1}, K^{+1}
NITRATE – Co^{+2}, Ni^{+2}, Ba^{+2}, Sr^{+2}, Na^{+1}, K^{+1}, NH_4^{+1}
SULPHITE – Na^{+1}
SULPHIDE – Zn^{+2}, Sb^{+3}
SULPHATE – Cu^{+2}, Cd^{+2}, Al^{+3}, Fe^{+2}, Zn^{+2}, Mn^{+2}, Co^{+2}, Ni^{+2}, Mg^{+2}, Na^{+1}, K^{+1}, NH_4^{+1}
CARBONATE –Cu^{+2}, Cd^{+2}, Zn^{+2}, Mn^{+2}, Co^{+2}, Ni^{+2}, Ca^{+2}, Ba^{+2}, Sr^{+2}, Mg^{+2}, Na^{+1},K^{+1}, NH_4^{+1}
PHOSPHATE - Cu^{+2}, Al^{+3}, Fe^{+3}, Zn^{+2}, Mn^{+2}, Co^{+2}, Ni^{+2}, Ca^{+2}, Ba^{+2}, Sr^{+2}, Mg^{+2}, Na^{+1}, K^{+1}, NH_4^{+1}
BORATE- Boric Acid

Inorganic qualitative analysis of a mixture containing six radicals. The mixture may be soluble in water or dilute hydrochloric acid or concentrated hydrochloric acid including Chromate and Borate.
N. B. Candidate should perform the analysis of at least 08 mixtures.

2.ORGANIC ESTIMATIONS (Any Four)

1. Determination of amount of ketone (Acetone)
2. Determination of saponification value of an oil.
3. Determination of percentage purity of Aspirin
4. Determination of amount of Formaldehyde in given solution
5. Determination of amount of Ethyl acetate in the given solution
6. Determination of amount of Glycine in the given solution
   (Instead of sample weighing, solutions to be given)

3.CHROMATOGRAPHY

Chromatographic separation of amino acid mixture by ascending paper chromatography
1. Glycine + Methionine
2. Alanine + Methionine
3. Alanine + Valine

4. PHYSICAL EXERCISE

1. To investigate rate of reaction between $K_2S_2O_8$ and KI, $a = b$, $a \neq b$.
2. To investigate rate of reaction between H_2O_2 and KI, $a = b$.
3. Polarimetry: Determination of angle of rotation of given substance using three different dilutions and determination of concentration of unknown solution. Sugar, Glucose, Tartaric acid.
4. pH metry: To measure pH of different buffer solution and to study the buffer capacity.
5. pH metry: To determine the dissociation constant of weak acid (CH_3COOH) and weak base (NH_4OH) by different dilutions.
6. Conductometry: To determine the amount of $BaCl_2$ in the given solution using K_2CrO_4 solution.
7. Conductometry: To determine the amount of NaCl in the given solution using $AgNO_3$ solution.
8. Potentiometry: To determine the normality of given HCl solution using 0.5N NaOH.
9. Potentiometry: To determine the solubility and solubility product of sparingly soluble salt AgCl by the titration of $AgNO_3$ and NaCl.

   (Any SIX including one kinetic experiment should be performed.)

5. Viva Based on Above Practicals :

Day	Time	Group A	Group B
1st Day	10:00 A.M. to 1:30 P.M.	Inorganic Qualitative	Physical Exercise
	2.00 P.M. to 5.30 P.M.	Organic Estimation	Paper Chromatography & Viva-Voce
2nd Day	10.30 P.M to1.30 P.M.	Physical Exercise	Inorganic Qualitative
	2.00 P.M. to 5.30 P.M.	Paper Chromatography & Viva-Voce	Organic Estimation

No.	Exercise	Marks
1.	Inorganic Qualitative Analysis	35
2.	Organic Estimation	30
3.	Physical Exercise	35
4.	Paper Chromatography	10
5.	Viva-Voce	10
	Total Marks	120

Veer Narmad South Gujarat University, SURAT.

T. Y. B. Sc.
Health Science Semester - V
(Proposed New Syllabus)

Unit : I Introduction to Health.

- Concept of health, Definition, WHO definition.
- Dimension of health, Positive health.
- Determination of health, Responsibility for health.
- Health and development.

Unit : II Introduction to Diseases.

- Concept of disease, Germ theory, Causative factors.
- Changing pattern of disease, New immersing diseases..
- Types of infectious disease, Dynamics of disease transmission.
- Mode of transmission.

Unit : III Nutrition and health

- Nutritional requirement, Balance diet & RDA.
- Major & Minor food factor (Carbohydrates, Proteins, Fat, Vitamins & Minerals)
- Nutrition during Pregnancy & Lactation.
- Nutritional problems/Malnutrition, Low birth weight, Anemia, Protein malnutrition etc.

Unit : IV Health care & health education:

- Hygiene, sanitation, immunization.
- Communication Process.
- Types of communication.
- Aims and objectives of health education.

REFERENCE BOOKS

1. Park's Textbook of Preventive & Social Medicine by Park
2. Anatomy & Physiology for Nurses by Smith (ELBS)
3. Text book of Medical Biochemistry by Chatterjee (Jaypee)
4. Harper's illustrated Biochemistry 26th edition (MacGraw-Hill)
5. Food & Nutrition volume – I & II by Swaminathan (Bappco)
6. Anatomy, Physiology & Health education by Rahul Phate (Career)

Veer Narmad South Gujarat University, SURAT.

T. Y. B. Sc.
Health Science Semester - VI
(Proposed New Syllabus)

Unit : I Infectious disease.

(Causative agent, epidemiology, symptoms, treatment & prevention)

- Air borne infection – TB, Pneumonia, ARI, Chicken pox
- Food & Water borne infection – Cholera, Typhoid, Polio, Hepatitis
- Skin, STD & zoonosis – Gonorrhea, AIDS, Rabies
- Parasitic infection – Amoebiasis, Malaria, Ascariasis,Hook worm

Unit : II Non infectious disease.

(Definition, Classification or types, Risk factor or cause & prevention)

- Coronary heart disease.
- Diabetes.
- Hyper tension, obesity.
- Cancer.

Unit : III Environment and health:

- Water sources, pollution, purification.
- Water Quality and standards.
- Composition of air, Air pollution and control.
- Disposal of wastes - solid and liquid.

Unit : IV Occupational health:

- Occupational hazards.
- Occupational diseases due to physical agent.
- Occupational diseases due to chemical agent.
- Occupational diseases due to biological agent.

REFERENCE BOOKS

1. Park's Textbook of Preventive & Social Medicine by Park
2. Microbiology, sixth edition by Prescott, Harley & Klein (McGraw-Hill)
3. Microbiology by Pelzar, Chan & Kreig (Tata McGraw-Hill)
4. Anatomy & Physiology for Nurses by Smith (ELBS)
5. Review of Medical Microbiology by Jawetz & Melnick (Lange)
6. Anatomy, Physiology & Health education by Rahul Phate (Career)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

CBCS Semester system

T. Y. B. Sc. BIOSCIENCE

Semester V & VI (New)

Title Summary for B. Sc. Bioscience Syllabus
(Effective from June 2021)

Semester	Paper	Title
V	BS 501	MICROBIAL TAXONOMY & VIROLOGY
	BS 502	BACTERIAL GENETICS & BIOTECHNOLOGY
	BS 503	MICROBIAL METABOLISM
	BS 504	MEDICAL PHYSIOLOGY
	BS 505	CLINICAL BIOCHEMISTRY
	BS 506	HEMATOLOGY & BLOOD BANKING
	BS 500P	PRACTICALS – SEMESTER V
VI	BS 601	MEDICAL MICROBIOLOGY & IMMUNOLOGY
	BS 602	CLINICAL MICROBIOLOGY
	BS 603	FOOD & DAIRY MICROBIOLOGY
	BS 604	ENVIRONMENTAL MICROBIOLOGY
	BS 605	FERMENTATION TECHNOLOGY
	BS 606	FUNDAMENTALS OF BIOINFORMATICS
	BS 600P	PRACTICALS – SEMESTER VI

T. Y. B. Sc. Semester - V
BIOSCIENCE
501: Microbial Taxonomy & Virology

Unit - I Microbial Taxonomy

- Introduction to Microbial Taxonomy.
- Phenetic, Genotypic, Phylogenetic classification & Taxonomic ranks.
- Classical Characteristics and Molecular Characteristics.
- Microbial phylogeny - Phylogenic tree.
- Major division of life, higher level of classification.

Unit - II Bacterial Diversity

- Introduction to Bergey's Manual of Systematic Bacteriology.
- Organization of Bergey's Manual of Systematic Bacteriology.
- Introduction to Archea.
- Characteristics of the major archael physiological groups.
- Characteristics of the major groups of gram negative Photosynthetic bacteria.

Unit - III Classification and Cultivation of Viruses

- Nucleic Acid classification.
- DNA & RNA Viruses: General properties and important Groups.
- Cultivation and Enumeration of Viruses.
- Emerging viruses, Satellites, Viroids and Prions.
- Viruses and cancer, Human cancer viruses.

Unit - IV Viral Replication

- General characteristics of Replication.
- Properties and Replication of Bacteriophage.
- Replication of T-Even phage, Lysogeny.
- Replication of Animal viruses.
- Latent viral infections.

References:

1. Prescott, Harley, and Klein's Microbiology by Wiley, J., & Sherwood, L. 9th Ed., (McGraw-Hill Science/Engineering/Math)
2. Microbiology by Black, J. G., 9th edition (Wiley, John Wiley and Sons , Inc.)
3. Microbiology an Introduction by Tortora G.J., and Funke B.R., 12th Ed., (Benjamin Cummings)
4. Microbiology-Concepts and Application by Pelczar, Chan and Krieg, 5th Ed (McGraw-Hill).

T. Y. B. Sc. Semester - V
BIOSCIENCE
502: Bacterial Genetics & Biotechnology

Unit - I Gene expression

- Gene expression: Translation in prokaryotes.
- Translation in eukaryotes.
- Level of Regulation of gene expression.
- Transcription regulation, Lac operon.
- Regulation of translation.

Unit - II Gene transfer and recombination

- Recombination: Homologous recombination, Site specific recombination.
- Transposable genetic elements.
- Transformation: Natural & Artificial transformation, DNA uptake, electroporation
- Transduction: Generalized, Specialized and Abortive transduction.
- Conjugation: Mechanism of DNA transfers in Gram + ve and Gram – ve bacteria.

Unit - III Introduction to Biotechnology

- Introduction to recombinant technology.
- Enzymes in rDNA technology: Restriction enzymes, DNA ligase.
- Cloning vectors – Plasmid, Phage, Cosmids, BAC & YAC.
- General methods & Screening for chimeric molecule.
- Application of rDNA technology, Transgenic organism.

Unit - IV Advanced techniques.

- Gel electrophoresis.
- DNA finger printing.
- Blot technique.
- DNA hybridization.
- Polymerase chain reaction.

References:

1. Molecular biology & Biotechnology by Walker (Panimas)
2. Text book of Medical Biochemistry by Chatterjee (Jaypee)
3. Harper's Review of Physiological Chemistry (Lange med. Pub)
4. Molecular Biotechnology by Bernrd, Pasterak & Cheryl, 4th ed.(ASM press W. DC)
5. Microbiology, 9th edition by Prescott, Harley & Klein (McGraw-Hill)

T. Y. B. Sc. Semester - V
BIOSCIENCE
503: Microbial Metabolism

Unit - I Introduction to Metabolism

- Fueling process, Chemoorganotrophic fueling.
- Anaerobic respiration.
- Fermentation.
- Aerobic respiration.
- Amphibolic pathway.

Unit - II Carbohydrate Catabolism.

- EM pathway, HMP shunts.
- Entner-Doudoroff pathway.
- Mitochondrion shuttle system, TCA.
- ETC & oxidative phosphorylation.
- Monosaccharide, disaccharide conversion, Glycogen breakdown.

Unit - III Lipid and Protein Catabolism.

- Overview of lipid metabolism, Oxidation of fatty acid, B-oxidation.
- Deamination, Transamination, Decarboxylation.
- Ammonia transport & Urea cycle.
- Chemolithotrophic & chemolithotrophic fueling process.
- Nitrification.

Unit – IV Biosynthesis.

- Principle and precursor metabolites of Anabolism.
- Organization of anabolism, Reductive TCA cycle.
- Gluconeogenesis, Glycogenesis.
- Peptidoglycan synthesis.
- Amino acid biosynthesis, Glyoxylate cycle.

References:

1. Microbial Biochemistry Second Edition by G.N. Cohen (Springer)
2. Text book of Medical Biochemistry by Chatterjee (Jaypee)
3. Harper's illustrated Biochemistry 26th edition (MacGraw-Hill)
4. Biochemistry by Campbell & Farrell 7th ed.
5. Microbial physiology, Fourth edition by Albert g. Moat, John w. Foster, Michael p. Spector. (A john wiley & sons, inc., publication)

T. Y. B. Sc. Semester - V
BIOSCIENCE
504: Medical Physiology

Unit - I Microscopic organization some organs of alimentary tract.

- Esophagus and Stomach.
- Intestine: Small & large.
- Salivary gland, Pancreas.
- Liver.
- Chemical composition & physiological function of some digestive Juice: Saliva, Gastric juice, Pancreatic juice and Bile.

Unit - II Microscopic organization some organs and Gonads.

- Lung
- Heart.
- Kidney.
- Hypothalamus.
- Gonads: Testis & ovary.

Unit - III Introduction to endocrinology.

- Introduction to endocrine glands.
- Hormones – General characteristics.
- Mechanism & Regulation of hormone.
- Hypothalamic hormones.
- Gonadal hormone.

Unit - IV Endocrine glands.

- Pituitary gland.
- Thyroid & parathyroid gland.
- Thyroid abnormalities.
- Adrenal gland.
- Abnormalities of adrenal gland.

References:

1. A Text book of Histology by Bloom (W. Saunder)
2. Text book of Human Anatomy by Hamilton
3. Atlas of Histology by Victor (Williams& Wilkins)
4. Essential of Medical Physiology by K Sembulingam (Jaypee)
5. Illustrated Physiology by Mackena & Callander (Churchill Livingston)
6. Physiological basis of Medical Practice by Best & Tailor (B.I.Waverly)

T. Y. B. Sc. Semester - V
BIOSCIENCE
505: Clinical Biochemistry

Unit - I Liver & Cardiac function tests

- Classification of Liver function tests.
- Bile pigment metabolism & Jaundice.
- Other liver function test.
- Cardiac profile test
- Enzymes in liver & cardiac abnormalities.

Unit - II Kidney, Pancreatic & Thyroid function test

- Classification of Kidney function test
- Glomerular filtration & Clearance test.
- Other kidney function test.
- Pancreatic function test.
- Introduction to thyroid function test

Unit - III Urine & Semen Analysis

- Collection, preservation & types of urine specimen.
- Physical, chemical & microscopic examination of urine.
- Urinary calculi.
- Physiology & collection of seminal fluid.
- Physical, chemical & microscopic examination of semen.

Unit - IV CSF, Sputum & Stool examination.

- Physiology & collection of CSF.
- Physical, chemical & microscopic examination of CSF.
- General Aspect & collection of sputum.
- Routine examination of Sputum.
- Collection & Routine examination of Stool.

References:

1. Medical Laboratory Technology by Praful Godkar (Bhalani pub.)
2. Medical Laboratory Science by Kolhatkar (Tata McGraw-Hill)
3. Clinical Laboratory Methods by Ackermann (Mosby pub.)
4. District Laboratory Practice in Tropical Countries Part I & II by Monika Cheesbraugh (Cambridge)
5. Microbiology, sixth edition by Prescott, Harley & Klein (McGraw-Hill)
6. Textbook of Medical Biochemistry by Chatterjee, 7th ed. (Jaypee)

T. Y. B. Sc. Semester - V
BIOSCIENCE
506: Hematology & Blood Banking

Unit - I Haematopoiesis & Clinical hematology

- Hematopoietic system of the body.
- Erythropoiesis, Leucopoiesis, Thrombopoiesis.
- Blood collection & preservation.
- Hb estimation, DC, ESR, PCV & Blood indices, Routine coagulation tests.
- Introduction to automation in hematology

Unit - II Disorders

- Disorders of RBC: Anemia – Nutritional.
- Anemia –Infection.
- Inherited hemoglobinopathies (SCA, thalassaemia).
- Disorders of WBC: Leukemia, lymphomas & multiple myelomas.
- Coagulation & bleeding disorder.

Unit - III Introduction to blood banking

- Blood transfusion practice.
- Documentation & QC in blood transfusion practice.
- Blood/blood component for transfusion.
- Blood donors, Types of donor, blood donor records.
- General history & screening of the donor.

Unit - IV Testing of blood & Transfusion reaction.

- Blood collection, Preservation & storage of blood/blood component.
- Testing of blood, Blood grouping - ABO (cell, serum, tile method) & Rh typing.
- Compatibility testing (slide, tube & AHG) & serological investigation.
- Introduction to transfusion complication.
- Types, Investigation & Prevention of transfusion reaction.

References:

1. Clinical Hematology by Wintrobe (K. M. Varghese)
2. Practical Hematology by Davis
3. District Laboratory Practice in Tropical Countries Part – I & II by Monika Cheesbraugh (Cambridge)
4. Medical laboratory science by Kolhatkar (Tata McGraw-Hill)
5. Handbook of Blood Banking and Transfusion Medicine by Rao (Jaypee)
6. Hematology - Blood Transfusion Practice (WHO)

T. Y. B. Sc. Semester - V
BIOSCIENCE
500P: BIOSCIENCE PRACTICAL

Practical based on paper 501, 502, 503, 504, 505 & 506
(Time duration: 9 hours/week)

1. Study of Digestive system of Rat. (dissected animal or model)
2. Study of Urinogenital system of Rat. (dissected animal or model) – Male & female
3. Study of Nervous system of Rat. (dissected animal or model)
4. Study of permanent histological section of some organs, endocrine glands & tissues.
5. Physical, chemical & microscopic examination of Urine.
6. Physical, chemical & microscopic examination of Cerebrospinal fluid.
7. Physical, chemical & microscopic examination of Semen.
8. Estimation of serum billirubin.
9. Estimation of serum total protein & albumin.
10. Estimation of serum creatinine.
11. Estimation of serum uric acid.
12. Estimation of serum urea & urea nitrogen.
13. Estimation of serum glucose.
14. Estimation of some serum enzymes
15. Estimation of serum cholesterol.
16. Collection & preservation of blood.
17. Hb estimation by cyanmethaemoglobin method.
18. Determination of Heamatocrite (PCV) & Blood indices.
19. Erythrocyte sediment rate
20. Differential WBC counts.
21. Absolute eosinophil counts & Reticulocyte counts
22. Screening of sickle cell anemia (Dithionate turbidity test)
23. Blood grouping techniques - ABO, Rh, Serum grouping & Tile method
24. Cross-matching (slide, albumin, AHG reagent)

25. Coomb's test
26. Introduction to principle & operational technique of electrophoresis.
27. Preparation of buffer solution. (phosphate, tris-EDTA)
28. Electrophoresis of serum protein.
29. Electrophoresis of haemoglobin for SCA.
30. Estimation of protein by Folin-lowery method.
31. Estimation of reducing sugar by Nelsen-Somogi method.
32. Determination of antibiotic resistant mutant by gradient plate method.
33. Isolation of inducible mutant by UV rays.

References:

1. Practical Biochemistry by Plummer (Tata MacGraw-Hill)
2. Laboratory manual in Biochemistry by Jayaraman (Wiley)
3. Practical Biochemistry by Tikekar
4. Medical Laboratory Technology by Praful Godkar (Bhalani pub.)
5. Medical Laboratory Science by Kolhatkar (Tata McGraw-Hill)
6. Clinical Laboratory Methods by Ackermann (Mosby pub.)
7. Experimental Microbiology, Vol. I & II by Rakesh Patel (Aaditya)
8. Practical Haematology by Davis
9. District Laboratory Practice in Tropical Countries Part – I & II by Monika Cheesbraugh (Cambridge)
10. Atlas of Histology by Victor (Williams& Wilkins)
11. Illustrated Physiology by Mackena & Callander (Churchill Livingston)

T. Y. B. Sc. Semester - VI
BIOSCIENCE
601: Medical Microbiology & Immunology

Unit - I Bacterial diseases

- Air borne disease – Tuberculosis, Pneumonia.
- Food & water borne disease – Cholera, Enteric fever.
- STD - Syphilis, Gonorrhea.
- Soil born disease – Tetanus and Zoonosis – Leptospirosis.
- Nosocomial infection, UTI.

Unit - II Viral & Fungal diseases

- Polio & Rabies.
- Mumps & chicken pox.
- Hepatitis – Hepatitis A & B.
- AIDS and immerging viral infection.
- Candidiasis, Superficial dermatomycosis.

Unit - III Parasitic diseases

- Introduction to Parasitology.
- Protozoan diseases: Amoebiasis, Balantidiasis, Giardiasis & Malaria.
- Introduction to Helminthology, Tape worm infection – Taeniasis.
- Ascariasis & Hookworm infection.
- Filariasis, Threadworm infection & Pin worm infection.

Unit - IV Immunology

- Cytokines: Chemical messenger of immune system.
- Ag –Ab reaction, Opsonization, Neutralization, Compliment system & CFT.
- Agglutination (Direct & indirect), Precipitation, Gel precipitation.
- Introduction to allergic reaction: Ab & Cell mediated allergic reaction.
- Introduction to autoimmune diseases.

References:

1. Medical Microbiology by Dey & Dey (Allied agency)
2. Microbiology, 9th edition by Prescott, Harley & Klein (McGraw-Hill)
3. Text book of Medical Microbiology by Anantnarayan
4. Medical Parasitology by Chaterjee
5. An Introduction to Immunology by Rao
6. Immunology by Nandini Shetty 2nd ed. (New Age Pub)
7. Clinical aspect of Immunology by Gell & Coombs (Blackwell oxford)

T. Y. B. Sc. Semester - VI
BIOSCIENCE
602: Clinical Microbiology

Unit - I. Epidemiology

- Introduction to epidemiology.
- Epidemiological tools.
- Patterns of infectious diseases.
- Emerging and re-emerging infectious diseases and pathways
- Epidemics: Prevention and control.

Unit - II Clinical Microbiology

- Introduction to clinical microbiology
- Collection & aseptic handling of clinical specimen.
- Transport of clinical specimen.
- Microbiological examination of clinical sample.
- Identification of pathogen – rapid method for identification.

Unit - III Antimicrobial chemotherapy

- Chemotherapeutic agent, General characteristics.
- Types & mode of action of drugs.
- Microbial susceptibility testing.
- Antimicrobial sensitivity test - MIC, MBC.
- Diffusion & Tube dilution test.

Unit - IV Advanced techniques.

- Microscopy: Immunofluorescence.
- Automation in Microbiology.
- Polyclonal & Monoclonal antibody, Hybridoma.
- Immunoassay: ELISA & RIA,
- Immunochromatographic & Immunoblot technique.

References:

1. Text book of Medical Microbiology by Anantnarayan.
2. Microbiology, 9th edition by Prescott, Harley & Klein (McGraw-Hill)
3. Immunology by Nandini Shetty 2nd ed. (New Age Pub)
4. District Laboratory Practice in Tropical Countries Part I & II by Monika Cheesbraugh (Cambridge)
5. Medical Microbiology by Dey & Dey (Allied agency)
6. Review of Medical Microbiology by Jawetz & Melnick (Lange)

T. Y. B. Sc. Semester - VI
BIOSCIENCE
603: Food & Dairy Microbiology

Unit - I Introduction to food microbiology

- Food as a substrate for microorganisms
- Principles of food preservation, Asepsis
- Removal of microorganisms, Heat treatments, drying.
- Chemical preservatives.
- Preservation by radiation

Unit - II Food Spoilage

- Contamination and Spoilage of food
- Spoilage of Bread, Vegetables and fruits, Heated canned foods
- Food borne diseases
- Detection of food-borne pathogens
- Food intoxication

Unit - III Microbiology of Fermented Foods

- Chocolate fermentation.
- Production of alcoholic beverages.
- Production of breads.
- Other fermented foods.
- Mushroom Culture

Unit - IV Microbiology of Milk & Milk products.

- Introduction to milk, sources of contamination,
- Pasteurization - principle & types.
- Normal fermentation (curdling), Spoilage of milk.
- Microbiological analysis of milk. (SPC, DCT, MPN, and reduction test)
- Milk products – Cheese & fermented milk & probiotics.

REFERENCES:

1. Applied Microbiology by Vinita Kale (Himalaya)
2. Food Microbiology by Frazier (Tata McGraw-Hill)
3. Food Microbiology by Adams
4. Dairy Microbiology by Mahanta
5. Fundamental of Dairy Microbiology by Prajapati (Ekta prakasan)
6. Microbiology, sixth edition by Prescott, Harley & Klein (McGraw-Hill)

T. Y. B. Sc. Semester - VI
BIOSCIENCE
604: Environmental Microbiology

Unit – I Microbiology of water.

- Introduction, sources of water.
- Purification of water, water quality & standard.
- Collection of water sample, fecal indicator.
- Coliforms & Detection of coliforms – Multiple tube fermentation test, PA - test.
- Membrane filtration technique, defined substrate test.

Unit - II Microbiology of waste water.

- Introduction to sewage, characteristics of sewage.
- Water quality – TOC, COD & BOD.
- Municipal waste water treatment.
- Anaerobic sludge digestion, Disposal of solid waste.
- Wetland treatment, Septic tank home treatment system.

Unit - III Agricultural Microbiology

- Microorganisms in the rhizosphere and their significance, Mycorrhiza
- Soil fertility and phenomenon of mineralization & immobilization of elements. Role of nitrogen fixers, nitrifying, ammonifying, denitrifying, phosphate solubilizing and plant growth promoting bacteria
- Biofertilizers: Innoculants of Rhizobium Azobacter Phosphate Solubilizer
- Biopesticide and Bioinsecticides (Production and Formulation)
- Bioenergy: Liquid Fuel & Gaseous Fuels – Alcohols, Biogas and Hydrogen

Unit - IV Biodegradation & Bioremediation

- Introduction to biodegradation process & types.
- Biodegradation impacts on environment.
- Bioremediation: General Aspects.
- Bioremediation of Hydrocarbons, industrial Wastes & xenobiotics.
- Phytoremediation & types.

References:

1. Applied Microbiology by Vinita Kale (Himalaya)
2. Microbiology, by Prescott, Harley & Klein, 9th ed. (McGraw-Hill)
3. Fundamental Microbiology by Frobisher (W. B. Saunder)
4. Microbiology, fifth edition by Pelzar, Chan & Kreig (Tata McGraw-Hill)
5. Microbial Ecology by Atlas, R.M. and Bartha, R. 4th Ed

T. Y. B. Sc. Semester - VI
BIOSCIENCE
605: Fermentation Technology

Unit - I Introduction to fermentation technology

- Concept of fermentation and fermentation process.
- Screening & strain improvement of industrially important organisms.
- Characteristics of an industrially ideal organism.
- Screening techniques: Primary screening for metabolites.
- Introduction to secondary screening for new metabolites.

Unit - II Fermentation media

- Principles of media formulation.
- Media ingredients: Water, carbon sources, nitrogen sources, minerals, growth factors, buffers, precursors, inducers, inhibitors, antifoam agents.
- Sterilization of media, high-pressure steam continuous sterilization.
- Batch and continuous sterilization.
- Use of filtration: Principle, types of filters.

Unit - III Bioreactor

- Essential features of a bioreactor.
- Stirred tank Bioreactor: Body construction & basic functions.
- Devices for aeration and agitation, pH, temperature, foam & dissolved oxygen
- Bioreactor for specialized purposes: (Alternate methods of mass culture)
- Reactors design for batch fermenter and continuous fermenter.

Unit - IV Downstream Processing

- Introduction
- Cell harvesting, Cell disruption
- Product recovery, finishing step.
- Major industrial products – Antibiotics, Organic acids, Enzymes
- Major industrial products – Enzymes, vitamins & biopolymers.

References:

1. Industrial Microbiology: An Introduction by Waites & Morgam. (Blackwell Science)
2. Biotechnology: The Biological Principles by Trevan (Tata McGraw-Hill, New Delhi)
3. Industrial Microbiology by Patel, A.H., 2nd Ed. (Macmillan, India)
4. Principles of Fermentation Technology by Stanbury, 2nd Ed., (Elsevier Science Ltd.)
5. Biotechnology: A textbook of industrial microbiology Creuger, W., 2nd Ed.,(Panima)
6. Fermentation technology, by Srivastva M. L., 1st ed. (Narosa pub. House)

T. Y. B. Sc. Semester - VI
BIOSCIENCE
606: Fundamentals of Bioinformatics

Unit - 1 Microbial genomics

- Introduction to Genomics.
- Determining DNA Sequences.
- Whole Genome Shotgun Sequencing.
- Single Cell Genomic Sequence.
- Functional genomics and Comparative genomics.

Unit - 2 Proteomics:

- Introduction to Proteomics.
- Introduction to two dimensional gel electrophoresis technique.
- Structural & function proteomics.
- Introduction to Mass spectrometry.
- Amino acid sequencing.

Unit - 3 Databases in bioinformatics

- Introduction to bioinformatics, Present bioinformatics scenario.
- Applications and research in bioinformatics
- Characteristics of bioinformatics database, Types of data
- Sequence database , Nucleotide – EMBL, Protein –DDBJ
- Structural database – PDB, CATH, Other database –Enzyme database

Unit - 4 Bioalgorithms tools and Phylogenetic

- Introduction And Concepts of Alignment (except gap penalty)
- Introduction to scoring matrices
- Pairwise Alignment & Multiple Sequence Alignment
- Molecular evolution and molecular phylogenetics terminology
- Forms of tree representation, Phylogenetic tree evaluation

References:

1. Prescott, Harley and Klein's Microbiology by Willey J., Sherwood L.,9th ed.
2. Essential Bioinformatics by Xiong, J.,(Cambridge University press)
3. Bioinformatics: Principles and Applications by Ghosh & Mallick, Oxford University
4. Bioinformatics: Databases, Tools and Algorithms by Orpita Bosu and Thukral S. K.,
5. Principles of Gene Manipulation & Genomics by Primrose S. and Twyman R. 7th edition. (Black well Publishing, Malden).

T. Y. B. Sc. Semester - VI
BIOSCIENCE
600P: BIOSCIENCE PRACTICAL

Practical based on paper 601, 602, 603, 604, 605 & 606
(Time duration: 9 hours/week)

1. Widal slide agglutination test, Screening test for enteric fever
2. Identification of unknown culture by Widal test.
3. Rapid plasma reagin test
4. Rheumatoid arthritis test
5. Demonstration of gel precipitate.
6. Introduction to some advanced serological technique.
7. Demonstration of ELISA.
8. Introduction & demonstration of Immunochromatographic test.
9. Introduction & demonstration of immunodot test.
10. Standard plate counts of water &milk sample.
11. Detection & enumeration of coliform (MPN & DCT)
12. Study of fecal indicator bacteria by membrane tech.
13. PA Test, Defined substrate test.
14. Bacteriological examination of sewage.
15. Gradation of milk. (MBRT)
16. Isolation & identification of microorganism from curd
17. Diagnostic medical problem: Collection of clinical sample - Blood / Urine / Stool & Wound/Abscess/ Purulent exudates.
18. Pure culture study of Salmonella group
19. Pure culture study of UTI pathogen.
20. Pure culture study of Staphylococci.
21. Routine examination of stool & sputum.
22. Antibiotic sensitivity testing. Paper disc method & combi disc.
23. Determination of MIC of antibiotics
24. Study of permanent slide & specimens as per theory.
25. Primary screening of amylase producers
26. Primary screening of organic acid producers

27. Primary screening of antibiotic producers by crowded plate method
28. Fermentative production of amylase and its activity check
29. Demonstration of recovery of crude protein / amylase from fermentation broth
30. either by salting out (ammonium sulfate) or by using isopropyl alcohol
31. Bioassay of penicillin using Bacillus subtilis
32. Separation of nucleic acid by agarose gel electrophoresis

REFERENCES:

1. Experimental Microbiology, Vol. I & II by Rakesh Patel (Aaditya)
2. Microbiology of water & waste water by Gainy (Prentice-Hall)
3. Experimental Microbiology.....by K.R.Aneja
4. Practical hand book of microbiology by Goldman &green (CRC Press)
5. District Laboratory Practice in Tropical Countries Part - I & II by Monika Cheesbraugh (Cambridge)
6. International student edition: Microbiology- A laboratory Manual 4th edition. By
7. James G. Chappuccino & Natalie Sherman
8. Bacteriological Techniques By F.J. Baker
9. Introduction to Microbial Techniques By Gunasekaran

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B. Sc. Semester-V

Zoology Paper – Z - 501

(Non chordates Taxonomy, Animal type)

(Effective from June-2021)

Unit - 1: Taxonomy of non-chordates phyla to be studied up to order. (07 **Hours)**
Structural organization of different classes of non-chordates.
(Protozoa to Annelida)

Unit - 2: Study of the following animal types with reference to the **(08 Hours)**
Structure and functions of various organs of all systems:
Leech

Unit - 3: Amplification of non-chordate phyla **(08 Hours)**

- Protozoa: Nutrition, Economic Importance
- Porifera: Skeletal system, Reproduction
- Cnidaria: Coral and coral reefs, Mesentries
- Helminthes: Ascariasis
- Annelida: Asexual Reproduction in Polychaeta, Coelomoducts and nephridia

Unit - 4: Phyllogenetic relationships of the following minor phyla and
General organization: **(07 Hours)**

- Ctenophora
- Chaetognatha

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B. Sc. Semester-V

Zoology Practicals (Based on paper Z - 501)

(Effective from June-2021)

1 – <u>Classification of following animals upto order.</u>

Volvox, Ceratium, Entamoeba, Polystomella, Plasmodium, Opalina, Balantidium, Leucosolenia, Pheronema, Euspongia, Obelia, Millipora, Physalia, Valella, Rhizostoma, Tubipora, Alcyonium, Cerianthus, Pennatula, Virgularia, Adamsia, Zoanthus, Favia, Fungia, Astrea, Opisthorchis, Trichinella, Sabella, Serpula, Arenicola, Polynoe, Acanthobdella, Sagitta and Pleurobranchia

2 – Study of some aquatic invertebrates like Euglena**,** Paramoecium, Vorticella, Hydra, Daphnia and Cyclops from the culture.

3 – <u>Study of permanent slides :</u>

- Sponge spicules and gemmules
- Life cycle of Ascaris

4- The following practicals of **Leech** to be studied/taught **<u>only</u>** with the help of charts, models, videos, photographs, permanent slides, working models, simulators etc.

- **Systems**: Digestive system, Nervous system and Reproductive system
- **Mountings**: Jaws, Salivary glands, Ovaries and Testicular nephridia

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B. Sc. Semester-VI

Zoology Paper – Z - 601

(Non chordates Taxonomy, Animal type)

(Effective from June-2021)

Unit - 1: Taxonomy of non-chordates phyla to be studied up to order. **(07 Hours)**
Structural organization of different classes of non-chordates.
(Arthropoda, Mollusca, Echinodermata, Hemichordata)

Unit - 2: Study of the following animal types with reference to the **(08 Hours)**
structure and functions of various organs of all systems : **Sepia**

Unit - 3: Amplification of non-chordate phyla. **(08 Hours)**

- Arthropoda: Respiration, Excretion, Crustacean larvae
- Mollusca: Torsion and detorsion in Gastropods, Economic Importance
- Echinodermata: Autotomy and regeneration, larval forms and evolutionary significance
- Hemichordata: Reproduction

Unit - 4: Phyllogenetic relationships of the following minor phyla and General organization:

- Endoprocta **(07 hours)**
- Ectoprocta

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B. Sc. Semester-VI

Zoology Practicals (Based on paper Z - 601)

(Effective from June-2021)

1 - <u>Classification of following animals upto order.</u>

Apus, Daphnia, Cyclops, Cypris, Squilla, Hippa, Sacculina, Mantis, Dragon fly, Ear-wig, Mosquito, Ant, Bettle, Tick, Mite, Heliotis, Patella, Nautilus, Oyster, Mytilus, Doris, Cyprea, Teredo, Solen, Octopus, Loligo, Astropecten, Strongylocentrotus, Synapta, Sand-dollar, Holothuria, Pedicellina and Bugula avicularia

2- The following practicals of **Sepia** to be studied/taught **<u>only</u>** with the help of charts, models, videos, photographs, permanent slides, working models, simulators etc.

- **Systems**: Digestive system, Nervous system
- **Mountings**: Jaws, Radula, Chromatophores and Spermatophores

3 - <u>Study of permanent slides :</u>

Crustacean larvae, Echinoderm larvae and Hemichordata larva

Reference books: Z-501 and Z-601

(1) Invertebrate Zoology- E. L. Jordan and P.S.Verma.

(2) A Text book of Invertebrate Zoology - S. N. Prasad.

(3) A Text book of Invertebrate Zoology - R. L. Kotpal.

(4) Invertebrates Zoology - R. W. Hegner.

(5) A manual of Zoology vol. I - E. Ayyer.

(6) The Invertebrates (only) - Bora dale & Potts.

(7) Invertebrate Zoology - Arumugum.

(8) A Text book of Zoology - Arumugum & Narayanan.

(9) A Text book of Zoology Vol. I - Parker & Haswell.

(10) Invertebrate Structure & Function - E. J. W. Barrington.

(11) A Textbook of Practical Zoology Invertebrate -S.S.Lal

(12) A Textbook of Practical Zoology- Ghosh & Manna.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B. Sc. Semester-V

Zoology Paper – Z - 502

(Chordates Taxonomy, Animal type and Comparative Anatomy)

(Effective from JUNE-2021)

Unit – 1: Taxonomy of chordate to be studied up to order, including Protochordata, Cyclostomata, Pisces and Amphibia. **(07 Hours)**

Unit – 2: Study of the following animal types with reference to the Structure and functions of various organs of all systems: **Scoliodon** **(08 Hours)**

Unit – 3: Amplifications **(08 Hours)**

- Geological time scale
- Origin of chordates
- Pisces: Dipnoi, Types of scales and Parental care in fishes
- Amphibia: Origin and evolution, Neoteny and Apoda (Gymnophiona)

Unit – 4: Comparative Anatomy **(07 Hours)**

- Aortic arches
- Vertebral column
- Skull

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B. Sc. Semester-V

Zoology Practicals (Based on Paper- Z - 502)

(Effective from June-2021)

1. Classification of following animals up to order.

Amphioxus, Ascidian, Doliolum, Lamprey, Myxine, Tiger shark, Raja (Skates), Anabas, Harpodon, Clarius, Syngnathus, Ichthyophis, Necturus, Ambystoma, Alytes and Pipa

2. The following practicals of **Scoliodon** to be taught/studied **only** with the help of Charts/models/videos/photographs/permanent slides, working models, simulators etc.

- **Systems**: Digestive system, Urinogenital system, Arterial system, Venous system and Brain
- **Mounting**: Eye muscles, Membranous labyrinth and Ampulla of Lorenzini

3. Parental care in fishes

4. Types of scales

5. Comparative study of Vertebral column and Skulls (Scoliodon, Frog, Varanus, Pigeon and Rabbit)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B. Sc. Semester-VI

Zoology Paper – Z - 602

(Chordates Taxonomy, Animal type and Histology)

(Effective from June-2021)

Unit – 1: Taxonomy of chordate to be studied up to order, including Reptilia, Aves and Mammalia **(07 Hours)**

Unit – 2: Study of the following animal types with reference to the Structure and functions of various organs of all systems: **Pigeon** **(08 Hours)**

Unit – 3: Amplifications **(08 Hours)**

- Reptilia: Mesozoic reptiles, Rhyncocephalia and its phylogenetic importance, Temporal fossae and Arcades, Carapace and Plastron
- Aves: Bird migration, Flight adaptations in birds, Ratitae
- Mammals: Dentition, Prototheria, Metatheria, Cetacea and Primates

UNIT – 4: Mammalian Histology: **(07 Hours)**

- Pituitary
- Thyroid
- Parathyroid
- Adrenal
- Thymus

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B. Sc. Semester-VI

Zoology Practicals (Based on Paper- Z - 602)

(Effective from June-2021)

1. Classification of following animals up to order:

Trionyx, Sphenodon, Varanus, Dhaman, Russel's viper, Sea snake, Great Indian Bustard, Horned owl, Kiwi, Flamingo, Ornithorhynchus, Koala, Erinaceas, Seal, Leopard and Rhesus monkey

2. The following practicals of **Pigeon** to be taught/studied **only** with the help of Charts/models/videos/photographs/permanent slides, working models, simulators etc.

- **Systems**: Digestive system, Urinogenital system, Circulatory system and Brain
- **Mountings**: Pecten and Hyoid apparatus

3. Study of Mesozoic reptiles (by Models/charts/photographs etc.) like Brontosaurus, Stegosaurus, Ichthyosaurus, Dimetrodon, Allosaurus and Rhamphorhynchus

4. Types of feathers

5. Dentition in Dog, Cat, Horse, Rabbit, Rat and Man

6. Mammalian histology: Pituitary, Thyroid, Thymus, Parathyroid, Adrenal

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Reference books: Z-502 and Z-602

(1) Young, J. Z. (2004). *The Life of Vertebrates*. III Edition. Oxford university press.

(2) Pough H. *Vertebrate life*, VIII Edition, Pearson International.

(3) Hall B.K. and Hallgrimsson B. (2008). *Strickberger's Evolution*. IV Edition. Jones and Bartlett Publishers Inc.

(4) Outline of comparative anatomy of vertebrate Kingsley J.S.Central book depot.Allahabad

(5) Kardong, K.V. (2005) *Vertebrates' Comparative Anatomy, Function and Evolution*. IV Edition. McGraw-Hill Higher Education.

(6) Kent, G.C. and Carr R.K. (2000). *Comparative Anatomy of the Vertebrates*. IX Edition. The McGraw-Hill Companies.

(7) Hilderbrand, M and Gaslow G.E. *Analysis of Vertebrate Structure*, John Wiley and Sons.

(8) Walter, H.E. and Sayles, L.P; *Biology of Vertebrates*, Khosla Publishing House.

(9) JUNQEIRA'S Basic Histology Text & Atlas by Anthony L. Mescher

(10) Histology: Arthiur W. Ham, M. B.

(11) Vertebrate Zoology: An Experimental Field Approach-Nelson G.Hairston. Cambridge University Press, 1994

(12) Chordate Zoology E.L Jordan & P. S. Verma. S.Chand

(13) Vertebrate Zoology: An Experimental Field Approach-Nelson G.Hairston. Cambridge University Press, 1994

(14) Text Book of Zoology - Dalela and Verma. JayPrash Nath & co. Meerut

(15) Text Book of Zoology - S.N. Prasad. Vikas Publishing House pvt.ltd. Delhi

(16) Chordate Zoology - Agrawal and Dalela. JayPrash Nath & co. Meerut

(17) Text book of Zoology - R. D. Vidyarthi. S.Chand

(18) Jiv Vignan-2 (Gujarati) - Nirav Prakashan.

(19) A Text Book of General Biology - Tomer & Singh. Rastogi Publication,Meerut

(20) Text Book of Chordates - A. Thangamani, S. Prasanna Kumar

(21) Prushthvanshi Praniyo ane Garbhvidya - A.B.Vyas. Guj.Granth nirman Board.

(22) Utkrushtha Aprushthvanshi Praniyo - U.M.Rawal. Guj.Granth nirman Board.

(23) Chordate Zoology - Majupuria.

(24) A Manual of Zoology Vol. I & II - Ekambernath Ayar. S. Vishwanathan Chennai.

(25) Histology by Majumadar
(26) Histology by Shivaji Deshmukh
(27) Text book of Human histology with colour atlas and practical guide by Inderbir Singh.
(28) Prani Autikee . Gujarat granth nirman board
(29) Practical zoology Vertebrate By S. S. Lal., Rastogi publications Meerut.
(30) A manual zoology Practical zoology Chordates By Dr. P. S. Verma., S. Chand publications
(31) Practical Vertebrate zoology By Agrawal & Jindal., Pragati Prakashan
(32) Manual of prac. zoology vol.- I,II,III - P.K.G.Nair, Himalaya Publishing House.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T. Y. B. Sc. Semester-V

Zoology Paper – Z - 503

(Enzymology and Biochemistry)

(Effective from June-2021)

Unit - 1: Enzymology (08 Hours)

- Definition and chemical nature
- Properties
- Holoenzyme
- Nomenclature and classification
- Enzyme activation: Activation energy
- Mechanism of enzyme action
- Factors affecting on enzyme action
- Enzyme inhibition
- Enzyme kinetics
- Derivation of Michaelis-Menten equation
- Lineweaver-Burk plot
- Enzyme regulation

Unit - 2: Biophysical Chemistry (07 Hours)

- pH
- Buffer
- Reaction kinetics
- Thermodynamics
- Solution and Colligative properties

Unit - 3: Nucleic acid and Vitamins (07 Hours)

- **Nucleic acid :** Composition, types, Structure and function of DNA, Composition, types, Structure and function of RNA
- **Vitamins** : Composition, Structure and Formation

Unit - 4: Metabolism: (08 Hours)

(With structures)

- Glycolysis
- TCA and oxidative phosphorylation (ETS or Biological oxidation)
- Gluconeogenesis
- Glycogenesis
- Glycogenolysis
- Deamination
- Transamination
- Ornithine cycle
- β-oxidation and synthesis of long chain fatty acids
- Glycerol metabolism

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B. Sc. Semester-V

Zoology Practicals (Based on Paper- Z - 503)

(Enzymology and Biochemistry)

(Effective from June-2021)

(1) Activation of salivary amylase under optimum condition
(2) Factors affecting enzymes activity (temperature and pH)
(3) To study the digestive enzymes from Human Saliva
(4) Preparation of pH, buffer or different solution as per theory
(5) Study of vitamins structure through model or chart
(6) Structure of DNA with the help of model / chart
(7) Structure of RNA with the help of model / chart
(8) Preparation of A___, T___, G___, C___ by models
(9) Preparation of water soluble vitamins and fat soluble vitamins

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Reference books: Z-503

(1) J.L. Jain – Biochemistry
(2) Lehninger - Biochemistry
(3) Stryer-Biochemistry
(4) Granner and Rodwell - Harper's Illustrated Biochemistry
(5) J H Wet - General Biochemistry
(6) Rangnatha Rao K-Text Book of Biochemistry
(7) C. B. Powar - Biochemistry
(8) Das.-Biochemistry
(9) Fundamentals of Biochemistry - Dr. A. C. Deb
(10) Fundamentals of Biochemistry - David T. Plummer
(11) Biochemistry - N. Arumugum

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B. Sc. Semester-VI

Zoology Paper – Z - 603

(Animal Physiology and Endocrinology)

(Effective from June-2021)

Unit - 1: Respiration (08 Hours)

- Aquatic & terrestrial respiratory mechanism
- Hypoxia
- O2 dissociation Curve
- Respiratory quotients
- BMR
- Transport of gases
- Exchange of gases
- Respiratory pigments
- Neural and chemical regulation of respiration.

Unit - 2: Circulation (08 Hours)

- Structure of mammalian heart
- Properties of cardiac muscles
- Internal circulation (systematic, pulmonary and coronary) Cardiac-cycle and cardiac output Stroke volume
- Blood pressure
- ECG
- Blood coagulation
- Hormonal, Ionic and Nervous regulation of heart beat.

Unit - 3: Mammalian Endocrinology (07 Hours)

Hormones:

- Pineal Gland
- Hypothalamus
- Pituitary Gland

- Thyroid Gland
- Parathyroid Gland
- Thymus
- Pancreas
- Adrenal Gland
- Ovary and Testes

Unit - 4: Chemical coordination of Hormone (07 Hours)

- Chemical nature of hormones
- Mechanism of hormonal action

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B. Sc. Semester-VI

Zoology Practicals (Based on Paper- Z - 603)

(Animal Physiology and Endocrinology)

(Effective from June-2021)

1. Study of analytical instrument principle and applications.
    - pH meter
    - Sphygmomanometer
    - Stethoscope
    - Thoma pipette of haemocytometer
2. Study of total RBC count in human blood
3. Study of WBC differential count
4. Measurement of systolic blood pressure, diastolic pressure, pulse pressure, mean pressure of an individual with the help of sphygmomanometer and stethoscope
5. Study of Electrocardiogram (ECG)
6. Study of hormonal control and regulation of glands:
    - Pituitary Gland
    - Thyroid Gland
    - Parathyroid Gland
    - Pancreas
    - Adrenal Gland
    - Ovary and Testes

Reference books: Z-603

(1) General and Comparative Endocrinology - Barrington,

(2) Textbook of Endocrinology - R.H. Williams

(3) A Text book of Biochemistry - A. K. Berry.

(4) Text book of medical Physiology - Guyton.

(5) A Text of Animal Physiology - Nagabhushanam.

(6) A Text of Animal Physiology - A. K. Berry.

(7) Comparative animal Physiology - Proser& Brown.

(8) Animal Physiology -M. P. Arora

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T. Y. B. Sc. Semester–V

Zoology Paper – Z – 504

(Embryology and Wild life Biology)

Unit – 1: Introduction to Embryology and Gametogenesis (07 Hours)

- Introduction
- The Programme of Development
- Scope and Branches of embryology
- Spermatogenesis: Formation of spermatids, Spermiogenesis, Factors controlling spermatogenesis, Structure of a typical sperm and Significance of spermatogenesis

  Oogenesis: Formation of egg (ovum) - Multiplication phase, growth phase (Previtellogenesis and Vitellogenesis) and Maturation phase

Unit – 2: Fertilization and Sexual cycles (07 Hours)

- Fertilization : External and internal fertilization - mechanism of Fertilization - capacitation and contact – acrosomal reaction and penetration – activation of ovum migration of pronuclei and amphimixis - theories of fertilization - significance of fertilization
- Estrous and Menstruous cycles, Pregnancy, Parturition, Placenta and placentation

Unit – 3: Chick Embryology (07 Hours)

- Sperm, Egg, Fertilization, cleavage, blastulation, gastrulation, formation of germ layers and primitive streak
- Development of chick embryo of 8, 16, 21, 24, 33, 48 and 72 hours

Unit – 4: Wild life Biology (07 Hours)

- Introduction to wild life Endangered, vulnerable, threatened species National parks and Sanctuaries
- Causes of depletion, conservation and management
- Wild life in Gujarat
- Wild life trades and its legal provisions
- CITES (Convention on International Trade in Endangered Species)
- Conservation projects: Wild ass, Tiger, Crocodile and Black buck

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T. Y. B. Sc. Semester–V

Zoology Practicals (Based on paper Z - 504)

(Embryology and Wild life Biology)

1. Different types of mammalian placenta

2. Chick embryology: Unfertilized egg, different stages cleavage, morula, blastula, gastrula, development of Structure of 8, 16, 21, 24, 33,48 and 72 hrs

3. Study of projects – Wild ass, Tiger, Crocodile and Black buck-their locations in map of India, present status and significance

4. Wild life Illegal trades, practices and its control measures of following

- Tiger (Claws, Bones, Skins and Whiskers)
- Rhino (Horns)
- Elephant (Tusks)
- Musk Deer (musk)
- Turtle (Shells)

5. The students are supposed to attend all the Industrial Workshops/Laboratory Workshops/ Training Programme/Symposia/Seminar/Field visit/Educational Excursion organized by the department/college. The students shall attend these programmes at their own cost.

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Reference books: Z-504

(1) Austin, C.R. and Short, R.V. reproduction in Mammals. Cambridge University Press.

(2) Degroot, L.J. and Jameson, J.L. (eds). Endocrinology. W.B. Saunders and Company.

(3) Knobil, E. et al. (eds). The Physiology of Reproduction. Raven Press Ltd.

(4) Hatcher, R.A. et al. The Essentials of Contraceptive Technology. Population Information Programme.

(5) Balinsky, B.I. (2008). An introduction to Embryology, International Thomson Computer Press.

(6) Carlson, Bruce M (1996). Patten's Foundations of Embryology, McGraw Hill, Inc.

(7) Chordate Embryology - P S Verma S.Chand Delhi.

(8) Embryology - N. Arumugam , Saras Publication, KanyaKumari

(9) Embryology A. K. Berry

(10) A Textbook of Embryology By G. S. Sandhu, Sharad Srivastava and C. K. Arora

(11) Wild life Protection Act(1972) - Publish by Wildlife Trust of India

(12) Remote Sensing – Schowengerdt

(13) The Wild Life of India By E. P. Gee An imprint of Harper Collins publishers india

(14) Call of the wild by B. Seshadri

(15) The wild animals of India by B. N. H. S.

(16) Vanya jeev vigyan by Gujarat Granth nirman board, Gujarat

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y. B. Sc. Semester-VI

Zoology Paper – Z - 604

(Entomology)

(Effective from June-2021)

Unit – 1: Introduction to Entomology **(08 Hours)**

- History, Development, Scope and Applications of Entomology
- Branches of Entomology
- General characteristics of class Insecta

U nit – 2: Agricultural Entomology **(08 Hours)**

- Pests of field crops and their management:
- **Sugarcane** – Stem borer, Leaf aphids and Shoot borer
- **Cotton** – Spotted ball worm, Leaf roller, Red cotton bug and Jassids
- Pests of Horticultural crops and their management:
- **Vegetables:** Brinjal (Shoot and Fruit borer, Leaf eating beetles, Jassids, Leaf roller), Cabbage (moth and maggot fly)
- Insect pests of stored grains and their management (Rice weevil, Saw Toothed Grain beetle, Khapra beetle, Rice moth and lesser grain borer)

U nit – 3: Medical Entomology **(07 Hours)**

- Morphology, Vectorship, Pathogenicity and Control of: Mosquito, Housefly, Rat fleas and Head louse
- Morphology, Vectorship, Pathogenicity and Control of: Pests of domestic animals - Dogs, Cats and Cattles

U nit – 4: Economic Entomology **(07 Hours)**

- **Beneficial Insects** (Economic importance of Honey bee, Silkworm, Lac insect, Pollinators, Scavengers, Insect as a source of drugs and dyes)
- **Household pests:** Morphology, Damage caused and Control measure of: Cockroach, Ants and Termites and Bed bugs

- **Insect pest control methods:** Bio control, Integrated pest management, Insecticides and Pesticides
- Appliances used for pest management (Hydraulic Sprayers: Hand, Knapsack and Foot., Pneumatic Sprayers: Hand and Knapsack)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y. B.Sc. Semester-VI

Zoology Practicals (Based on paper Z - 604)

(Entomology)

(Effective from June-2021)

To study the following practicals with the help of charts/models/photographs/ specimens/slides etc.

1. Branches of Entomology, Its scope, Applications, Development

2. Identification, Pathogenicity and Control of pests

- Cereals - Khapra beetle (*Trogoderma granarium*), Locust
- Cotton - Spotted ball worm
- Sugarcane (*Saccharum officinarum*) – Stem (node-internode) borer
- Vegetables - *Hellula undalis*

3. Morphology, Vectorship, pathogenicity and control of – Anopheles (male – female), Culex (male-female) and Aedes (male-female)

4. Pests of domestic animals: Dogs- Dog flea (*Ctenocephalidies canis*), *Trichodectes canis*, Cats- Cat flea (*Ctenoce felis*), Cattles – Cattle tick (*Boophilus microplus*), *Haemaphysalis cuspidate, H.minuta*

5. Economic importance of arthropods /insects – Silk worm, Lac insects, Honey bees and Butterflys **as Pollinators**; Lady bug and Dermestid beetle **as Scavengers**; Cochinial insects and Kermes insects(of oak tree) **as Dyes**; Honey bees, Blow fly maggots, Centipedes and Cantharis fly (*Canth vesictoria*) **as Drugs /Medicine**s; Ants, Termites, Dermestid beetles and Bed bugs as **Harmful insects**

6. Pests management appliances- Insect repellents, Hydraulic Sprayers: Hand, Knapsack and Foot; Pneumatic Sprayers: Hand and Knapsack), Traps (electric and chemical).
Biological pests controller- Spiders, Lizards, Frogs, Green bee-eater, Lady bug beetle and Bats

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Reference books: Z-604

(1) General and Applied Entomology- Nayer, K.K. , T. Anant Krishnan and B.W. David

(2) Metcalf, G.L. and W.P. Fling : Destructive and Useful Insects

(3) Hemsingh Pruthi : A Text Book of Agricultural Entomology

(4) Wigglesworth : Principles of Insect Physiology

(5) ESSIG : College Entomology

(6) M.S. Mani : A Text Book of General Entomology

(7) Fradt, R.E. : Fundamentals of Applied Entomology

(8) Smith, K.G.V.: Insects and Other Arthropods of Medical Importance

(9) Ray, D.N. and A.W.A. Brown: Entomology Medical & Veterinary

(10) Shrivastava, K.P.: A Text Book of Applied Entomology (Vol.I–H)

(11) Ross, H.A.: Text Book of Entomology

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y. B. Sc. Semester-V

Zoology Paper – Z - 505

(Forensic science and Toxicology)

(Effective from June-2021)

Unit – 1: Definition, Scope, History and Development of Forensic science, Basic principles, Forensic science in international perspectives including RFSL, CFSL and INTERPOL, Dactylography, Foot prints, Tattoo marks, Occupational marks, Speech and Voice **(07Hours)**

Unit – 2: Morphology and Structure of hair: Human and other animals (Dog, Cat, Cow, Buffalo, Horse, Goat), DNA Fingerprinting, Wildlife and forensic science **(08 Hours)**

Unit – 3: Concept and Scope of Toxicology: Introduction, History, Disciplines of toxicology, Toxicants and their classification, Toxicity **(07 Hours)**

Unit – 4: Food-Additives: General account, Incidental (indirect) additives, Intentional (direct) additives, Terms related to adverse reactions to food, Food-borne molds and Mycotoxins (food contaminants), Testing of food additives **(08 Hours)**

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y. B. Sc. Semester-V

Zoology Practicals (Based on paper – Z - 505)

(Forensic science and Toxicology)

(Effective from June-2021)

To study the following practical with the help of charts/models/photographs/ specimens/slides/simple methods without using live animals.

1. Study of different types of Finger prints and Tattoo marks

2. Study the morphology of different hairs- Man, Dog, Cat, Cow, Buffalo, Horse, Goat

3. Study of various samples of food additives/preservatives and their usages (Vinegar, Benzoic acid, Formic acid, Citric acid and Gelatin)

4. Study of food contaminants on - Bread, Chapati, Curd and Fruits

5. Tests (only two tests to be performed) of adulterated milk, black pepper, khoya (maava of milk), edible oil, coconut oil, ghee, rabdi

6. To study DNA finger printing method

Reference books: Z-505

(1) Fundamentals of Toxicology-K.Pandey,J.P.Shukla and S.P.Trivedi.

(2) Environmental Biology and Toxicology-P.D.Sharma.

(3) Aquatic Pollution and Toxicology-R.K. Trivedi.

(4) Toxicology-P.D. Sharma.

(5) Introduction to General Toxicology-E.J.Ariens, A.M.Simonis and J.Offermerier.

(6) Modern Toxicology,vol.I,II,III - P.K.Gupta and D.K.Salunkhe.

(7) Basic Toxicology- C.Lu Frank

(8) Toxicology, A Basic Science of Poisons,2nd edition- L.J.Casarett and J.Doull

(9)Text book of forensic science and toxicology- Narayan Reddy

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y. B. Sc. Semester-VI

Zoology Paper – Z - 605

(Cell Biology and Bioinstrumentation)

(Effective from June-2021)

Unit – 1: Microscopy **(08 Hours)**

- Introduction
- Magnification, Resolution
- Light microscope (Simple and Compounding Microscope)
- Electron microscope
- Phase Contrast microscope

Unit – 2: Cytological Techniques **(08 Hours)**

- Examination of living cells (Teasing, Smear preparation, Squash preparation, Whole mount and Microtomy)
- Fixation
- Cytological staining

Unit – 3: Biochemical techniques **(07 Hours)**

- Paper chromatography
- Centrifugation
- Electrophoresis
- PCR
- Spectrophotometry

Unit – 4: Cell cycle and Cellular transportation **(07 Hours)**

- Cell Cycle
- Interphase
- Mitosis
- Meiosis
- Cell membrane structure and function: Structure of cell membrane, Lipid bilayer and membrane protein diffusion, Osmosis, Ion channels, Active transport, Ion pumps, Mechanism of sorting and regulation of intracellular transport

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y. B. Sc. Semester-VI

Zoology Practicals (Based on paper Z - 605)

(Cell Biology and Bio instrumentation)

(Effective from June-2021)

1. Types of microscope
2. Micro technique preparation of permanent slides of different organs
3. To perform paper chromatography for separation of amino acids
4. Permanent slides of mitosis and meiosis
5. To prepare different stages of mitosis from onion root tip
6. To study electrophoresis, Centrifuge machine, PCR and Spectrophotometry through charts/models

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Reference books: Z-605

(1) Basic Separation Techniques in Biochemistry, 1998, Okotore R. O., New Age International, New Delhi.

(2) Cytological techniques: The Principles Underlying Routine Methods, 1963, Baker J.R, Methuen & Co, London

(3) Davenport H. A.: Histological and Histochemical techniques.

(4) Handbook of basic Microtechnique, 1958, 2nd Edn., Gray P., McGraw-Hill, USA

(5) The microscope and how to use it, 1970, George Stehli, Dover Publications Inc., New York.

(6) Histopathological technique and Practical Histochemistry, 1976, 4th Edn, Lillie R.D McGraw-Hill, USA

(7) Notes on Microscopical Techniques for Zoologist, 1964, Pantin C. F.A.: Cambridge University Press

(8) Elementary Microtechnique, 1973, 4th Edn., Peacock H.A., Edward Arnold Publ. Ltd., UK

(9) Histochemistry, 1968, Pearse A.G.E., Vol. I & II., W.B. Saunders Company (WBS) of Philadelphia

(10) Microscope and microscopic life, 1979, 2nd Edn., Peter Healey, Hamlyn, UK

(11) Biological Instrumentation and methodology, 2008, 2nd Revised Edition, P.K. Bajpai, S. Chand and Co. Ltd., New Delhi

(12) Cell and molecular biology By P. K. Gupta., Rastogipublication, Meerut, New Delhi

(13) Cell biology A laboratory handbook Volume 2., Edited by Julio E. Celis

(14) Fundamentals of Biochemistry By Dr. A. C. Deb.

(15) Biochemistry By. Geoffrey L. Zubay

(16) Text book of Biochemistry By A. K. Berry

(17) Cell biology Genetics Molecular Biology Evolution and Ecology By P. S. Verma and V. K. Agrawal., S. Chand publicationMeerut.

(18) Handbook of Exprerimental Physiology and Biochemistry By Dr. P. V. Chadha., Jaypee publication

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T. Y. B. Sc. Semester–V

Zoology Paper – Z - 506

(Genetics and Molecular Biology)

(Effective from June-2021)

Unit – 1: Gene Structure and Functions **(08 Hours)**

Gene concept, Location of and size of genes, Role of genes, Chemical composition and numbers of genes, Ultra structure of genes, Jumping genes, Split genes and Sex chromatin

Unit – 2: Central Dogma and Biotechnology **(08 Hours)**

Genetic code, DNA replication, Transcription and Protein synthesis, DNA Repair, Recombinant DNA technology

Unit – 3: Human Cytogenetics and Mutation **(07 Hours)**

Karyotyping, Chromosomal banding techniques – G, Q, C and R banding, Chromosomal aberrations and syndromes, Gene mutations

Unit – 4: Oncology **(07 Hours)**

Cancer: Overview of Tumour growth and development, Metastasis

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T. Y. B. Sc. Semester–V

Zoology Practicals (Based on paper Z - 506)

(Genetics and Molecular Biology)

(Effective from June-2021)

1. To study Barr body (dosage compensation) from cheek epithelial cells
2. Preparation of DNA, RNA by models
3. To study DNA replication using photographs or charts
4. Normal human karyotype and syndromes (Down syndrome, Patau, Edward, Cri du chat, Jacob's, Klinefelter, Turner, Super female, Philadelphia)
5. To study types of cancer – Blood cancer, Skin cancer with charts/photos
6. Study of Transgenic animal (Dolly sheep)

Reference books: Z-506

(1) Principles of Genetics- F.J. Gardner.

(2) Molecular cell biology- H.S. Bhamra and KavitaJuneja,

(3) Fundamental molecular biology- Lizabethallison.

(4) Thomas A. P (Editor), (2012). *Genetics and Biotechnology- The Fundamentals. Green Leaf Publications*, TIES, Kottayam.

(5) Vijayakumaran Nair K. (2012). *Genetics and Biotechnology*. Academica, Trivandrum.

(6) Robert A. – Biology of Cancer Weinberg. 2nd edition

(7) Weinberg R A. 2014. Biology of Cancer. 2nd edition. Garland Science, Taylor & Francis

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B. Sc. Semester-VI

Zoology Paper – Z - 606

(Ecology, Ethology and Evolution)

(Effective from June-2021)

Unit – 1: (A) Animal Inter relationship: **(08 Hours)**

- Species interactions
- Types of interactions

(B) Biogeography:

- Zoogeography
- Zoogeographical Regions of world
- Diverse fauna of India

Unit – 2: Social behaviour: **(07 Hours)**

- Costs and Benefits of group living
- Evolutionary Advantages and disadvantages of group living
- Characteristics of Social Insect

Unit – 3: Bioluminescence, Biological Clock and Insect Pheromones **(08 Hours)**

Unit – 4: Direct Evidences of Evolution: **(07 Hours)**

- Fossils:
  - Introduction
  - Branches of Palaeontology
  - Fossils formation
  - Conditions of Fossilisation
  - Determination of age of Fossils
  - Nature of Fossils
  - Types of Fossils
  - Significance of Fossils
  - Conclusions drawn From Fossil record
  - Imperfection of Fossil record

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B. Sc. Semester-VI

Zoology Practicals (Based on paper Z - 606)

(Ecology, Ethology and Evolution)

(Effective from June-2021)

1. Estimation of Alkalinity and Hardness
2. Estimation of free CO_2 and dissolved O_2
3. Study of Habituation of mosquito larva
4. Study of Antennal grooming behavior (Chemotoxis)
5. Study of alarming, attractant, aggression behavior
6. Types of Fossils by photo graphs/charts

Reference books: Z-606

(1) Ecology and Environment- P.D.Sharma

(2) Modern concepts of Ecology- H.D.Kumar

(3) Fundamentals of Ecology- E.P.Odum

(4) Animal Ecology- S.P.Singh

(5) Cytology, Genetics and Evolution-P.K.Gupta.

(6) Cell Biology, Genetics and Evolution-N.Arumugam.

(7) Cell biology, Genetics, Molecular Biology, Evolution and Ecology. – P.S. Verma, and V.K.Agarwal

(8) Animal Behaviour-M.P.Arora

(9) Animal Behaviour-E.G.Boulenger

(10) Animal Behaviour-Vinod Kumar

(11) A Textbook of Animal Behaviour-H.S.Gundevia &H.G.Singh

(12) Insect Behaviour-M.Prakash.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T. Y. B. Sc. Semester-V

Zoology - Fisheries – E.G.

(Effective from June-2021)

Unit- 1: Natural and cultivated ponds-construction, layout, Management and productivity **(05 Hours)**

Unit- 2: Induced breeding methods in major carp **(05 Hours)**

Unit- 3: Fish seed collection and transportation **(05 Hours)**

Unit- 4: Study of aquarium fishes and its management **(05 Hours)**

Unit- 5: Crafts and Gears used in fresh and marine water fisheries **(05 Hours)**

Unit- 6: Larvivorous Fishes **(05 Hours)**

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T. Y. B. Sc. Semester-VI

Zoology – Fisheries – E.G.

(Effective from June-2021)

Unit -1: Fish migration **(05 Hours)**

Unit- 2: Schooling of fish **(05 Hours)**

Unit- 3: Electric organs in fishes **(05 Hours)**

Unit- 4: Preservation, processing and by-products of fishes **(05 Hours)**

Unit -5: Fish pathology: bacterial, fungal, ectoparasitic and protozoan diseases of fishes **(05 Hours)**

Unit- 6: Global warming and its effects on Fisheries **(05 Hours)**

Reference books: Fisheries – E. G. (Semester – 5 and 6)

(1) An Introduction to fishes-S.S.Khanna.

(2) Fish and Fisheries of India-V.G.Jhingran.

(3) Fish and Fisheries –A.R.Shukla

(4) Fish and Fisheries-B.N.Yadav.

(5) Ichthyology-Lagler,Bardach,Passino & Miller

(6) Fundamentals of Ichthyology-Gupta,Guhalwat,Yadav,Jain

(7) Fundamentals of Ichthyology-S.P.Biswas

(8) General and Applied Ichthyology-S.K.Gupta,P.C.Gupta.

(9) An Introduction to fishes-G.S.Sandhu.

(10) Fish Biology-C.B.L.Srivastava

(11) A Textbook of Fish Biology and Fisheries- S.S.Khanna and H.R.Singh

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T. Y. B. Sc. Semester-V

Zoology- Food Hygiene and Sanitation – E.G.

(Effective from June-2021)

UNIT – 1: **(08 H0urs)**

- Definition of Public Health and Hygiene
- Social and preventive medicine
- Basic aspects of personal hygiene
- Epidemiology methods
- Introduction to Analytical
- Experimental and Descriptive methods
- Diseases transmission

UNIT – 2: **(08 Hours)**

- Food Borne Disorders:
- Food borne infections-
- Typhoid
- Para typhoid,
- Cholera
- Infective hepatitis
- Amoebiasis

- Food borne intoxications:
- Disorders caused by-
- Natural toxins
- Chemical toxins
- Microbiological toxins in food- Staphylococcal intoxication
- Botulism
- Clostridium
- Perfringens
- Mycotoxins.

UNIT – 3: **(08 Hours)**

- Food handling and Public Health:
- Preventing food borne illness and the speed of communicable disease
- Sanitation of food serving institution
- Environmental sanitation
- hygiene in food handling and personal hygiene of food handler
- Water- sources, Impurities- Principles of water purification- commercial and domestic

UNIT – 4: **(06 Hours)**

- Food adulteration:
- Common, adulterants, and health hazards

- Food standards and food laws - National and International;
- PFA, FPO, FAO, MMPO, Agmark, Codex, FSSAI, HACCP, ISO Certification;
- Consumer guidance society
- Consumer rights
- Consumer court
- Central facilities for assessing food adulteration
- Role of food inspectors

Reference Books: Food Hygiene and Sanitation – E.G.
(Semester – V)

(1) Food hygiene & sanitation- Roday.S ,tataMcGraw hill publishing company ltd.

(2) Food science- B.Srilakshmi.

(3) MohiniSethi, catering management, New age international publishers.

(4) Sri Lakshmi.B – Food science, New Age International Publishers.

(5) Park K (2011). Park's Textbook of Preventive and Social Medicine, 21st EditionM/sBanarasidasBhanot Publishers, Jabalpur, India.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T. Y. B. Sc. Semester-VI

Zoology- Public Health – E.G.

(Effective from June-2021)

UNIT – 1: **(08 Hours)**

- Health and Nutrition:
- Education-definition
- Components
- Principles of health education

- Methodology:
- Individual
- Group and mass methods use of audio visual aids

UNIT – 2: **(08 Hours)**

- Medical entomology
- Control of household pest with special reference to Mosquito and Housefly
- Environmental, chemical, biological and generic control

UNIT – 3: **(07 Hours)**

- Immunity:
- Classification, specific and non-specific immunity
- Immunoglobulins
- Cellular and hormonal, immune response
- Immunization active and passive immunization schedule
- Immunizing agents
- Hazards of immunization

UNIT – 4: **(07 Hours)**

- Primary health care system with special reference to Maternal and Child Health care
- Primary health system functioning in rural areas, health indicators mortality (Infant and Maternal), morbidity, disability and various health organizations
- Malaria and AIDS Control-NHP, WHO, UNICEF

Reference Books: Public Health – E.G. (Sem – VI)

(1) Wadhwa A and Sharma S (2003). Nutrition in the Community-A Textbook. Elite Publishing House Pvt. Ltd. New Delhi.

(2) Park K (2011). Park's Textbook of Preventive and Social Medicine, 21st Edition. M/sBanarasidas Bhanot Publishers, Jabalpur, India.

(3) Mahtab S. Bamji, Kamala Krishnaswamy and G.N.V. Brahmam, Human Nutrition 4th edition. Oxford and IBH Publishing Co., P. Ltd. New Delhi.

(4) McLaren D.S .Nutrition in the Community, John Wiley and Sons.

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
F.Y.B.Sc. SEMESTER- I
ZOOLOGY: Z – 101
(Effective from JUNE-2019)
(Systematics and Animal Diversity)

UNIT- I: Systematics

Scope and branches Zoology,Salient features of Non-chordates, structural organization in different phylum of Non-chordates with examples.

Kingdom – Animalia

Phylum – Protozoa- Locomotory Organelles and locomotion

Porifera-Canal System in Sycon

Cnidaria-Polymorphism in Hydrozoa

Platyhelminthes, Nemathelminthes-Parasitic adaptations

Annelida-Metamerism

Arthropoda -Metamorphosis in Insects

Mollusca-Shell in Mollusca

Echinodermata-Water-vascular system in Asteroidea

Protochordata- General features and Phylogeny

UNIT- II: Non-Chordate Animal Diversity

Type study– *Fasciola hepatica* (Liver fluke)

- Systematic position, Habit and habitat
- External features, Body wall
- Digestive system, Respiratory System, Excretory system, Nervous system
- Reproductive system, Life cycle and development
- Pathogenesis, Parasitic Adaptations

UNIT-III: Systematics

Salient features of Chordate classes with examples.

Agnatha, Pisces, Amphibia, Reptiles, Aves, Mammals

UNIT- IV: Chordate Animal Diversity

Pisces-Difference between Osteichthyes and Chondrichthyes

Amphibia- Parental care

Reptiles- Poisonous and non-poisonous snakes

Aves-Types of beak and feet in birds

Mammals-Proboscidia

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
F.Y.B.Sc. SEMESTER-I
ZOOLOGY PRACTICALS (Based on Paper-Z – 101)
(Effective from JUNE-2019)
(Systematics and Animal Diversity)

The following practicals are to be taught/studied **only** with the help of charts, models, videos, photographs, permanent slides, working models etc.

1. Study of the following specimens:
Amoeba, Euglena, Paramecium, Sycon, Hyalonema, Physalia, Aurelia, Metridium, Taenia solium, Male and female Ascaris lumbricoides, Nereis, Pheretima, Hirudinaria

2. Carcinus, Scolopendra, Limulus, Lepisma,Periplaneta,Butterfy Chiton, Dentalium, Pila,Ostrea, Octopus,Pentaceros, Ophioderma,Echinus, Cucumaria.

3. Balanoglossus, Herdmania, Branchiostoma, Petromyzon, Sphyrna, Pristis, Torpedo, Labeo, Exocoetus, Ichthyophis, Salamandra, Bufo, Hyla,

4. Chelone,Hemidactylus, Chamaeleon, Vipera, Naja, Crocodylus, Gavialis, Koel, Peacock,Sparrow, Ornithorhynchus, Macropus, Bat,Dolphin

5. Study of the following permanent slides:
T.S. and L.S. of *Sycon*, **Liver fluke:** Larva stages.miracidium, sporocyst, redia, cercaria

6. Key for Identification of poisonous and non-poisonous snakes

7. An "**animal album**" containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
F.Y.B.Sc. SEMESTER- I
ZOOLOGY: Z – 102
(Effective from JUNE-2019)
(Cytogenetic, Ecology and Ethology)

UNIT-I: Cytology

- Structural organization of cells- Prokaryotes and Eukaryotes

Introduction to cell organelles (Golgi body, E.R., Mitochondria, Nucleus, Lysosome, Ribosome, Nucleolus, Cell wall) and cell inclusions.

UNIT-II : Genetics

Types,structures and functions of chromosomes

- Principles of inheritance, Mendel's law, deviation from Mendelian inheritance, incomplete dominance and co-dominance, Complementary genes, Supplementary genes. multiple alleles (ABO blood groups)

UNIT-III : Ecology

- Introduction to Ecology
- Marine Ecosystem
- Fresh water – Pond Ecosystem
- Desert ecosystem

Ecological Adaptations

- Aquatic, Arboreal, Volant, Desert

UNIT- IV :Ethology

- Introduction, Scope and patterns of behavior.
- Nesting behavior (Weaver bird, Horn bill) and social behavior (honeybee)
- Behavioral disorders- Alzheimer's and Dementia

VEER NARMADSOUTH GUJARAT UNIVERSITY, SURAT.
F.Y.B.Sc. SEMESTER- I
ZOOLOGY-PRACTICALS (Based on Z-102)
(Effective from JUNE-2019)
(Cytogenetic, Ecology and Ethology)

The following practicals are to be taught/studied **only** with the help of charts, models, videos, photographs, permanent slides, working models etc.

1. Ecological adaptations
(a) Aquatic: Catla, Dolphin
(b) Arboreal: Chameleon, Squirrel
(c) Volant: Flying fish,Bat
(d) Dessert: Camel, Phrynosoma

2. To study structure of typical animal cell and cell organelles: Golgi body, E.R., Mitochondria, Nucleus, Lysosome, Ribosome, Nucleolus, Cell wall.

3. To study nesting behaviour (Weaver bird, Horn bill) and social behaviour (Honey bees).

4. To prepare blood smear to observe R.B.C.s and W.B.C.s from human blood.

5. To study Blood groups and Rh factor in human blood.

6. Complementary genes, Suplemetary genes.

Reference Books:

(1) Ruppert and Barnes, R.D. (2006). *Invertebrate Zoology*, VIII Edition. Holt Saunders International Edition.
(2) Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). *The Invertebrates: A New Synthesis*, III Edition, Blackwell Science
(3)Kardong, K.V. (2005) *Vertebrates' Comparative Anatomy, Function and Evolution*. IV
Edition.McGraw-Hill Higher Education.
(4) Kent, G.C. and Carr R.K. (2000). *Comparative Anatomy of the Vertebrates*.IX Edition.
The McGraw-Hill Companies.
(5) Young, J. Z. (2004). *The Life of Vertebrates*.III Edition.Oxford University press.
(6) Modern Text Book of Zoology (vertebrate) R.L.Kotpal, Rastogi Publication, Meerut, India.
(7) Modern Text Book of Zoology (invertebrate) R.L.Kotpal,Rastogi Publication, Meerut, India.
(8) Invertebrate Zoology- E.L.Jordan & P.S.Verma
(9) Invertebrate Zoology- T.C. Majupuria, Pradeep Publication, Jalandhar, India.
(10) Intruduction to Chordates- T.C. Majupuria, Pradeep Publication, Jalandhar, India.
(9) A manual of Practical Zoology Invertebrates- P.S.Verma, S. Chand & Co. Ltd. New Delhi, India.
(10) A manual of Practical Zoology Chordates- P.S.Verma, S. Chand & Co. Ltd. New Delhi, India.
(11) Cell biology, Genetics and Molecular Biology- V.B. Rastogi, Rastogi Publi. Meerut- India
(12) Modern zoology –Dr. Ramesh Gupta,Prakash Publication,12th Edition,Muzaffarnagar(UP)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
F.Y.B.Sc. SEMESTER- II
ZOOLOGY: Z – 201
(Effective from JUNE-2019)
(COMPARATIVE ANATOMY, APPLIED ZOOLOGY, WILDLIFE BIOLOGY)

Unit-1: Integumentary System

Derivatives of integument w.r.t. glands and digital tips

Digestive System

Brief comparative account of alimentary canal and digestive glands of vertebrates (Pisces to mammals).

Unit-2: Respiratory System

Brief account of Gills, Lungs, Air sacs and Swim bladder

Receptor Organs : Cutaneous receptors, Chemo receptors and Internal receptors

Unit-3: Applied Zoology:

- **Poultry Farming**-Importance of Poultry Farming, Breeds of poultry, Cage system and deep litter system of bird keeping, Egg as food, Care of egg laying hen, poultry appliances and excreta as manure.
- **Fisheries**-Prawn fishery,Pearl Oyster fishery and Bombay duck fishery

Unit-4:Wildlife Biology

- Introduction, causes of depletion of wild life, Importance of conservation of wild life
- Difference between National Parks and Sanctuaries
- **Wildlife in Gujarat:**

National Parks

(1) Gir National Park (2) Marine National Park

Sanctuaries

(1)Wild ass sanctuary (2) Thol wildlife sanctuary (3)Velavadar black buck sanctuary

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
F.Y.B.Sc. SEMESTER- II
ZOOLOGY PRACTICALS (Based on Z- 201)
(Effective from JUNE-2019)

(COMPARATIVE ANATOMY, APPLIED ZOOLOGY, WILDLIFE BIOLOGY)

The following practicals are to be taught/studied **only** with the help of charts, models, videos, photographs, permanent slides, working models etc.

1. Integumentary System: Derivatives of integument w.r.t. glands and Digital tips

2. Digestive System: Brief account of alimentary canal and digestive glands

3. Respiratory System: Brief account of Gills, lungs, air sacs and swim bladder

4. Receptor Organs : Cutaneous receptors: Free nerve endings, Tectile corpuscles
Chemo receptors:Taste buds,Organ of Jacobson

5. Study of national parks and Sanctuaries
Gir N.P., Marine N.P., Wild ass W.L.S.,
Thol W.L.S.and Velavadar W.L.S

6. To study Prawn fishery,Pearl Oyster fishery and Bombayduck fishery

7. To study poultry appliances- hover canopy type brooder, modern hanging feeder (plastic), modern hanging water appliance (plastic) and box type candling appliance.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
F.Y.B.Sc SEMESTER- II
ZOOLOGY : Z- 202
(Effective from JUNE-2019)

(LIFE PROCESSES, BIOCHEMISTRY, IMMUNOLOGY AND TISSUE SYSTEM)

UNIT-I Life Processes

Nutrition/ Digestion in Human

- Buccal digestion: Salivary secretion and digestion.
- Gastric digestion: Gastric secretion and digestion
- Intestinal digestion: Pancreatic secretion, bile secretion, digestion in small intestine, digestion and absorption in large intestine

Reproduction and its types

UNIT-II Biological Chemistry

- pH and Buffers in Biological Systems
- Introduction to constituents of balanced diet-Sources, functions and deficiency status
- Diseases due to vitamin deficiency: Xerophthalmia, Nyctalopia (Night blindness),Rickets, Scurvy, Beriberi, Pellagra

UNIT-III Immunology

- Introduction and basic concepts of immunology
- Cells and organs of immune system
- Humoral and cellular immune response
- Innate and acquired immunity

UNIT-IV Tissue systems

To Study various types, their structure and functions.
Epithelial,Connective,Nervous and Muscular tissue

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
F.Y.B.Sc. SEMESTER- II
ZOOLOGY PRACTICALS (Based on Z-202)
(Effective from JUNE-2019)
(LIFE PROCESSES, BIOCHEMISTRY, IMMUNOLOGY AND TISSUE SYSTEM)

The following practicals are to be taught/studied **only** with the help of charts, models, videos, photographs, permanent slides, working models etc.

1. To study the control of food ingestion in animals and T.S. of intestine of mammals to show villi for absorption.

2. To study different salivary glands and their functions in human.

3. Diseases due to vitamin deficiency: Xerophthalmia, nyctalopia (Night blindness),rickets, scurvy, beriberi, pellagra

4. To study Different types of reproduction.

5. Tissue System: Study of various types of tissues with the help of permanent slides- areolar tissue, adipose tissue, Hyaline Cartilage, Mammalian bone, Medulated and non Medulated nerve fiber.

Reference Books :

(1) Shukla, G.S. & Upadhyay, V.B. Economic Zoology. Rastogi Publi. 2005, 487 pages.(For Poultry)
(2) JawaidAhsan, Sinha, S. P. 2008. A Handbook of Economic Zoology. S. Chand and Co. Publ. 272 pages.(For Poultry)
(3) Ruppert and Barnes, R.D. (2006). *Invertebrate Zoology*, VIII Edition. Holt Saunders International Edition.
(4)Kardong, K.V. (2005) *Vertebrates' Comparative Anatomy, Function and Evolution*.IVthEdition.McGraw-Hill Higher Education.
(5) Kent, G.C. and Carr R.K. (2000). *Comparative Anatomy of the Vertebrates*. IX Edition.The McGraw-Hill Companies
(6) Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). *The Invertebrates: A New Synthesis*, III Edition, Blackwell Science
(7) Young, J. Z. (2004). *The Life of Vertebrates*.III Edition.Oxford University press.
(8) Modern Text Book of Zoology (vertebrate) R.L. Kotpal, Rastogi Publication, Meerut, India.
(9) Modern Text Book of Zoology (invertebrate) R.L. Kotpal, Rastogi Publication, Meerut, India.
(10) Invertebrate Zoology- E.L. Jordan & P.S.Verma
(11) Invertebrate Zoology- T.C. Majupuria, Pradeep Publication, Jalandhar, India.
(12) A Text Book of Histology – Leslie P. Gartner-4thedi.-Amazone
(13) Intruduction to Chordates- T.C. Majupuria, Pradeep Publication, Jalandhar, India.
(14) A manual of Practical Zoology Invertebrates- P.S.Verma, S. Chand & Co. Ltd. New Delhi, India.
(15) A manual of Practical Zoology Chordates- P.S.Verma, S. Chand & Co. Ltd. New Delhi, India.
(16)Prani Auotiki (Gujarati)- Desai and Akhunji – University Granth nirman Board- Ahmedabad- India.
(17) Poultry vigyan- Mehta and Ghasura- University Granth nirman Board- Ahmedabad- India.
(18) Vanyajiv Vidya ane Vanyajiv Vyavasthapan- Prof, V.C.Soni - University Granth nirman Board- Ahmedabad- India.
(19) Ecology, Cell biology, Genetics, Animal diversity, Animal Physiology, Immunology, Chordates and Invertebrates- Titles by N.Arumugam, Saras Publi., Kanyakumari, India.

Web references:

(1) Comparative Anatomy - Digestive System
https://www.slideshare.net/emsicipriano/comparative-anatomy-digestive-system
(2)Comparative Anatomy - Respiratory System
https://www.slideshare.net/emsicipriano/comparative-anatomy-respiratory-system
(3)Urogenital system chap
https://www.slideshare.net/CharmHernandez/urogenital-system-chap

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y.B. Sc. SEM – III
ZOOLOGY PAPER - Z – 301
(Effective from June 2020)
(Non-chordates, Evolution and Economic Zoology)

UNIT – I Classification:

Introduction to classification:

- General study of Non-Chordate Phyla up to Subclass with examples:

- Protozoa
- Porifera
- Coelenterata (Cnidaria)
- Helminthes
- Annelida

UNIT - II Type study: Earthworm:

- Study of the following animal type with reference to the structure and functions of various organs of all systems of **Earthworm**:

- Systematic position
- Habit and Habitat
- External features
- Body wall and its function
- Coelom – composition and function
- Food and feeding mechanism
- Digestive system and digestion
- Circulatory system
- Excretory system and excretion
- Nervous system-(central, peripheral and sympathetic)
- Sense organs- Epidermal receptors, Buccal receptors and photoreceptors
- Reproductive system-copulation, cocoon formation and development

UNIT - 3 Evolution and Adaptations:

- Variation
- Deep sea & Cave Dwelling Adaptations

UNIT – 4 Economic Zoology:

➢ Vermi culture:

- Definition of Vermiculture,Vermicomposting and Vermibed
- Limitations of traditional agricultural system
- Role of earthworm in saving environment
- Vermibreeds
- Earthworm-The Cinderella of Vermiculture
- Ecology of earthworm
- Physical, Chemical and biological parameters of Vermicast
- Vermiculture process
- Advantages and disadvantages of Vermicomposting
- Prospects of Vermiculture and Vermicomposting

➢ **Sericulture:**

- Life-History of Indian species of Mulberry silk-worm (Bombyx mori)
- Management of Silk industry including rearing
- Spinning and reeling
- Types and Economic importance of silk

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
S.Y.B. Sc. SEM – III
ZOOLOGY PRACTICAL (Based on Paper - Z – 301)
(Non-chordates, Evolution and Economic Zoology)

The following practicals are to be taught/studied **only** with the help of charts, models, videos, photographs, permanent slides, working models etc.

1 - Classification of following animals upto sub-class.

- Trypanosoma
- Monocystis
- Vorticella
- Grantia
- Euplectella
- Spongilla
- Hydra
- Cyanea
- Gorgonia
- Planaria
- Taenia
- Ascaris
- Aphrodite
- Tubifex
- Hirudo medicinalis

2 - Earthworm:

- External features
- Digestive System
- Mounting of setae
- Reproductive system
- Mounting of Septal nephridia
- Nervous system Spermatheca
- Blood glands

3 - Permanent Slides of earthworm:

- T.S.passing through pharynx
- T.S.passing through gizzard
- T.S. passing through typhlosolar region
- T.S.passing through testis
- T.S.passing through ovary

4– Evolution and Adaptations:

- Variation:
  - Digits in man
  - Giraffe
- Deep sea adaptations:
  - Euplectella
  - Limulus
  - Feather star
  - Flat fish
- Cave dwelling adaptations:
  - True spiders
  - Proteus anguinus

5 – Economic Zoology:

- Life history of Indian mulberry silk worm (Bombyx mori)
- Vermiculture (with the help of charts/ photographs/ models etc.)
- Vermibreeds, Vermiculture process(Vermicompost practices)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y.B. Sc. SEM – III
ZOOLOGY PAPER – IV (Z – 302)
(Effective from June 2020)
(Chordates, Histology and Osteology)

UNIT – 1 Classification:

- General study of the following protochordates and chordates up to subclass with examples:
  - Urochordata
  - Cephalochordate
  - Cyclostomes
  - Pisces
  - Amphibia.

UNIT – 2 Type study:

- Study the ***Labeo rohita*** as an animal type with reference to their structure and functions of various organs of all systems.
  - External characters
  - Digestive system
  - Circulatory systems
  - Urinogenital system
  - Brain

UNIT – 3 Histology:

- Study the Ultra structure following mammalian tissues:
  - Salivary gland
  - Stomach
  - Liver
  - Intestine
  - Pancreas
  - Kidney
  - Ovary

- Testis

UNIT – 4 Osteology:

- Comparative study of girdles in:
  - Scoliodon
  - Frog
  - Varanus
  - Pigeon
  - Rabbit

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y.B. Sc. SEM – III
ZOOLOGY PRACTICAL (Based on Paper - Z – 302)
(Chordates, Histology and Osteology)

The following practicals are to be taught/studied **only** with the help of charts, models, videos, photographs, permanent slides, working models etc.

1 - Classification of following animals upto sub-class.

- Ascidian
- Salpa
- Oikopleura
- Amphioxus
- Lamprey
- Scoliodon
- Chimaera
- Protopterus
- Eel
- Hilsa
- Pterois
- Frog
- Uruaeotyphlus
- Siren
- Rhacophorus

2 - Labeo rohita

- Digestive system
- Urinogenital system
- Brain-dorsal and ventral view

3 - To study the permanent mammalian histological slides:

- Salivary gland
- Stomach

- Liver
- Pancreas
- Intestine
- Kidney
- Ovary
- Testis

4 - Osteology:

- To study the pectoral girdles and pelvic girdles in:
  - Scoliodon
  - Frog
  - Varanus
  - Pigeon
  - Rabbit

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y.B. Sc. SEM – III
ZOOLOGY PAPER – V (Z – 303)
(Effective from June 2020)
(Biochemistry, Genetics and Physiology)

UNIT – 1 Biochemistry:

- Introduction and structure of:
  - Carbohydrates
  - Proteins
  - Lipids

UNIT – 2 Genetics:

- Structure and function of genetic material
- Types of RNA

UNIT – 3 Physiology:

- **Muscle coordination:**
  - Types and structure of muscle fibres
  - Physiology of muscle contraction and energetic

UNIT – 4 Hematology:

- Composition of blood
- Haemopoiesis
- Blood groups

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y.B. Sc. SEM – III
ZOOLOGY PRACTICAL (Based on Paper - Z – 303)
(Biochemistry, Genetics and Physiology)

The following practicals are to be taught/studied **only** with the help of charts, models, videos, photographs, permanent slides, working models etc.

1- Preparation of atomic models:

- Glucose
- Fructose
- Galactose
- Maltose
- Lactose
- Sucrose
- Valine
- Threonine
- Glycine
- Alanine
- Glycerol

2 - Genetics:

- To study Structure of genetic material
- Types of RNA

3 – Haematology:

- To study clotting time of human blood
- Estimation of Haemoglobin from human blood
- To study Haemin crystals from human blood

4 - Physiology

To study different types of muscle fibres and nerve fibres:

- Striated muscle fibre
- Nonstriated muscle fibre
- Cardiac muscle fibre

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y.B. Sc. SEM – III
MARINE SCIENCE (E. G.)
(Effective from June 2020)

UNIT - 1 Scope of marine science:

- Introduction to marine science and career
- Classification :
    - Prokaryotes
    - Eukaryotes - Fungi, Protista, Plant, Animalia – Five Kingdoms

UNIT – 2 Geology of the ocean:

- Physico-chemical properties of Marine Environment
- Zonations of ocean

UNIT - 3 Marine Biology:

- Adaptations:
    - Bony fish surviving in near freezing water (or adaptations in deep sea fishes)
    - Sea birds
    - Whales and their relations
- General characters of bony and cartilaginous fishes.

UNIT - 4 Marine organisms:

- Microorganisms:
    - Phytoplanktons
    - Zooplanktons
    - Red algae
    - Brown algae
    - Green algae
    - Multicellular algae

- Economic importance of algae

- Macro organisms:
  - Invertebrates-Economic importance
    - Marine sponges
    - Molluscs
    - Arthropods (crab and prawns).
  - Vertebrate: Economic importance
    - Scoliodon (sharks)
    - Marine mammals (whales and dolphins)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y.B. Sc. SEM – IV
ZOOLOGY PAPER – III (Z – 401)
(Effective from June 2020)
(Non-chordates, Evolution and Economic Zoology)

UNIT - 1 Classification:

- General study of Non-Chordate Phyla up to Subclass with examples:
  - Arthropoda
  - Mollusca
  - Echinodermata
  - Hemichordata.

UNIT – 2 Type study:

- Study of the following animal types with reference to the structure and functions of various organs of all systems of **Pila**:
  - Classification and external characters
  - Digestive system
  - Respiratory system
  - Blood vascular system
  - Excretory system
  - Nervous system
  - Reproductive system

UNIT – 3 Evolution and adaptations:

- Evidence of evolution from comparative functional anatomy:
  - Homologous
  - Analogous and vestigial organs
  - connecting link
  - Atavism (Reversion)
  - Protective coloration and mimicry

UNIT - 4 Economic Zoology:

- Dairy Farming:
  - Definition of Dairy and other allied aspects, Indian breeds of cows and buffaloes,
  - Milk and milk by-products
- Apiculture:
  - Life-history of Honey-bees
  - Types
  - Castes
  - Structure of honeycomb
  - Economic importance of honey and wax

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y.B. Sc. SEM – IV
ZOOLOGY PRACTICAL (Based on Paper - Z – 401)
(Non-chordates, Evolution and Economic Zoology)

The following practicals are to be taught/studied **only** with the help of charts, models, videos, photographs, permanent slides, working models etc.

1 - **Classification** of following animals upto sub-class. (with the help of specimens, photographs, charts, models etc.)

- Peripetus
- Crab
- Julus
- Palaemon
- Silverfish
- Termite
- Butterfly
- Chaetoderma
- Unio
- Aplysia
- Sepia
- Starfish
- Brittle star
- Sea cucumber
- Feather star
- Balanoglossus

2 - **Pila** to be taught/studied only with the help of charts, models, videos, photographs, permanent slides, working models, simulators etc.

- External features
- Digestive system
- Reproductive system
- Nervous system
- Mountings:

- Osphradium
- Radula
- Statocyst

3 - **Evolution**

- Homologous organs-Forelimbs and hind limbs of chordates
- Analogous organs-Wings of butterfly, birds and bats
- Vestigial organs-Caecum and vermiform appendix in man ,hindlimbs in python, leg bones in whale
- connecting link-Archaeopteryx,Ornithorhyncus,Peripatus
- Atavism (Reversion)- Human babies with a tail, Dolphins with legs, Iris dogman

4 - **Protective coloration and mimicry**

- Leaf insect
- Stick insect
- Lantern fly
- Eye spot Butterfly
- Australian seahorse
- Rattle snake

4 - **Economic Zoology:**

- Dairy Farming:
  - Indian breeds of cows and buffaloes
- Apiculture:
  - To study Life history of Honey bee
  - Queen
  - Drones
  - Workers
  - Honey and Wax
  - Modern movable beehive

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y. B.Sc. SEM – IV
ZOOLOGY PAPER – IV (Z – 402)
(Effective from June 2020)
(Chordates, Embryology and Osteology)

UNIT – 1 Classification:

- Introduction to classification: General study of the following chordates up to subclass with examples:
  - Reptilians
  - Aves
  - Mammals

UNIT – 2 Animal Type Study:

- Study of the **Uromastix** with reference to their structure and functions of various organs of all systems:
  - External characters
  - Digestive system
  - Circulatory systems
  - Urinogenital system
  - Brain

UNIT – 3 Embryology:

- Different types of eggs
- Cleavage patterns
- Development of frog (up to neurulation)
- Metamorphosis

UNIT – 4 Osteology:

- Comparative Study in frog, varanus, pigeon and rabbit
  - Fore limbs
  - Hind limbs

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y.B. Sc. SEM – IV
ZOOLOGY PRACTICAL (Based on Paper - Z – 402)
(Chordates, Embryology and Osteology)

The following practicals are to be taught/studied **only** with the help of charts, models, videos, photographs, permanent slides, working models etc.

1 - Classification of following animals upto sub-class. (with the help of specimens, photographs, charts, models etc.)

- Calotes
- Draco
- Testudo
- Python
- Krait
- Aligator
- Pigeon
- Wood packer
- Vulture
- King fisher
- Echidna
- Kangaroo
- Loris
- Porcupine
- Squirrel
- Dolphin

2 - The following practicals of **Uromastrix** to be taught/studied only with the help of charts, models, videos, photographs, permanent slides, working models, simulators etc.:

- Digestive system
- Circulatory system
- Urinogenital system
- Dorsal and ventral view of brain

3 – Study of frog embryology (with the help of models /charts /specimens /photographs /permanent slides etc).

- Uncleaved egg
- 2 cell stage
- 4 cell stage
- 8 cell stage
- 16 cell stage
- Blastula
- Gastrula
- Metamorphosis (Tadpole larva)

4 - Osteology:

- Comparative Study in frog, varanus, pigeon and rabbit
  - Fore limbs
  - Hind limbs

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y. B.Sc. SEM – IV
ZOOLOGY PAPER – III (Z – 403)
(Biochemistry, Genetics and Animal Physiology)

UNIT – 1 Biochemistry

- Classification of
  - Carbohydrates
  - Proteins
  - Lipids

UNIT – 2 Genetics:

- Epistasis genes
- Concept of lethal alleles and pseudo alleles

UNIT – 3 Physiology:

- **Nervous coordination:**
  - Synapse and mechanism of nerve impulse conduction
  - Structure and function of sense organs (human) eye & ear

UNIT – 4 Physiology:

- **Excretion and osmoregulation:**
  - Structure of uriniferous tubule
  - Physiological process of excretion (including counter current mechanism) and urine formation; hormonal control (rennin angiotensin system and ADH); Osmoregulation in fresh and marine waters
  - Osmosis, diffusion and Donnan's equilibrium

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y. B. Sc. SEM – IV
ZOOLOGY PRACTICAL (Based on Paper - Z – 403)
(Biochemistry, Genetics and Animal Physiology)

The following practicals are to be taught/studied **only** with the help of charts, models, videos, photographs, permanent slides, working models etc.

1. Qualitative test for organic compound:

- Carbohydrates:
  - Glucose
  - Fructose
  - Maltose
  - Lactose
  - Sucrose
- Proteins:
  - Albumin
  - Casein

2. Genetics:

- To study Epistasis genes, lethal alleles, pseudo alleles by chart.

3. Physiology:

- To determine normal constituents of urine.
- To determine abnormal constituents of urine.

4. Physiology:

- To study different types of Sensory organs –human eye and ear.
  Different types of nerve cells.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y. B.Sc. SEM – IV
MARINE SCIENCE (EG)

UNIT-1

- Types of seashores and their fauna:
  - Sandy shore
  - Rocky shore
  - Estuaries

UNIT-2

- Coral and coral reefs:
  - Types
  - Economic importance and threats.
- Voyage of green sea turtle.

UNIT- 3

- Introduction to aqua culture:
  - History
  - Scope
  - Present status

General idea of different aquaculture practices:

- Monoculture
- Polyculture
- Extensive culture
- Intensive culture

UNIT-4

- Marine Pollution:
  - Causative factors and impacts

Reference Books for Z-301 & 401

1. Living Invertebrates, 1987: Pearse, Buchsbaum, Blackwell Scientific Publication, California.
2. A Text book of Zoology Invertebrates, Vol. I 1992, 7th Edn. Parker and Haswell edited by Marshall William, C B S publishers and distributors, New Delhi.
3. Invertebrate Zoology, 1992; S. N. Prasad, Vikas Publishing House, New Delhi.
4. Life of Invertebrates, 1992; S.N. Prasad, Vikas Publishing House, New Delhi.
5. Invertebrate Zoology, 1992 4th Edn., reprint, P.S. Dhami and J. K. Dhami, R. Chand and Co., New Delhi.
6. Modern text book of Zoology, Invertebrates 10th Edn., 2009, R.L. Kotpal, Rastogi publ., Meerut.
7. Invertebrates Structure and Function, 2nd Edn.1979, EJW Barrington, John Wiley and Sons Inc.
8. Invertebrates Zoology, 1994, 6th Edition, Ruppert, E. Edward, R. D. Barnes; Saunders college Publishing, USA.
9. Invertebrate Zoology, 1991, P.A. Meglitsch and F. R. Schram, Oxford University Press; New York.
10. Invertebrate: A New synthesis, 1988, R.S.K. Barnes, P. Calow and P.J.W., Olive Blackwell Scientific, U.K.
11. An Introduction to Protochordata, 1990, H. S. Bhamrah and KavitaJuneja, Anmol publication, New Delhi.
12. The invertebrates: Protozoa through CtenophoraVol.I, 1959, Hyman, Libbie Henrietta, McGraw-Hill Book Co., Inc. New York.
13.A text book of Zoology, Vol.II, 1990, T. J. Parker and W. A. Haswell, Low price Publication, Delhi.
14.Applied Zoology,2016,Tarit Kumar Banerjee,N.C.B.A.,(P)LtdLondon
15.Economic Zoology,Biostatistics and Animal Behaviour,2005-2006,Rastogi Publication,Shukla,Mathur,Upadhyay,Prasad

Reference Books for Z-302 & 402

1. A text book of Zoology, Vol.II, 1990, T. J. Parker and W. A. Haswell, Low price Publication, Delhi.
2. Modern Text Book of Zoology, 1992, R. L. Kotpal, Rastogi Publication, Meerut.
3. Chordate Zoology, 1982, P. S. Dhami and J. K. Dhami, R. Chand and Co., New Delhi.
4. The life of Vertebrates, 3rd edn.1993, J. Z. Young, Oxford University Press, USA.
5. The Phylum Chordata: Biology of Vertebrates and their Kin, 1987, H. H. Newman, Distributor Satish book enterprise, Agra.
6. A text book of Zoology, 1984, R. D. Vidyarthi, S. Chand and Co., New Delhi.
7. Comparative Anatomy of the Vertebrates, G. C. Kent, R. K Carr,9thEdn., 2001, McGraw Hill, Boston, USA
8. Practical Zoology Invertebrates, 11th revised Edn., 2014, S. S. Lal, Rastogi publ.,Meerut.
9. Vertebrate Practical Zoology, 11th revised Edition, 2014, S. S. Lal, Rastogi publ.,Meerut.
10. Practical Zoology, 2004, Vijay Laxmi Sharma, Paragon International Publishers.
11. The anatomy of Garden Lizard, 1974, S.Y. Paranjape, Pune University Publication,Pune.
12. Chordate Zoology, 2009 reprint, E. L. Jorden, S. Chand and Co., New Delhi.
13. Text book of Zoology, Vertebrates, Vol. II, T.J. Parker and W.A. Haswell, edited by Marshall and Williams, CBS Publications, New Delhi.
14. An Introduction to Embryology 2012, 5thEdn., Balinsky B. L., Fabian B. C. Brooks Cole Pub. Co., USA.
15. Developmental Biology: Patterns**,** principle and problems, 1982, Saunders J. W., Prentice Hall Coll Div.
16. Developmental Biology 1992 3rd den Browder L. W., Erickson C.A. & Jeffery W. R., Saunders college pub., London.
17. Developmental Biology, 2013, 10thEdn. Gilbert S. F., Sinauer Associates Inc.

Reference books for Z-303 & 403

1. Principles of Biochemistry, 1993, 2nd Edn, Lehninger A. L. Nelson D.L. & Cox M.M.
CBH Publisher and distributors, Delhi.
2. Biochemistry, 1995 5th Edn. Zuby G. Wm, C.Brown Communications USA
3. Harpers Biochemistry ,1996 ,26 th Edn., Murray R.k.,Granner D.K. ,Mayes P.A. &Rodwell
V.W. Prentice Hall international USA.
4. Outline of biochemistry, 1995 5th Edn, Conn E.E., Stumph P.K. Bruening G &Doi R.H.John Wiley & Sons, USA
5. Principals of Biochemistry, 1993, 1st Edn., Pattabhiraman T.N.,Gajanan Book publisher s and distributors Bangalore.
6. Clinical Biochemistry, 1994, B. P. Godkar, Bhalini Publishing house, Mumbai.
7. Biochemistry, 1995 5th Edn, Stryer Sanfrancisco, W. H. Freeman & Co.
8. Biochemistry, 1990, 8th Edn., D.Voet & J. Voet, JohnWilley, New York
10. Introduction of Medical Laboratory Technique,1998, 7th Edn., Baker F. J., Silverton R.
E., Pallister C. J., Butterworth-Heinemann, UK
11. Hematology: Basic Principles and Practice, 2008, 5th Edn., Ronald Hoffman , Bruce Furie, Philip McGlave, Churchill Livingstone Elsevier, USA
12. Histological and Histochemical Methods, Theory and Practice, 2008, 4th Edn., John A.Kiernan, Scion Publishing Ltd, UK
13. Basic Separation Techniques in Biochemistry, 1998, Okotore R. O., New Age International, New Delhi.
14. Cytological techniques: The Principles Underlying Routine Methods, 1963, Baker J.R, Methuen & Co, London
15. Davenport H. A.: Histological and Histochemical techniques.
16. Handbook of basic Microtechnique, 1958, 2nd Edn., Gray P., McGraw-Hill, USA
17. The microscope and how to use it, 1970, George Stehli, Dover Publications Inc., New York.
18. Histopathological technique and Practical Histochemistry, 1976, 4th Edn, Lillie R.D McGraw-Hill, USA

19. Staining methods (Histological and Histochemical), 1960, Mc Manus J. F. A. And Mowry R.W., Paul B. Hoeber, Inc.; Harper & Brothers, NY
20. Notes on Microscopical Techniques for Zoologist, 1964, Pantin C. F.A.: Cambridge University Press
21. Elementary Microtechnique, 1973, 4th Edn., Peacock H.A., Edward Arnold Publ. Ltd., UK
22. Histochemistry, 1968, Pearse A.G.E., Vol. I & II., W.B. Saunders Company (WBS) of Philadelphia
23. Microscope and microscopic life, 1979, 2nd Edn., Peter Healey, Hamlyn, UK
24. Biological Instrumentation and methodology, 2008, 2nd Revised Edition, P.K. Bajpai, S. Chand and Co. Ltd., New Delhi.
Textbook of Medical Physiology, Guyton A.C. & Hall J.E., 2006, 11th Edition, Hercourt Asia Pvt. Ltd. / W.B. Saunders Company
25. Principles of Anatomy & Physiology, 2006, 11th Edition, Tortora G.J. & Grabowski S., John Wiley & sons, Inc.
26. Human physiology, Vol. I & II, 1980, 12th Edn. Dr. C. C. Chatterjee, Medical applied agency, Kolkata
27. Text book of Animal Physiology, 2008, 2nd Edn. Nagabhushanam, S. V. S. Rana, S. Kalavathy, Oxford University Press, India.
28. Animal Physiology: Adaptation and Environment, 1997, Schmidt-Nielsen, Knut, Cambridge University Press,
29. General and Comparative Physiology, 1983, 3rd Edn., Hoar W. S., Prentice Hall, UK.
30. Medical Physiology, 2006, Asis Das, Books and Allied Pvt. Ltd., Kolkata
31. Endocrinology, 2005, Lohar P. S., M J P Publishers, Chennai
32. Vander, Sherman, Luciano's Human Physiology: The Mechanisms of Body Function, 2003, 9th Edn., Eric P. Widmaier, Hershel Raff , Kevin T. Strang , Mc Graw Hill
33.Textbook of Practical Physiology,2001,G.K.Pal,Pravati Pal:Orient Longman
34.Experimental Physiology,2005,S.C.Rastogi:New AgeInternational Publishers.

Reference Books For Marine Science:

1) Fundamentals of Ecology- E.P.Odum
2) Marine biology and Ecology-N.K.Pillai
3) Fishes-Mary Chandy
4) Fish and Fisheries of India-V.G. Jhingran
5) Fish and Fisheries-S.S.Khanna.
6) Marine Fish Farming for India-James Hornell
7) Introduction to Marine Biology-Karleskint
8) Marine fisheries Extension-P.N.Ananth
9) General and Applied Ichthyology(fish and fisheries)-S.K.Gupta & P.C.Gupta.:S.Chand and Co.NewDelhi.
10) Aquaculture Technology & Environment-Ujwala Jadhav.
11) Economic Zoology- Dr.G.S.Shukla &Dr.V.B.Upadhyay
12) Fish and Fisheries,2013,Dr.Arvind N.Shukla,D.P.H.Pvt.Ltd.New Delhi
13) Economic Importance of Fisheries and Aquaculture,2013,S.K.Rao & S.Rawat,Campus Books, New Delhi

Page 1 of 2

Veer Narmad South Gujarat University, Surat

M. Sc. Biotechnology Semester-X

List of Research Papers: 2020-2021

BT: R-4002 Review of Published Research Paper/Article

Sr. No.	Title
1.	A liposomal formulation of.... Journal of Nanobiotechnology
2.	Non-invasive early detection of cancer.... Nature Communications
3.	Au-Ag assembled on silica.... Journal of Nanobiotechnology
4.	Characterization and Engineering of.... PNAS
5.	Plant-associated bacteria mitigate.... Environmental Sc. and Pollution Research
6.	Entry of Human Coronavirus NL63.... Journal of Virology
7.	Aerobic microbial life persists... Nature Communications
8.	Genome-wide identification, expression.... Journal of Plant Biology
9.	Identification of differently expressed.... Current Genomics
10.	Potential of Bacillus pumilus.... Biotecnologia Vegetal

26/03/2021 26/3/21 26.3.2021

P.G.DIPLOMA

IN

MEDICAL LABORATORY TECHNOLOGY

Post Graduate Diploma in Medical Laboratory Technology (PGDMLT) is a one year Post-Graduate (Post B.Sc.) course.

1. Title of the Course: P.G. Diploma in Medical Laboratory Technology (PGDMLT)

2. Eligibility: Candidate should have a B.Sc. degree of Veer Narmad South Gujarat University, Surat with (A) or (B) or equivalent qualification of other recognized University.

(A)Microbiology, Chemistry (Biology at F.Y. B.Sc. level), Botany, Zoology, Medical Technology, MLT, Environment , Biochemistry, Biosciences, Life sciences or Biotechnology as the principal subjects

(B) M.B.B.S, BDS, BAMS, BHMS, B.sc Nursing, B.sc Optometry, B. Pharmacy, B. Physiotherapy

3. Admission: Admission to the course should be done once in a year. The course will begin in the month of July, each year (After declaration of B.Sc. results of Universities) and will extend over two academic terms – July to October and November to April.

4. Learning objectives:

1. To have theoretical and practical knowledge about principles, procedures, interpretation and preparation of reagents for routine clinical laboratory investigations performed for laboratory diagnosis of various human diseases, so that after completion of the course the candidate may be able to perform routine clinical laboratory investigations in any clinical laboratory.

2. To have theoretical and practical know-how in advanced newer techniques so that trained personnel can apply these wherever facilities exist.

The learner at the end of the course will –

- Be able to work as technician in laboratories attached to hospitals under the supervisions of senior officers like Biochemist, Microbiologist or Pathologist.
- They may be employed in a small laboratory functioning independently or attached to a doctor's clinic. Nature of the job dictates that the candidate should give more emphasis on learning of practical skills along with a basic knowledge of the subject.
- Be able to carry out the routine tests in all these fields personally. He / She will maintain effective quality control and provide the patient with reliable reports.
- Will acquire the necessary oriental knowledge and practical skill expected of him for the fulfillment of above objectives.
- Aacquire theoretical knowledge and practical skill leading to further specialization in the elective field.
- Process information and ensure quality control as appropriate to routine laboratories
- Upgrade knowledge and skills in a changing healthcare scenario
- Appreciate and follow the ethical standards of the profession and will demonstrate qualities of honesty and accuracy towards his work and sympathy towards the suffering patients.

5. Duration: One Year (Full Time)

6. Pattern: Annual

7. Medium of Instruction: English

8. Structure of the Course:

i. Total number of papers: THEORY: 4; PRACTICAL: 4

A student offering this course will study Papers I, II, III, IV & Practicals based on these papers.The teaching per week for 4 papers is 16 hours & there are 16 hours per week for practicals.

ii. Pattern of Examination: The examination shall be held for 700 marks.

The total marks of papers are 280 for University examination, distributed as 70 of each paper of 3 hours duration & the internal evaluation is of 120 marks distributed as 30 of each paper. The total marks of practicals are 210 for University examination, distributed as 54 for practical paper-I & practicals papers II, III, & IV are each of 52 marks. The internal evaluation for practical is of 90 marks distributed as 24, 22, 22, & 22 for practical based on Paper I, II, III & IV respectively. The University examination for practicals based on paper I is of 12 hours distributed over a period of 2 days & for practicals based on paper II, III, & IV are of one day each & 6 hours per day.

Theory examination for four subjects shall be conducted on separate days. Practical examination for four subjects will be conducted on five consecutive days.

University examination for DMLT will be conducted at the end of the course i.e. after completion of two academic terms. For failed candidates, midterm examination will be conducted in month of October or November.

iii. Nature of Question Paper (Theory): For university examination there shall be a question paper of 70 marks and three hours duration, for each subject. The paper shall be of following nature –PAPER STYLE

Paper No (Code) & Name of Paper; Section: Name of subject (35 Marks)

Q-1. Objective type Question (Multiple Choice/True or False/Short Answer type from all 6 Units(5 out of 6) 05 Mark.

Q-2. Descriptive Questions from Unit 1& 2(2 out of 3) 10 Marks

Q-3. Descriptive Questions from Unit 3& 4 (2 out of 3) 10 Marks

Q-4. Descriptive Questions from Unit 5& 6 (2 out of 3) 10 Marks

iv. Teaching and Examination hours break up:

PAPER NO.	**PAPER CODE**	**TITLE OF THE PAPER/NAME OF THE SUBJECT**	**TOTAL MARKS**			**UNIVERSITY EXAM DURATION (HRS)**	**NO. OF LECTURES (1 HOUR DURATION) PER WEEK**
			External	Internal	Total		
1	DMLT 1	Medical Microbiology & Immunology	70	30	100	3	4
		Practical in Medical Microbiology & Immunology	54	24	78	6X2=12	4
2	DMLT 2	Clinical Pathology & Parasitology	70	30	100	3	4
		Practical in Clinical Pathology & Parasitology	52	22	74	6	4
3	DMLT 3	Haematology & Blood Banking	70	30	100	3	4
		Practical in Haematology & Blood Banking	52	22	74	6	4
4	DMLT 4	Fundamentals in Medical Laboratory Technology & Clinical Biochemistry	70	30	100	3	4
		Practical in Fundamentals in Medical Laboratory Technology & Clinical Biochemistry	52	22	74	6	4
Total			490	210	700		32

v. Standard of Passing:

a. Candidate must obtain 40 % marks in theory papers and practical papers separately.

b. There will be a separate head of passing for theory papers and practical. If candidate fails in one of the heads, he / she has to reappear only for the failed head.

c. Training – The candidate has to complete the training in any recognized clinical laboratory or institute or hospital, of a period of minimum 30 days in each of the practical subject.

vi. Qualification of the Examiners:

All examiners on the University panel for theory and practical should have Master degree in the subject/ relevant subject. There will be two examiners (Preferably one internal and one external) for practical examination in each subject.

Introduction:

Medical Laboratory Technology/Medical Technology is the branch of science which deals with all the clinical laboratory investigations on clinical samples for laboratory diagnosis of various diseases. Blood, tissue and body fluids are analyzed and examined for various types of foreign organisms and abnormalities. This information is then used by the medical team to make decisions regarding a patient's medical care. 85% of all medical decisions are based on the results of clinical laboratory investigation reports.

Medical Laboratory Science is an important subject in the field of Medicine. In each system of Medicine, diagnosis of disease is a primary step because no treatment is possible without a proper diagnosis. It is the Medical Laboratory Technocrat, who performs this important task by various scientific tools and techniques. In today‘s modern world of technology, the diagnosis, treatment & prognosis of various diseases depends upon the results of investigations carried out in a clinical laboratory. Thus, these professionals play a key role in the field of health care. Medical Laboratory Science has played a significant role in the advancement in the field of Medicine, especially in past few decades. As modern medicine becomes more of a team effort, the Medical Laboratory Scientist/Technologist is an important member and integral part of the Medical team.

Definition of Medical Laboratory Technology/Science:

“A medical laboratory professional (also referred to as a Medical Laboratory Technologist, a Clinical Laboratory Scientist or Clinical Laboratory Technologist) is a healthcare professional who performs chemical, hematological, immunologic, microscopic and microbiological diagnostic analyses on body fluids such as blood, urine, sputum, stool, cerebrospinal fluid (CSF), peritoneal fluid, pericardial fluid, and synovial fluid, as well as other specimens. Medical laboratory scientists work in clinical laboratories at hospitals, reference laboratories, biotechnology laboratories and non-clinical industrial labs.”

Education of the medical laboratory professional

When developing any education programme, it is necessary that programme planning should be outcome-based and should meet local and national manpower requirements. It should also provide personal satisfaction and career potential for the professionals with supporting pathway in the development of the profession. One of the major changes is the shift from a focus based on traditional theoretical knowledge, to a skills-and competencies-based education and training. Optimal education/training requires that the student is able to integrate knowledge, skills and attitude in order to be able to perform a professional act adequately in a given situation. Thus, the following curriculum is prescriptive, aims to focus on a skills-and competencies-based approach for learning and is designed accordingly to standardize the content across the nation.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
REVISED SYLLABUS FOR P.G.DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY
SUBJECT CODE: DMLT 1: PAPER – I: MEDICAL MICROBIOLOGY & IMMUNOLOGY
SECTION – I: MEDICAL MICROBIOLOGY

Rationale: The Medical Microbiology course has been formulated to impart basic and medically relevant information on the microbes. The microbial structure, growth and development, methods and role of sterilization in the context of study of microbes are included. The pathogenic microbes and the diseases caused by them are included to broaden the perspective of the subject. This course will also focus on mechanisms of microbial pathogenesis and the host response, and the scientific approaches that are used to investigate these processes. Lastly the course deals with the problem of emerging antimicrobial resistance with reference to known pathogens.

Unit	Topics	Content/ Fundamental Concepts
1.	INTRODUCTION TO CLINICAL MICROBIOLOGY	1.1 EVOLUTION AND HISTORY OF MICROBIOLOGY: a) Definition b) History c) Discovery of microorganisms d) Contributions of Louis Pasteur and Robert Koch in Medical Microbiology. 1.2 CLASSIFICATION OF MICROORGANISMS: a) General characteristics of prokaryotes & eukaryotes b) Morphological classification of bacteria c) Introduction to Bacterial cell structures 1.3 MICROSCOPY a) Introduction and history b) Types of microscopes: Principles & Components i. Light microscope ii. Dark field microscope iii. Fluorescent iv. Phase contrast v. Electron microscope: Transmission/ Scanning c) Importance and applications of dyes, stains, fixatives, mordent and intensifiers.

2.	PURE CULTURE STUDY	2.1Types of media: Principle, composition and use a) Nutrient Agar b) Mac Conkey Agar c) Eosin Methylene Agar d) CLED Agar e) W B Agar f) Kings Agar g) MSA h) PSA 2.2 Methods of Cultivation a) Broth, slant and Stab b) Enrichment technique 2.3 Methods of Isolation 2.4 Preservation
3.	STERILIZATION AND DISINFECTION	3.1 Sterilization a) Introduction and Definition b) Principles and applications 3.2 Physical Methods a) Heat b) Radiation c) Filtration 3.3 Chemical methods a) Alcohol b) Phenol & Phenolic compounds c) Hypochlorite d) ETO e) β- propionolactone 3.4 Ideal characteristics and mode of action of Disinfectants 3.5 Antibiotic susceptibility test by disk diffusion technique
4.	LABORATORY DIAGNOSIS OF INFECTIOUS DISEASES	4.1 Collection, preservation, transport, processing and disposal of following clinical samples for culture a) Blood b) Throat c) Sputum d) Pus e) Urine f) Stool g) C.S.F h) Other body fluids
5.	CLINICAL BACTERIOLOGY	5.1 Identification of microorganisms by morphological, cultural and biochemical characteristics *a) Staphylococcus aureus* *b) Bacillus cereus* *c) Escherichia coli* *d) Klebsiella spp.* *e) Enterobacter aerogenes*

		f) Proteus vulgaris *g) Salmonella spp.* h) *Pseudomonas aeruginosa* 5.2 Pathogenesis and laboratory diagnosis of microbial disease a) TB b) Syphilis c) Diphtheria d) Food poisoning e) Typhoid f) Leptospirosis 5.3 Nosocomial Infections 5.4 Automation a) BACTEK b) VITEK
6	CLINICAL MYCOLOGY & VIROLOGY	6.1 Mycology a) Introduction of Mycosis b) Morphology of fungi c) Specimen collection & diagnostic methods of fungal infection 6.2 Virology: Morphology, Pathogenesis and Laboratory diagnosis of a) Hepatitis b) AIDS c) Dengue d) Chikungunya

REFERENCE BOOKS:

1. Godkar P B.Text book of Medical Laboratory Technology, 2nd Edn.2003 Bhalani Publication.
2. Ananthnarayan R. and Jayram Paniker C.K. Text book of Medical Microiology,5th Edn. Orient Longman, Madras.
3. Mackie and McCartney Medical Microbiology. A Guide to Laboratory Diagnosis and control of Infection.13th ed., J.P.Duguid, B.P.Marmion and R.H.A.Swain, The English Language Book Society and Churchil Company.
4. Cheesbrough Monica ,District laboratory practice in tropical countries VOL-1 & 2, , Cambridge University Press.
5. Prescott M,Harley John P., Microbiology, 8th edition, Lansing, Donald A. Klein, McGraw Hill.
6. A text book of Microbiology and immunology, 2nd Edition, Subhash Chandra Parija, ELSEVIER, a division of Reed Elsevier India Private Ltd.
7. Modi H.A.,Elementary Microbiology,Fundamentals of Microbiology,Vol-1,Akta Prakashan,Nadiad
8. Mukharjee K.L. (1999),*Medical Laboratory Technology*,Vol II, 2nd ed .,Tata MacGraw Hill.

SECTION – II: IMMUNOLOGY

Rationale: The students will learn how to analyze various clinical patients samples, for estimation of different components which are the cause of the immune disease or are the diagnostic/prognostic markers. This subject gives information about various clinically important cells of immune system, lymphoid organs, antigen, antibody, Ag-Ab. reactions, transplant immunology etc. & automation techniques.

Unit	Topics	Content/ Fundamental Concepts
1.	IMMUNITY	1.1 Introduction 1.2 Classification of immunity a) Innate immunity b) Acquired immunity c) Active & Passive immunity d) Cell mediated immunity e) Humoral immunity 1.3 Organs and cells of immune system
2.	ANTIGEN & ANTIBODY	2.1 Antigens a) Defination, Characterstics ,Properties of antigen b) Classification of antigens. c) Types of Antigen- Haptens and Epitopes 2.2 Antibodies/ Immunoglobulins a) Defination, Characterstics,properties,Structure & Types of immunoglobulins b) Monoclonal Antibodies and their production c) Polyclonal antibody
3.	ANTIGEN-ANTIBODY REACTION	3.1 Defination, Mechanism and Factors affecting antigen –antibody reactions. 3.2 Principle, procedure and applications of various antigen antibody reactions a) Precipitation b) Agglutination c) Fluorescent – antibody technique d) RIA e) Enzyme linked immunosorbent assay (ELISA) f) Complement fixation test 3.3 Immunochromatograghy
4.	COMPLEMENT & VACCINES	4.1 Introduction, types & functions of complement system. 4.2 Introduction & types of vaccine. 4.3 Vaccination Schedule in India
5.	IMMUNOLOGICAL DISORDER	5.1 Hypersensitivity: Classification and Immunological basis 5.2 Auto-immunity: Mechanisms and classification of auto immune disorders 5.3Immunodeficiency: Immunological basis of Primary and secondary Immunodeficiency Diseases

6.	ADVANCED DIAGNOSTIC TECHNIQUES	6.1Blotting Techniques 6.2 Nucleic acid amplification test(NAT) 6.3 Chemilumenescence.

REFERENCE BOOKS:

1. Ananthnarayan R.and Jayram Paniker C.K. Text book of Medical Microiology,5th Edn. Orient Longman, Madras.
2. Godkar P B.Text book of Medical Laboratory Technology, 2nd Edn.2003 Bhalani Publication.
3. Roitt I.M.,Essential Immunology, 6 th Edn. ELBS, London
4. Talwar G. P., A Hand book of Practical Immunology,1st Edn. Vikas Publishing House.
5. Owen,Judith A. ,PuntStanford,Sharon A.,Jones,Patricia P., Kuby Immunology.,7th ed.Macmillan Higher education Pub.

PRACTICAL BASE ON PAPER-1

SECTION-I:MEDICAL MICROBIOLOGY

1. Study of Compound Microscope.
2. Cleaning, Neutralization and preparation of glassware for sterilization.
3. Examination of living Bacteria.
    a) Wet mount preparation
    b) Hanging – drop technique.
    c) Semisolid stab agar test.
4. (A) Staining of the bacterial cell
    a) The Simple Stain
    b) The Negative Stain.

   (B) Differential Staining
    a) The Gram Stain
    b) The Acid fast Staining.

   (C) Special Staining
    a) The Spirocheate Stain
    b) The Metachromatic Granules Stain.
    c) The spore Stain
    d) The Capsule Stain
5. Study of some important biochemical reactions.
    a) Indole Test.
    b) Methyl red Test.
    c) V.P. Test.
    d) Citrate Utilization Test.
    e) H_2S Production (2% peptone)
    f) Study of TSI slants with different
    g) Fermentation of Sugars
    h) Test for enzyme activity-Oxidase, Catalase, Coagulase, Urease,
6. Preparation of media, pH adjustment and preparation of buffers

   (A) Bacteriological Media
    a) Nutrient agar
    b) MacConkey' agar
    c) EMB agar

d) Wilson & Blair's agar for Salmonella sp.
e) CLED medium for Urinary Tract Infection.
f) King's medium for Pseudomonas sp.
g) Manitol Salt agar for *Staphylococcus* sp.

(B) Mycological Media

a) Potato – dextrose agar.
b) Glucose Yeast Extract agar.
c) Sabouraud's agar

7. Pure culture study of the following cultures.

(i) *Bacillus cereus*
(ii) Staphylococcus aureus
(iii) Escherichia coli
(iv) Enterobacter aerogenes(Klebsiella mobillis)
(v) Klebseilla pneumoniae
(vi) Proteus vulgaris
(viii) Salmonella typhi / paratyphi A / paratyphi B
(ix) Pseudomonas aerugenosa

7. Demonstration of common fungi - Penicillin, Aspergillus, Rhizopus, Mucar, Yeast.
8. Schematic Processing/Methods of Isolation and identification of aerobic and anaerobic bacteria/pathogens from pathological specimens- Blood; Urine; Stool; Pus; CSF; Sputum; Body Fluid; Ear Swab; Eye Swab; Nasopharyngeal Swab; Throat Swab
9. Antimicrobial susceptibility testing by Kirby-Bauer disc diffusion method

SECTION-II: IMMUNOLOGY

Diagnostic tests:

1. ICT/Dot immunoassay/ Flow through assay for HIV Ab
2. ICT/Dot immunoassay/ Flow through assay for HBs Ag
3. ICT/Dot immunoassay/ Flow through assay for HCV Ab
4. Slide / Tube/ Strip / Cassette, Dot immunoassay test for typhoid
5. Slide test for syphilis/Flow through /Spot/ Immunodot for Syphillis
7. Slide / Strip / Cassette test for Pregnancy
8. Latex test for Rheumatoid arthritis
9. Latex test for C-Reactive protein
10. Latex test for Anti Streptolysin O (ASO).
11. Leptospirosis ICT (Demonstration)
12. Chickungunya ICT (IgG,IgM) (Demonstration)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

REVISED SYLLABUS FOR P.G.DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

SUBJECT CODE: DMLT 2: PAPER – II: CLINICAL PATHOLOGY & PARASITOLOGY

SECTION – I: CLINICAL PATHOLOGY

Rationale: The candidates are imparted basic training of theoretical and practical in the field of clinical pathology.The training in this subject enables the students to carry out routine clinical laboratory

investigation (urine, stool, sputum etc.). The candidates are made to learn collection of clinical samples and their processing along with basic histopathological technique and recording of data.

Unit	Topics	Content/ Fundamental Concepts
1.	URINE ANALYSIS	1.1 Formation of urine and its composition 1.2 Indications,Collection, Preservation & Transportation of Urine specimen. 1.3 Routine Examination -Physical, Chemical & Microscopic. 1.4 Correlation of urinary findings in various diseases. 1.5 Automated Urine Analysis & Reagent Strip Method 1.6 Pregnancy Test
2.	STOOL ANALYSIS	2.1 Indication, Collection, Preservation, Transportation of stool 2.2 Routine - Physical, Chemical & Microscopic Examination of stool 2.3 Significance of presence of blood and excess fat in stool. 2.4 Occult blood – Detection 2.5 Concentration methods for detection of intestinal parasites
3.	SEMEN ANALYSIS	3.1 Formation of semen 3.2 Indication, Collection, Preservation, Transportation of semen specimen 3.3 Physical, Chemical & Microscopic Examination as per WHO Recommendation. 3.4 Medico – legal significance of Semen examination.
4.	CEREBROSPINAL FLUID	4.1 Formation of C.S.F. 4.2 Composition of CSF. 4.3 Collection, Preservation & Transportation of C.S.F. 4.4 Physical, Chemical & Microscopic Examination. 4.5 Correlation of Abnormal C.S.F. findings in various diseases.
5.	EXAMINATION OF BODY FLUIDS & SPUTUM	Formation ,Composition, Indications, Significance, Collection, Preservation, Transport and Routine Examination of 5.1 Pleural 5.2 Peritoneal 5.3 Pericardial 5.4Synovial fluid 5.5 Gastric Juice 5.6 Sputum
6.	HISTOPATHOLOGY TECHNIQUES	6.1Introduction to Histotechnology 6.2 Types of fixatives uses. 6.3 Decalcification 6.4 Basic concept of tissue processing. 6.5 Microtomy & Types of Microtome 6.6 Principle & Procedure of Staining techniques: H &E, PAP 6.7 Automated tissue processing 6.8 Museum- Technique & Specimen preservation. 6.9 FNAC

REFERENCE BOOKS:
1. Godkar P. B. (2014). *Textbook of Medical Laboratory Technology*, 3rd ed., Bhalani Publishing house.
2. Ochei J. & Kolhatkar A. 2000, *Medical Laboratory Science: Theory & Practice,* Tata McGraw Hill Pub.
3. Mukharjee K.L. (1999),*Medical Laboratory Technology*,Vol II, 2nd ed .,Tata MacGraw Hill.
4. Mohan H. (2005). *Textbook of Pathology*, 5th ed., Jaypee Brothers Medical publishers (P) LTD.
5. Sood R. (1994) *Medical Laboratory Technology*, 4th ed., Jaypee Brothers.
6. Kawthalkar S M, Essential of Clinical Pathology,2nd ed., Jaypee Brothers.

SECTION – II: PARASITOLOGY

Rationale: The candidates undergoing training medical laboratory technology are made to learn the techniques of collection of samples, their processing and identification of various parasitic pathogens, using different procedures with special reference to their habitat, morphology, life cycle and their isolation, identification for diagnostic purpose.

Unit	Topics	Content/ Fundamental Concepts
1.	GENERAL PARASITOLOGY	1.1 Introduction to Medical Parasitology with respect to terms used in Parasitology 1.2 General characteristics and Classification of Parasite 1.3 Types of Parasite and Types of Host 1.4 Host –Parasite Relationship 1.5 Mode of transmission 1.6 Laboratory Diagnosis of Parasitic Infection
2.	PROTOZOOLOGY I	Morphology, Life cycle,Mode of infection and Laboratory diagnosis 2.1 *Entamoeba histolytica* 2.2 *Trichomonas vaginalis* 2.3 *Naegleria fowleri* 2.4 *Acanthamoeba* species
3.	PROTOZOOLOGY II	Morphology, Life cycle ,Mode of infection and Laboratory diagnosis 3.1 *Leishmania donovani* 3.2 *Giardia lamblia* 3.3 *Plasmodium falciparum & Plasmodium vivax* 3.4 *Toxoplasma gondii*
4.	CESTODES	Morphology, Life cycle , Mode of infection and Laboratory diagnosis 4.1 General characteristics of Cestodes 4.2 *Taenia saginata* 4.3 *Taenia solium* 4.4 *Echinococcus granulosus*
5	TREMATODES	Morphology, Life cycle , Mode of infection and Laboratory diagnosis 5.1 General characteristics of Trematodes 5.2 *Schistosoma haematobium* 5.3 *Schistosoma mansoni* 5.4 *Schistosoma japonicum*
6	NEMATODES	Morphology, Life cycle,Mode of Transmission and Laboratory diagnosis 6.1 General characteristics of Nematodes 6.2 *Trichuris trichiura*

		6.3	*Strongiloides stercoralis*
		6.4	*Anchylostoma duodenale*
		6.5	*Enterobius vermicularis*
		6.6	*Ascaris lumbricoides*
		6.7	*Wuchereris bancrofti and Brugiya malayi.*

REFERENCE BOOKS:

1. Chatterjee K.D. (2009). *Parastology: Protozoology and Helthminthology in Relation to Clinical Medicine,* 13th ed., CBC Publishers & Distributors Pvt Ltd
2. Arora D.R. and Arora B. (2004). *Medical Parasitology,* 2nd ed., CBC Publishers & Distributors Pvt Ltd.
3. Godkar P. B. (2014). *Textbook of Medical Laboratory Technology*, 3rd ed., Bhalani Publishing house.
4. Ichhpujani RL and Bhatia Rajesh. *Medical parasitology*.3rd ed., JP
5. Chakraborty P. *Text book of Medical Parasitology*, 2nd ed., JP

PRACTICAL BASE ON PAPER-II

SECTION-I:CLINICAL PATHOLOGY

1. Routine Urine Analysis: Physical, Chemical, Microscopic examination & Reagent Strip Method
2. Routine Stool Analysis: Physical, Chemical, Microscopic examination.
3. Routine Cerebrospinal Fluid Analysis: Physical, Chemical, Microscopic examination.
4. Routine Sputum examination: Physical, Microscopic
5. Routine Gastric Juice Analysis: Chemical examination of gastric juice.
6. Routine Semen Analysis: Physical, Chemical, Microscopic examination.
7. Routine Body fluids - Peritoneal, Pleural, Pericardial, Synovial (each separately): Physical, Chemical, Microscopic examination.
8. Cutting, Fixation and processing of tissues (Demonstration).
   Staining – (i) Haematoxylin and Eosin for paraffin sections.
   (ii) PAP Stain for cytology.

SECTION-II:PARASITOLOGY

1 Routine stool examination for detection of intestinal parasites with concentration methods: (Demonstration)

a) Saline preparation
b) Iodine preparation
c) Floatation method
d) Centrifugation method
e) Formal ether method
f) Zinc sulphate method

2. Identification of adult worms, Tapeworm segments ,ova, cysts, and larvae of parasite from charts/photographs/models/slides
3. Malarial Parasite Microscopy:
   i. Preparation of thin and thick blood smears
   ii. Staining of smears
   iii. Examination of smears for malarial parasites (*P. vivax* and *P. falciparum*)
   iv. Demonstration of various stages of life cycle of malarial parasites from stained slides
4. Malaria Rapid diagnostic test (RDT/ICT)

5.Test for Filarial parasite: (slide/demonstration)

REVISED SYLLABUS FOR P.G.DIPLOMA OF MEDICAL LABORATORY TECHNOLOGY
SUBJECT CODE: DMLT 3: PAPER – III: HAEMATOLOGY & BLOOD BANKING
SECTION – I HAEMATOLOGY

Rationale: The training in this subject is imparted to enable the students to carry out routine clinical laboratory investigation in haematology or related to blood. They should be able to provide technical help for selected sophisticated hematological techniques with adequate knowledge of various principles.

Unit	Topics	Content/ Fundamental Concepts
1.	INTRODUCTION TO HAEMATOLOGY	1.1 Definition, composition and functions of blood. 1.2 Collection & Storage of blood :venous and capillary. 1.3 Various equipment used for collection of blood samples 1.4 Anticoagulants: Definition and various types along with their mode of action, uses, methods of preparation merits and demerits of each. 1.5 Formation of blood: Erythropoiesis, Leucopoiesis, Thrombopoiesis.
2.	HAEMOGLOBIN & HAEMOGLOBIN OPATHIES	2.1 Definition, types, structure of Hb 2.2 Hb Estimation: Different methods-(a) Colorimetric Method, (b) Sahli's Method, and (c) Specific Gravity Method. 2.3 Clinical importance, Normal ,abnormal values and Physiological variations 2.4 Haemoglobinopathies: Abnormalities of Haemoglobin Molecule. Sickle Cell Anaemia &Thalassemia 2.5 Tests for Haemoglobinopathies: Screening test : Sickling test, DTT, NESTROF Confirmative test: Electrophoresis & HPLC
3.	RED BLOOD CELLS & ANAEMIAS	3.1 RBC count: Normal, abnormal values, and Physiological variations 3.2 Morphology of normal and abnormal Red Blood Cells. 3.3 Reticulocyte count 3.4 Erythrocyte Sedimentation Rate (ESR), 3.5 Haematocrit: Pack Cell Volume(PCV) and Various Blood indices; their brief description 3.6 Anemia: Definition and classification of anemia; factor causing anemia a) Iron & B-12 deficiency anaemia. b) Aplastic anaemia c) Haemolytic anaemia & Sideroblastic anaemia. d) G-6PD deficiency anaemia.
4.	WHITE BLOOD CELLS & LEUKAEMIAS	4.1 Total White Blood Cell Count : Normal and abnormal values 4.2 Differential WBC Count :- Normal, abnormal values and physiological variation; Preparation of peripheral blood smear, Staining by different methods. 4.3 Introduction and general Classification of Leukaemias. Acute & Chronic Myeloid Leukaemias.

5.	HAEMOSTASIS & BLOOD COAGULATION	5.1 Coagulation Factors, Mechanism of Blood Coagulation. 5.2 Coagulation disorders, Haemophilia A & Haemophilia B 5.3 Platelet disorders and Platelet count. 5.4 Coagulation defect test – a) Bleeding time (BT), b) Clotting time(CT), c) Prothrombin time (PT), d) Activated Partial Thromo Plastin time (APTT), e) Thrombin time f) Fibrinogen g) D- dimer h) Fibrin degradation product.
6.	AUTOMATION & QUALITY CONTROL IN HEMATOLOGY	6.1 Basic concepts of automation in Haematology with special reference to: a) Blood cell counter b) Coagulometer 6.2 Quality control in Hematology.

REFERENCE BOOKS:

1. Godkar P.B, Textbook of MLT, 3rd edition, Bhalani Publications.
2. Mukherjee .L. K , Medical Laboratory Technology,Vol.1-3, 3rd edition, Tata McGraw Hill
3. Wintrobe's Clinical Haematology, 14th edition, Lippincott Williams & Wilkins
4. De Gruchy's Clinical Haematology in Medical Practice, Sixth edition, Wiley Publications
5. Sood Ramnik, Text book of Medical Laboratory Technology, 5th edition, Jaypee Publications
6. Dacie & Lewis Practical Haematology, 12th edition, Elsevier Publications
7. Kawthalkar S M, Essential of Clinical Pathology,2nd ed., Jaypee Brothers.

SECTION – II: BLOOD BANKING

Rationale: The candidates are taught the skill of blood collection from donors and preventive measures against communicable diseases. They should be able to perform different investigations, preservation and interpretation.

Unit	Topics	Content/ Fundamental Concepts
1.	BLOOD GROUP SYSTEM –I & II	1.1 ABO blood Group system, subgroup of ABO, Variants of ABO blood group system. 1.2 Rh blood group system. 1.3 Serological techniques for detection of ABO & Rh antigens. 1.4 Gel technique for blood grouping and serological Techniques. 1.5 AHG test. 1.6 Other Blood Group systems 1.7 Importance of Atypical antibodies, their detection and clinical significance
2.	BLOOD COLLECTION &COMPONENT PREPARATION	2.1 Screening of Donor 2.2 Phlebotomy of Blood Donor 2.3 Storage and transportation of blood 2.4 Mandatory screening tests-HIV1&HIV2, HBsAg, HCV, RPR & Malaria.

		2.5 Component preparation: a) Red cell concentrate b) Fresh Frozen Plasma c) Cryoprecipitate d) Platelet concentrate 2.6 Introduction of apheresis and Single donor platelet (SDP)
3.	COMPATIBILITY TESTING AND ISSUE OF BLOOD FOR TRANSFUSION	3.1 Compatibility testing and special methods of routine and emergency cross match 3.2 Problems and Trouble shooting in grouping and Cross matching 3.3 Discrepancies in ABO grouping 3.4 Selection of Blood/Blood Components for Transfusion
4.	TRANSFUSION REACTION AND HDN	4.1 Types of Transfusion reaction 4.2 Investigation of Transfusion reaction. 4.3 Hemolytic disease of Newborn due to ABO, Rh or Other blood group incompatibility
5.	AUTOMATION AND BIOSAFETY IN BLOOD BANKING	5.1 Automation in Blood collection 5.2 Automation in blood grouping , Cross matching 5.2 Bio safety and Biomedical waste management
6.	QUALITY CONTROL IN BLOOD BANKING	6.1 QC of reagents-Parameters, Quality Requirements and frequency 6.2 QC of Blood Components- Parameters, Quality Requirements and frequency

REFERENCE BOOKS:

1. Denise Harmening ,Modern Blood banking and Transfusion Practices, 6th Edition 2012.
2. Saran RK., Transfusion Medicine Technical Manual, ed, 2nd ed, Directorate General of Health Service (DGHS), Ministry of Health & Family Welfare, 2003.
3. Mollison PL,Engelfriet CP and Marcela Contreras: Blood Transfusion in Clinical Medicine. 12th edition, Blackwell Science, 2014
4. Makroo R.N., Compendium of Transfusion Medicine, Practice of Safe Blood Transfusion,
5. Technical Manual, American Association of Blood Banks, 1996.
6. Technical Manual, American Association of Blood Banks, 2014
7. Wintrobe.M.M.,Clinical Haematology, Kothari's Indian Edition.
8. Dacei J.A & Lewis S.M. Practical Haematology. The English Language Book Society. 8th ed., ELBS
9. Mark K Fung, Brenda J. Grossman, Christopher D. Hillyer, Connie M Westhoff. Technical Manual. 18th ed.,AABB

PRACTICAL BASED ON PAPER III
SECTION-I:HAEMATOLOGY
1. Methods of Blood Collection and Anticoagulants 2. Haemoglobin estimation: Sahli's method and Cyanmethaemoglobin method. 3. Total R.B.C. 4. Total W.B.C. Count.

5. Differential Count. 6. Platelet Count. 7. Reticulocyte Count 8. E.S.R. 9. Packed cell volume/ Determination of Haematocrit. 10. Bleeding time, Whole Blood Coagulation time and Prothrombin time. 11. Osmotic fragility test –single tube test. 12. Sickling test.- Slide Test, Solubility Test
SECTION – II : BLOOD BANKING.
1. ABO (Forward) and RH grouping by slide method. 2. ABO (Forward) and RH grouping by Tube method. 3. ABO Reverse grouping 4. Direct Antiglobulin Test (DAT) 5. Indirect antiglobulin test (IAT) 6. Tests for Weak D testing by albumin and indirect antiglobulin technique 7. Anti A/ Anti B titer 8. Anti D titration by albumin and indirect antiglobulin technique 9. Cross matching by saline, albumin and IAT 10. Test for HBsAg (Hepatitis B surface Antigen) ELISA and Rapid Test. 11. Test for HIV / HCV Antibodies (ELISA and Rapid Test) 12. Visit to a Blood Bank.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
REVISED SYLLABUS FOR P.G.DIPLOMA OF MEDICAL LABORATORY TECHNOLOGY
SUBJECT CODE: DMLT 4: PAPER – IV: FUNDAMENTALS IN MEDICAL LABORATORY TECHNOLOGY & CLINICAL BIOCHEMISTRY
SECTION – I: FUNDAMENTALS IN MEDICAL LABORATORY TECHNOLOGY

Rationale: The main objective of the subject is to impart the knowledge of apparatus, units, equipment, and volumetric analysis in the laboratory of clinical Biochemistry. The students are also given basic training in safety measures quality control and automation.

Unit	Topics	Content/ Fundamental Concepts
1.	BASICS OF CLINICAL LABORATORY	1.1 Introduction to Medical Laboratory Technology a) Role of Medical lab Technologist b) Ethics and responsibility 1.2 Safety measures for Mechanical, Electrical, Chemical, Radioactive and Biological hazards; Universal safety precautions. 1.3 First aid 1.4 Units of Measurements 1.5 Reagent Grade Water 1.6 Types and Preparation of Solutions 1.7 Acid, Base, p^H, Indicators, Buffer and Buffering action 1.8 Introduction to laboratory accreditation (NABL)

2.	LABORATORY INSTRUMENTS- I	Principle, Component, Operations , Maintenance and Applications of 2.1 Balance 2.2 P^H Meter 2.3 Centrifuge 2.4 Water Distillation Apparatus
3.	LABORATORY INSTRUMENTS- II	Principle, Component, Operations , Maintenance and Applications of 3.1 Colorimeter 3.2 Spectrophotometer 3.3 Flame Photometer 3.4 Turbidiometer
4.	ELECTROPHORESIS & CHROMATOGRAPHY	4.1 Electrophoresis: a) Principle b) Factors Affecting Electrophoresis c) Support Media d) Types Of Electrophoresis: PAGE & SDS 4.2 Chromatography a) Principle b) Types c) Applications
5.	AUTOMATION IN BIOCHEMISTRY	5.1 Types Of Biochemistry Analyzer a) Continuous Flow Analysers b) Discrete Chemistry Analysers c) Centrifugal Analysers d) Dry Chemistry Analysers 5.2 Advantages and Disadvantages Of Automation 5.3 Blood Gas Analysers
6.	QUALITY CONTROL	6.1 Analytical Variables: a) Accuracy, Precission and Reliability b) Standard and Control c) Sensitivity and Specificity d) Types of Error e) Mean, Standard Deviation, Co-Efficient Of Variation and Central Tendency 6.2 Internal and External Quality Control 6.3 Preparation Of Quality Control Charts a) Levy-Jenning Chart and Gaussian Curve b) Cusum Chart 6.4 Westguard Multirule Chart 6.5 Various Ways of Maintaining Quality Control

REFERENCE BOOK

1. P.B. Godkar, 2014, *Textbook of Medical Laboratory Technology*, 3rd ed., Bhalani Publishering House, Mumbai, India.
2. Ochei J. & Kolhatkar A. 2000, *Medical Laboratory Science: Theory & Practice,* Tata McGraw Hill Pub.
3. Wilson K. & Walker J., *Practical Biochemistry: Principles & Technique,* 5 ed., Cambridge University Press.
4. Tambwekar S., Handbook of Quality Assurance in Laboratory medicine., BI
5. Veerakumari L., Bio Instrumentation., MJP

SECTION – II CLINICAL BIOCHEMISTRY

Rationale: The candidates are imparted specialized training of theory and practical in the field of clinical biochemistry. The students will learn how to analyze various clinical patients samples, for estimation of different components which are the cause of the disease or are the diagnostic/prognostic markers. This subject gives information about various clinically important enzymes & learn special biochemical investigations e.g. LFT, RFT, etc.

Unit	Topics	Content/ Fundamental Concepts
1.	CARBOHYDRATES	1.1 Definition, Classification, Functions of Carbohydrates. 1.2 Digestion, absorption of Carbohydrates. 1.3 Regulation of blood glucose & its importance, 1.4 Hyperglycemia, Hypoglycemia 1.5 Diabetes & Diabetic Profile. 1.6 Blood Glucose estimation & Glucose Tolerance Test Glucocylated Hb
2.	PLASMA PROTEINS	2.1 Definition, Classification , Functions of Plasma Proteins 2.3 Plasma Proteins estimations. 2.4 Clinical significance plasma protein; Bence-Jones' Proteins and Cryoglobulins.
3.	LIPIDS AND LIPOPROTEINS	3.1 Lipid: Definition, Classification , Functions, Essential Fatty Acids 3.2 Lipoproteins: Classification and its Separation methods 3.3Important Lipid Profile Tests- cholesterol, triglyceride, Lipoproteins, phospholipids and its significance in various disorders.
4.	CLINICAL ENZYMOLOGY AND ENDOCRINOLOGY	4.1 Definition, Classification, Factors affecting enzyme activity, Isoenzymes and Coenzymes. 4.2 Clinical Enzymology: Therapeutic, diagnostic and analytical uses of enzymes 4.3 Estimation Methods and Diagostic Importance of Enzymes & Isoenzymes: a) Phosphatases b) Transaminases c) Lactate Dehydrogenases d) Creatine Kinase e) Amylase

		f) Lipase g) Gama Glutamyl Transferase 4.4 HORMONES: a) Types and biochemical functions. b) Determination of T3, T4, TSH.
5.	FUNCTION TESTS	5.1 Liver Function Tests 5.2 Renal Function Tests 5.3 Cardiac Function Tests
6.	ELECTROLYTES AND VITAMINS	6.1 Minerals and Electrolytes determination and clinical Significance a) Sodium b) Potassium c) Chloride d) Calcium e) Phosphorus f) Iron & TIBC 6.2 Vitamins a) Brief Classification and Clinical Significance b) Determination of Vitamin B_{12} and D_3.

REFERENCE BOOK

1. P.B. Godkar, 2014, *Textbook of Medical Laboratory Technology,* 3rd ed., Bhalani Publishering House, Mumbai, India.
2. Ochei J. & Kolhatkar A. 2000, *Medical Laboratory Science: Theory & Practice,* Tata McGraw Hill Pub.
3. Wilson K. & Walker J., *Practical Biochemistry: Principles & Technique,* 5 ed., Cambridge University Press.
4. Chatterjea M. N. and Shinde R. 2007. *Textbook of Medical Biochemistry*, 8th ed., Jaypee Brothers Publishers.
5. Vasudevan D. & Sreekumari S. 2005. *Textbook of Biochemistry*; 4th ed, Jaypee Publishers.
6. Harold Varley, 1990, *Practical Clinical Biochemistry* , Indian Edition, Anold Heinemann.
7. Satyanarayan, U. Chakrapani, Biochemistry, 3rd edition, Books & Allied Pvt Ltd Kolkatta.

PRACTICAL BASED ON PAPER IV

SECTION – I : FUNDAMENTALS IN MEDICAL LABORATORY TECHNOLOGY

1. Operation of - pH meter, Single pan Balance, Spectrophotometer, Colorimeter, Autoanalyzer, ,Centrifuge.

SECTION – 1I : CLINICAL BIOCHEMISTRY

Preferably all the test should be done on semi Auto analyser.

1. Blood Glucose/Sugar estimation and GTT.
2. Blood Cholesterol – Free & Total HDL Cholesterol, LDL Cholesterol.
3. Serum Triglyceride
4. Serum Total Protein and Serum Albumin and A/G ratio
5. Microalbumin test
6. Blood/Urine Urea.
7. Blood /Urine Creatinine.
8. Blood /Urine Uric Acid
9. Serum Calcium / Ionized Calcium

10. Serum Phosphorus
11. Serum Potassium
12. Serum Sodium
13. Serum Chloride
14. Serum Iron, and TIBC (Total Iron Binding Capacity)
15. Serum Bilirubin.
16. Serum Alkaline Phosphatase.
17. Serum Acid Phosphatase.
18. S.G.O.T
19. S.G.P.T.
20. LDH
21. CPK
22. Serum Amylase.
23. Serum Lipase
24. Serum Protein Electrophoresis and Lipoprotein electrophoresis (Demonstration).
25. Cardiac Troponin T (Demonstration)
26. Cardiac Troponin I (Demonstration)
27. T3 ,T4, TSH ELISA (Demonstration)

Veer Narmad South Gujarat University, Surat

M.Sc. (Microbiology) Syllabus

(Effective from June, 2021)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
M.Sc. MICROBIOLOGY

Teaching & Evaluation Scheme

Semester III

Paper No.	Paper Title	Theory (Hrs/Week)	Practical (Hrs/Week)	External	Internal	Total	Credit
MB 3001	Fermentation technology	4	-	70	30	100	**4**
MB 3002	Microbial products	4	-	70	30	100	**4**
MB 3003	Biochemical engineering	4	-	70	30	100	**4**
MB 3004	Pharmaceutical microbiology	4	-	70	30	100	**4**
MBP 3005	Practical	-	16	140	60	200	**8**
Total		**16**	**16**	**420**	**180**	**600**	**24**

M.Sc.SEMESTER III

MB 3001: FERMENTATION TECHNOLOGY

Student Learning Objective: The objective of this paper is to introduce students to fermentation process and impart knowledge required for fermentation. The paper also provides the information about the industrial applications and recent technological advances in fermentation technology.

UNIT 1	**THE ISOLATION AND IMPROVEMENT OF INDUSTRIALLY IMPORTANT MICROORGANISMS**
	Teaching Duration: Lectures 09
1.1	Isolation methods utilizing selection
1.2	Isolation methods not utilizing selection of the desired characteristic—from the "waksman platform" to the 1990s of the desired characteristics
1.3	Screening methods and high throughput screening
1.4	Broadening the base of the discovery process and maximizing gene expression
1.5	Improvement of strains producing primary biosynthetic products
1.6	Improvement of strains producing secondary biosynthetic products

UNIT 2	**MEDIA FOR INDUSTRIAL FERMENTATIONS**
	Teaching Duration: Lectures 09
2.1	Introduction
2.2	Typical media
2.3	Medium formulation
2.4	Water
2.5	Energy sources
2.6	Carbon sources
2.7	Nitrogen sources
2.8	Minerals
2.9	Growth factors
2.10	Nutrient recycle
2.11	Buffers
2.12	The addition of precursors and metabolic regulators to media
2.13	Oxygen requirement and antifoams
2.14	Medium optimization

UNIT 3	**FERMENTORS: DESIGN, OPERATION, AND APPLICATIONS**
	Teaching Duration: Lectures 09
3.1	Bioreactors: an overview
3.2	Component parts of bioreactors
3.3	Component parts of a "typical" vessel
3.4	Peripheral parts and accessories
3.5	Alternative vessel designs
3.6	Bioreactor instrumentation
3.7	Common measurement and control systems
3.8	Additional sensors
3.9	"Substrate sensors"
3.10	Bioreactor preparation and use
3.11	Examples of common bioreactor applications

3.12	Current trends and future prospects in fermenter design and applications

UNIT 4	THE RECOVERY AND PURIFICATION OF FERMENTATION PRODUCTS
	Teaching Duration: Lectures 09
4.1	Introduction
4.2	Removal of microbial cells and other solid matters
4.3	Foam separation (floatation)
4.4	Precipitation
4.5	Filtration
4.6	Centrifugation
4.7	Cell disruption
4.8	Liquid–liquid extraction
4.9	Solvent recovery
4.10	Two-phase aqueous extraction
4.11	Reversed micelle extraction and supercritical fluid extraction
4.12	Adsorption
4.13	Removal of volatile products
4.14	Chromatography
4.15	Membrane processes
4.16	Drying
4.17	Crystallization
4.18	Whole broth processing

References:

- Creuger W,Crueger A. and Aneja K. R., (2000) Biotechnology: A textbook of industrial microbiology, 3rd Edition, Panima, New Delhi, (ISBN: 978-93-85998-63-8)
- E.M.T. El-Mansi, Bryce C.F.A., Demain A. L. and Allman A. R., (2012) Fermentation Microbiology and Biotechnology, 3rd Edition, , Taylor & Francis, (ISBN: 978-1-4398-5581-2)
- Okafor N., (2017), Modern industrial microbiology and biotechnology, 2nd edition, Science publishers, USA., (ISBN: 978-1-1385-5018-6)
- Stanbury P. F., Whitaker A. and Hall S. J., (2016), Principles of Fermentation Technology, 3th Edition, , Elsevier, (ISBN: 978-0-08-099953-1)
- Waites, M.J., (2001) Industrial microbiology: An Introduction, 1st Edition, Blackwell publishing, (ISBN: 0-632-05307-0)

MB 3002: MICROBIAL PRODUCTS

Student Learning Objective: Industrial microbiology is a branch of applied microbiology in which microorganisms are used in industrial processes which includes production of high-value products such as drugs, chemicals, fuels and food product. This paper includes the production and processes of various microbial metabolites at industrial scale by use of microbes.

UNIT 1	**FERMENTED FOOD AND DAIRY**
	Teaching Duration: Lectures 09
1.1	Fungal biomass production: Bakers' yeast
1.2	Milk based fermented foods: Yogurt and Cheese
1.3	Grain based fermented foods: Soy sauce, Soy paste
1.4	Alcohol based fermented products: Beer and Wine
1.5	Vegetable based fermented foods: Sauerkraut and Olives
1.6	Fermented sausages and fish
1.7	Mushroom production

UNIT 2	**MICROBIAL FERMENTATIONS**
	Teaching Duration: Lectures 09
2.1	Antibiotics: Cephalosporin
2.2	Hormones: Insulin
2.3	Anticancer agents: Anthracyclines
2.4	Organic acids: Citric acid
2.5	Amino acids: L-Lysine
2.6	Enzymes: Cellulase and Protease
2.7	Vitamins: B12

UNIT 3	**MODERN TRENDS IN MICROBIAL PRODUCTION - I**
	Teaching Duration: Lectures 09
3.1	Biosurfactants
3.2	PHA: Separation, purification and manufacturing methods
3.3	Carotenoids: β carotene
3.5	Microbial polysaccharides: Dextran
3.6	Microbial flavors: Vanillin, Terpenes
3.7	Microbial biotransformation of steroids and sterols

UNIT 4	**MODERN TRENDS IN MICROBIAL PRODUCTION - II**
	Teaching Duration: Lectures 09
4.1	Techniques and technologies to produce biomass of cyanobacteria and microalgae
4.2	Single Cell Protein (SCP)
4.3	Bioinsecticides
4.4	Rhizobium inoculants
4.5	Monoclonal antibodies: Production and recovery
4.6	Bacterial siderophores
4.7	Ergot alkaloids

References:

- Adam M. and Dick M., (2014), Food Microbiology: An introduction, 1st edition, Medtec Publication, (ISBN: 978-93-81714-61-4)
- Clarke W., (2016), Biotechnology: Industrial Microbiology, 1st edition, CBS Publishers, (ISBN: 978-81-239-2864-7)
- Flickinger M. C. and Drew S. W., (1999), Encyclopedia of Bioprocess Technology, Volumes 1-5, Wiley-Inter-science, (ISBN: 978-0471138228)
- Okafor N., (2017), Modern Industrial Microbiology and Biotechnology, 2nd edition, Science Publishers, (ISBN: 978-1-138-03614-7)
- Peppler H. J. and Perlman D., (2004), Microbial Biotechnology, Volume 1 and Volume 2, 2ndedition, Academic press, (ISBN: 978-81-8147-495-7/978-81-8147-496-1)
- Ratledge C. and Kristiansen B., (2006), Basic Biotechnology, 3rd edition, Cambridge University Press, (ISBN: 978-0-521-72947-5)
- Reed G., (2004), Prescott & Dunn's Industrial Microbiology, 4th edition, CBS Publishers, (ISBN: 81-239-1001-0)
- Rehm H. J. and Reed G., (2010), Biotechnology, Vol. 10, Wiley India Pvt. Ltd., (ISBN: 978-3527283200)
- Rehm H. J. and Reed G., (2010), Biotechnology, Vol. 7, Wiley India Pvt. Ltd., (ISBN: 978-81-265-2535-5)

MB 3003: BIOCHEMICAL ENGINEERING

Student Learning Objective: This course is designed to impart the knowledge of principle of fermenters and its configuration. Students shall gain knowledge to design, develop and operate industrial level fermentation process and would learn rheological behavior of fluids and mass transfer and population dynamics in a fermentor.

UNIT 1	**REACTOR ENGINEERING**
	Teaching Duration: Lectures 09
1.1	Bioreactor configurations: Overview
1.2	Monitoring and control of bioreactors
1.3	Bioprocess control
1.4	Sterilization
1.5	Microtiter Plate fermentation: Introduction, Routine and next generation MTP fermenter, Impact on bioprocessing and synthetic biology
1.6	Statistical optimization of fermentation

UNIT 2	**FLUID FLOW AND MIXING**
	Teaching Duration: Lectures 09
2.1	Classification of fluids
2.2	Fluids in motion
2.3	Factors affecting broth viscosity
2.4	Viscosity measurement
2.5	Non-Newtonian fluids
2.6	Mixing
2.7	Role of shear in stirred fermenters
2.8	Rheological properties of fermentation broths

UNIT 3	**HEAT AND MASS TRANSFER**
	Teaching Duration: Lectures 09
3.1	Heat transfer equipment
3.2	Mechanisms of heat transfer and conduction
3.3	Heat transfer between fluids
3.4	Relationship between heat transfer, cell concentration and stirring conditions
3.5	Convective mass transfer
3.6	Oxygen uptake in cell cultures
3.7	Oxygen transfer in fermenters
3.8	Measurement of *kLa*

UNIT 4	**MULTIPLE INTERACTING MICROBIAL POPULATIONS**
	Teaching Duration: Lectures 09
4.1	Classification of interactions between two species
4.2	Competition
4.3	Predation and parasitism
4.4	Spoilage and product manufacture by spontaneous mixed cultures

References:

- Doran P. M., (2013),Bioprocess Engineering Principles,2nd Edition, Academic Press, (ISBN 9780122208515)
- E.M.T. El-Mansi, Bryce C.F.A., Demain A. L. and Allman A. R., (2012) Fermentation Microbiology and Biotechnology, 3rd Edition, Taylor & Francis, (ISBN: 978-1-4398-5581-2)
- Ollis D. F. and Bailey J. E., (2010), Biochemical Engineering Fundamentals. 2nd edition McGraw-Hill Education (India) Private Limited, (ISBN: 978-0070701236)
- Vogel H. C and Todaro C. M., (2014), Fermentation and biochemical engineering handbook. 3rd edition, William Andrew publisher, (ISBN: 978-1-4557-2553-3)

MB 3004: PHARMACEUTICAL MICROBIOLOGY

Student Learning Objective: This paper gives insight of microbiological analysis and quality control in pharmaceutical industries. It includes the learning of good manufacturing practices and its monitoring in pharmaceutical companies. The students would also learn quality check and quality maintenance of pharmaceutical products and microbiological auditing.

UNIT 1	**BIOPHARMACEUTICAL: INTRODUCTION AND MICROBIOLOGICAL ASSAY**
	Teaching Duration: Lectures 09
1.1	Introduction to pharmaceuticals: Microorganisms and medicines
1.2	The agar diffusion assay: Its quantitative basis
1.3	The theory and practice of tube assays for growth promoting substances
1.4	The theory and practice of tube assays for growth inhibiting substances
1.5	Standard reference materials

UNIT 2	**MONITORING MICROBIOLOGICAL QUALITY**
	Teaching Duration: Lectures 09
2.1	Principles of good manufacturing practice
2.2	Monitoring microbiological quality – Conventional testing methods
2.3	Monitoring microbiological quality – Application of rapid methods

UNIT 3	**MICROBIAL ASPECTS OF PHARMACEUTICAL PROCESSING**
	Teaching Duration: Lectures 09
3.1	Microbial spoilage and preservation of pharmaceutical products
3.2	Sterilization control and sterility assurance
3.3	The quality assurance and quality control of pharmaceutical products

UNIT 4	**PHARMACEUTICAL STERILE PRODUCTS AND MICROBIOLOGICAL AUDITING**
	Teaching Duration: Lectures 09
4.1	Types of sterile products: Injections, non-injectable sterile fluids, ophthalmic preparations, dressing, implants, absorbable haemostats, surgical ligatures and sutures, instruments & equipment
4.2	Vaccines: Seed lot system, production, fermentation, blending, filling, and drying
4.3	In-vitro diagnosis
4.4	Immune sera
4.5	Human immunoglobulin &monoclonal antibodies
4.6	Microbiological auditing

References:

- Barredo, J. L., (2005), Microbial Processes and Products. Humana Press, New Jersey, (ISBN: 978-1-59259-847-2)
- Denyer, S. P. and Baird, R. M., (2008), Guide to microbiological control in pharmaceuticals and medical devices. 2nd Edition, CRC Press, Boca Raton, (ISBN: 9781444330632)
- Flickinger, M. C. and Drew, S. W., (1999), Encyclopedia of Bioprocess Technology. Wiley- Interscience, New Jersey, (ISBN: 9780471138228)
- Gad, S. C., (2007), Handbook of Pharmaceutical Biotechnology. Wiley-Interscience, New Jersey, (ISBN: 978-0-470-25958-0)
- Hewitt,W.(2004). Microbiological Assays for Pharmaceutical Analysis-A rational approach, Indian Edition, CRC, (ISBN: 0-203-58859-2)
- Hugo and Russells, (2007), Pharmaceutical Microbiology, Blackwell Publishing.
- Walsh G., (2007), PharmaceurcalBiotechnolog- Concepts and Applications, Wiley (ISBN: 978-0-470-01244-4)

M.Sc. Microbiology Semester III
LIST OF PRACTICALS

MBP-3005

1. Screening of citric acid and lactic acid producing microorganisms.
2. Screening of cellulase, amylase and protease producing microorganisms.
3. Production of fungal amylase by solid state fermentation.
4. Production of fungal amylase by submerged fermentation
5. Partial purification of amylase by ammonium sulphate precipitation and dialysis/column chromatography and calculation of specific activity & fold purification.
6. Determination of *KLa*of laboratory fermenter.
7. Sterility testing of pharmaceutical products by direct inoculation & membrane filtration methods as per Indian Pharmacopoeia (IP).
8. Cell disruption by sonication and estimation of intracellular protein.
9. Production of ethanol using pure carbohydrate.
   (a) Determination of pH, TSS (ºBrix)
   (b) Determination of alcohol (ethanol) percentage.
   (c) Determination of phenol content
   (d) Estimation of reducing & total sugar.
10. Production of ethanol using agro-industrial waste.
    (a) Determination of pH, TSS (ºBrix)
    (b) Determination of alcohol (ethanol) percentage
    (c) Determination of phenol content
    (d) Estimation of reducing & total sugar
11. Microbial production of dextran/xanthan by *Leuconostocmesenteroides/Xanthomonascampestris.*
12. Microbiological assay of amino acid.
13. Detection of anti-HIV sera by ELISA.
14. Detection of anti-HBsAgsera by ELISA.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
M.Sc. MICROBIOLOGY

Teaching & Evaluation Scheme

Semester IV

Paper No.	Paper Title	Theory (Hrs/Week)	Practical (Hrs/Week)	External	Internal	Total	Credit
MB 4001	Seminar Presentation	4		70	30	100	**4**
MB 4002	Dissertation	12	16	350	150	500	**20**
TOTAL		**16**	**16**	**420**	**`180**	**600**	**24**

<table>
<tr><th colspan="2">Guidelines for MB 4001 & MB 4002</th></tr>
<tr><td>MB 4001</td><td>

Faculty has to mentor the allotted students for selected topics of seminar.
Students have to individually deliver a seminar on the advance or novel topic other than that mentioned in the curriculum.
Teacher has to evaluate seminar of individual student and prepare for the final presentation of the allotted students
Topic should not be related to his/her dissertation.
A seminar should be delivered within 15 minutes.
Students have to submit one copy of colour printed handouts (4 slides /page) of his/her presentation to the examiner.

</td></tr>
<tr><td>MB 4002</td><td>

Faculty has to mentor the allotted students for the dissertation.
Faculty will mentor the students for Scientific writing& communicationwhich includes:

Communication skill in science
Searching of scientific journals & resources
Reviewing scientific literature
Preparation of graphs and tables to present the scientific data
Online grammar checking in scientific writing
References management by online tools
Delivering effective oral presentation
Preparing and presenting research poster
Writing a research paper and compiling a dissertation thesis
Plagiarisms checking
Publishing in scientific journal

References:

Davis M, Davis K. and Dunagan M., (2012), Scientific papers and presentations: Effective scientific communication, 3rd edition, Elsevier and Academic press, (ISBN: 978-0-12-384727-0)
Wallwork A., (2011), English: for writing research papers, Springer science plus Business media, LLC, (ISBN: 978-1-4419-7921-6)

Dissertation work can be done individually or in a pair on any topic related to microbiology.
Dissertation may be carried in-houseor outside the campus after due permission grantedby the supervising teacher and institute head at the following recognized institutions or industries like:

Any UGC recognized University PG departments.
Any Agriculture University.
All National and State level research institute.
ISO or FDA/USFDA industry or research center having R & D and Q.C. facilities.

The thesis will be evaluated by examiner(s) which includes thesis evaluation and dissertation presentation.
The dissertation presentation shall be done in audio-visual mode by the candidate within 15 minutes.
The candidate has to submit their dissertation in a standard hard-bound thesis and soft copy in PDF format.

</td></tr>
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એકેડેમિક કાઉન્સિલ તા.૨૫/૦૬/૨૦૨૧
બાબત : ૨૫ બિડાણ : ૧૭

Veer Narmad South Gujarat University, Surat

S.Y. B. Sc. (Microbiology) Syllabus Semester 3 & 4

(Effective from June, 2021)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
B. Sc. MICROBIOLOGY

Teaching & Evaluation Scheme
S. Y. B. Sc. Semester III

Paper No.	Paper Title	Theory	Practical	External	Internal	Total	Credit
		(Hrs/Week)					
MB-301	Principles of bacterial systematics	02	-	50	20	70	06
MB-302	Control of microorganisms in the environment	02	-	50	20	70	
MB-303	Virology	02	-	50	20	70	
MBP-304	Practicals	-	06	60	30	90	03
Total		**06**	**06**	**210**	90	300	09

MB 301: Principles of Bacterial Systematics

Course description

Course code: MB 301
Course title: Principles of Bacterial Systematics
Course type: Core
Course credit: 02
Course overview:
The paper explores microbial taxonomy and classification of bacteria using an evolutionary framework. Bacterial taxonomy and phylogeny gives an understanding regarding degree of prokaryotic diversity unmatched by eukaryotic unicellular and multicellular organisms.

Course Objectives

- To understand taxonomic ranks and taxonomic phlogeny
- To study classical and molecular characteristics for microbial taxonomy
- To understand Bergey's manual of systematic bacteriology
- To study arachea and its classification
- To aquire knowledge of taxonomy of proteobacteria

Course Content

	UNIT 1	Microbial Taxonomy and the Evolution of Diversity
		Teaching Duration: Lectures 07
1.1	Microbial Taxonomy	
1.2	Taxonomic Ranks	
1.3	Microbial taxonomy and phylogeny 1.3.1 Classical Characteristics 1.3.2 Molecular Characteristics: Nucleic acid hybridization, Nucleic acid base composition	
1.4	Evolutionary process and the concept of microbial species	
1.5	Bergey's Manual of systematic bacteriology	

	UNIT 2	Taxonomy of Archaea
		Teaching Duration:Lectures 07
2.1	Overview of Archaea	
2.2	Major groups of *Archaea*	
2.3	Phylum *Crenarchaeota*	
2.4	Phylum *Euryarchaeota* 2.4.1 Methanogens and Methanotrophs 2.4.2 Haloarchaea	

	UNIT 3	Taxonomy of Proteobacteria
		Teaching Duration:Lectures 08
3.1	Class *Alphaproteobacteria*: Order *Rhizobiales*	
3.2	Class *Beta Proteobacteria*: Order *Hydrogenophiales*	
3.3	Class *Gamma Proteobacteria*: Order *Enterobacteriales*	
3.4	Class Delta *Proteobacteria*: Order *Bdellovibrionales*	
3.5	Class *Epsiloneproteobacteria*	

	UNIT 4	Important groups of bacteria
		Teaching Duration:Lectures 08
4.1	Class *Bacilli*: Aerobic endospore forming bacteria	
4.2	Class *Mollicutes*	
4.3	Phylum *Cyanobacteria*	
4.4	Phylum *Spirochaetes*	
4.5	Phylum *Bacteroidetes*	

Student learning Outcome

Unit 1: Student will learn evolutionary process of microorganisms.
Student will be able to classify microorganisms based on their cultural and molecular characteristics.

Unit 2: Students will gain knowledge of the unique characteristics of archea, its adaptation

and importance.

Unit 3: Students shall understand the major classes of proteobacteria and important phyla

Unit 4: Shall enable the students to understand aerobic endospore former, bacteroidetes, Spirohaetes and cyanobacteria.

Recommended References:

- Lory, S., Perry, J. J., Gunsalus, R. P., Staley, J. T. (2007). Microbial Life. 2nd Edition, United Kingdom: Sinauer Associates. ISBN: 9780878936854, 0878936858
- Pelczar, Chan and Krieg, (1993), *Microbiology-Concepts and Application*, International Edition, McGraw-Hill. ISBN: 9780071129145
- Sherwood, L., Willey, J. M., Woolverton, C. J. (2017). Prescott'sMicrobiology. Singapore: McGraw-Hill Education.10th Edition, 2017. ISBN: 9789813151260, 9813151269.
- Tortora G.J., and Funke B.R. (2016), *Microbiology an Introduction*, 12th Ed., Pearson, ISBN: 9781292099149

MB 302: Control of Microorganisms in the environment

Course description

Course code: MB 302
Course title: Control of Microorganisms in the environment
Course type: Core
Course credit: 02
Course overview:
The paper includes the study of the control and destruction of microorganisms. It includes the physical and chemical methods to control pathogens and prevent their transmission and to reduce or eliminate microbes responsible for the contamination of food, water and other substances.

Course Objectives

- To understand the principle of controlling the presence of microorganisms.
- To study the physical agents and mechanisms used for the control.
- To learn the effect of various chemical agents used for the microbial control.
- To understand the mechanism of control of chemical agents.
- To acquire the ability to select the control agent in the environment.

Course Content

	UNIT 1	Basic Principles of Microbial Control
		Teaching Duration: Lectures 07
1.1	Terminology of Microbial Control	
1.2	Microbial Death Rates	
1.3	Action of Antimicrobial Agents	
1.4	The Selection of Microbial Control Methods	
1.5	Situational Considerations	

	UNIT 2	Mechanical and Physical Methods for Microbial Control
		Teaching Duration: Lectures 08
2.1	Filtration	
2.2	Heat Related Methods	
2.3	Refrigeration and Freezing	
2.4	Desiccation and Lyophilization	
2.5	Osmotic Pressure	
2.6	Radiation	

	UNIT 3	Chemical Methods for Microbial Control – I
		Teaching Duration: Lectures 07
3.1	Choosing a Microbicidal Chemical	
3.2	Factors Affecting Germicidal Activity of Chemicals	
3.3	The Halogens Antimicrobial Chemical	
3.4	Phenols: Its derivatives and Applications	
3.5	Alcohols	

	UNIT 4	Chemical Methods for Microbial Control - II
		Teaching Duration: Lectures 08
4.1	Hydrogen Peroxide and related Germicides	
4.2	Chemicals with Surface Action: Detergents	
4.3	Heavy Metals	
4.4	Aldehydes	
4.5	Gaseous Sterilants and Disinfectants	
4.6	Dyes	
4.7	Acid and Alkalies	

Student learning Outcome

Unit 1: Student will understand the role of microbial control in disease transmission
Students will be enabled to select the suitable microbial control agents.

Unit 2: Gain knowledge of physical and mechanical of microbial control and mode of action of each.

Unit 3: Student shall understand the major chemical agents and its microbicidal effect.

Unit 4: Shall enable the students to understand the mechanism of chemical control.

Recommended References:

- Bauman R. W., (2003), *Microbiology, Pearson/Benjamin-Cummings*, (ISBN: 0-8-53-7590-2)
- Cowan M. K. and Talaro K. P., (2006), *Microbiology: A Systems Approac*h, Mc-Graw Hill Higher Education, (ISBN: 0-07-291804-7)
- Nester E. W., Anderson D. G., Roberts Jr. C. E., Pearsall N. N. and Nester T. M., *Microbiology,* International Edition, Mc-Graw Hill Higher Education, (ISBN: 0-07-121493-3)

Further Reading:

- Pommerville J. C., (2014), *Alcamo's Fundamentals of Microbiology*, 10th edition, Jones and Bartlett Learning, (ISBN: 978-93-80853-5374-1)
- Willey J. M., Sherwood L. M. and Woolverton C. J., (2017), *Prescott's Microbiology*, 10th edition, Mc-Graw Hill Education, (ISBN: 978-981-3151-26-0)

MB 303: Virology

Course description

Course code: MB 303
Course title: Virology
Course type: Core
Course credit: 02
Course overview:

The aim of the paper is to realize the increasing importance of virology. Students shall learn the origin, basic structure of virus and its classification. It teaches the cultivation and reproduction of virus. The paper also includes the role of virus in disease as well as cancer but also a study on viruses associated with plant, animal, insects and archaeal viruses.

Course Objectives

- To give an overview of medically important virus families.
- To describe the structure, classification and cultivation of viruses.
- To understand the replication strategies of viruses.
- To study virus like infectious particles
- To study the role of virus and virus host.

Course Content

	UNIT 1	Basics of Viral Structure
		Teaching Duration: Lectures 07
1.1	Origin of Virus	
1.2	Viron Structure is defined by Capsid Symmetry or presence and absence of Envelope	
1.3	Host Range and Specificity of Virus	

	UNIT 2	Viral Taxonomy and Cultivation
		Teaching Duration:Lectures 07
2.1	Classification of Viruses	
2.2	Emerging Viruses	
2.3	Cultivation of viruses in Laboratory	

	UNIT 3	Replication of Viruses
		Teaching Duration: Lectures 08
3.1	General Characteristic of Replication	
3.2	Replication of T – even phages (Lytic cycle)	
3.3	Lysogeny	
3.4	Replication of Animal Viruses	
3.5	Latent Virus infection	

	UNIT 4	Viruses and Sub Viral Infectious Particles
		Teaching Duration: Lectures 08
4.1	Viruses and Tertotogenesis	
4.2	Viruses like Agents	
4.3	Viruses and Cancer, Human Cancer Viruses	
4.4	Plant Viruses	
4.5	Viruses of Fungi and Protist	
4.6	Insect Viruses	
4.7	Archaeal Viruses	

Student learning Outcome

Unit 1: Students shall get insights about viruses, its structure, its symmetry and origin.
Unit 2: Students shall learn about classification of virus.
Acquire knowledge of emerging viruses threatening the world.
Unit 3: Enable the students to understand virus replication.
Students shall understand the differences between lytic and lysogenic cycles.
Unit 4: Students gain insights about viruses and virus like infectious particles.
Students shall understand the role of virus in cancer.

Recommended References:

- Black, J. G. (2012). Microbiology: Principles and explorations. Hoboken, NJ: Wiley. ISBN: 9780470541098, 0470541091.
- Sherwood, L., Willey, J. M., Woolverton, C. J. (2008). Prescott's Microbiology. Singapore: McGraw-Hill Education.7th Edition and 10th edition. 2017. ISBN: 0073302082, 9780073302089 and ISBN: 9789813151260, 9813151269.

S.Y.B.Sc. Microbiology

Semester– III Practicals

(Time Duration: 06 Hours/week)

MBP 304: Practicals

1. Enumeration of bacteria by Heterotrophic plate count method (HPC)
2. Action of antiseptics and disinfectants on bacteria.
3. Effect of hand sanitizer on skin flora.
4. Lethal action of U.V. rays on bacteria
5. Lethal action of heavy metals on bacteria
6. Demonstration of lysis of bacteria by bacteriophage.
7. Determination of TDP & TDT.
8. Study of biochemical reactions.
9. Pure culture study of *Escherichia coli* and *Klebseilla mobillis* (formerly *Enterobacter aerogenes)*
10. Pure culture study of *Proteus vulgaris, Serratia marcescens* and *Pseudomonas aeruginosa.*
11. Pure culture study of *Bacillus megaterium, Bacillus subtilis, Bacillus cereus.*
12. Pure culture study of *Staphylococcus aureus, Staphylococcus epidermidis.*

References:

- Aneja, K.R., (2003). *Experiments in Microbiology, Plant Pathology, Tissue Culture and Mushroom Production Technology,* 4th edition., New Age International Publishers.
- Cappuccino, J.G., (2016). *Microbiology: A Laboratory Manual,* 11th ed., Pearson Education (Singapore) Pvt. Ltd.
- Patel, R. J., & Patel, K. R., (2011). Experimental Microbiology, Vol. 2, 8th ed., Aditya.
- Patel, R. J., & Patel, K. R., (2015). Experimental Microbiology, Vol. 1, 9th ed., Aditya.

B. Sc. MICROBIOLOGY

Teaching & Evaluation Scheme
S. Y. B. Sc. Semester IV

Paper No.	Paper Title	Theory	Practical	External	Internal	Total	Credit
		(Hrs/Week)					
MB-401	Biological molecules	02	-	50	20	70	06
MB-402	Mycology, Phycology and protozoology	02	-	50	20	70	
MB-403	Microbial ecosystems	02	-	50	20	70	
MBP-404	Practicals	-	06	60	30	90	03
Total		**06**	**06**	**210**	**90**	**300**	09

MB 401: Biological molecules

Course description

Course code: MB 401
Course title: Biological molecules
Course type: Core
Course credit: 02
Course overview:
The paper gives an understanding of biomolecules found in all living organisms including microbes. Students shall learn important biomolecules such as proteins, enzymes, carbohydrates, lipids and nucleic acids. They shall become aware of the structure, types and the important functions of biomolecules.

Course Objectives

- To study the structure and properties of amino acids and proteins.
- To understand classification of enzymes and enzyme activity.
- To understand types of carbohydrates and its importance.

- To gain knowledge of lipids, its structure and functions.
- To enable students to understand DNA and RNA.

Course Content

	UNIT 1	**Amino Acids, Proteins and enzymes**
		Teaching Duration:Lectures 08
1.1	Amino Acids Exist in a Three-Dimensional world	
1.2	Individual Amino Acids: Their Structures and Properties	
1.3	The Peptide Bond	
1.4	Protein Structure and Function	
1.5	Chemical nature of enzymes	
1.6	Nomenclature and classification of enzymes	
1.7	Factor affecting enzyme activity	
1.8	Isoenzymes	

	UNIT 2	**Carbohydrates**
		Teaching Duration: Lectures 07
2.1	Sugars: Their structures and stereochemistry	
2.2	Reactions of monosaccharides	
2.3	Some Important oligosaccharides	
2.4	Structures and functions of polysaccharides	

	UNIT 3	**Lipids**
		Teaching Duration: Lectures 08
3.1	Classification lipids	
3.2	Fatty acids	
3.3	Glycerol lipid	
3.4	Lipid devoid of glycerol	
3.5	Complex lipids	
3.6	Lipids and biological membranes	

	UNIT 4	**Nucleic Acid**
		Teaching Duration:Lectures 07
4.1	Levels of Structure in Nucleic Acids	
4.2	The Covalent Structure of Polynucleotides	
4.3	The Structure of DNA	
4.4	Denaturation of DNA	
4.5	Types of RNA and their Structures	

Student learning Outcome

Unit 1: Student shall understand structure of amino acids and its role in peptide bond formation.

Student shall gain knowledge about structure and functions of proteins and enzymes.

Unit 2: Enable the students to understand the stereochemistry of carbohydrates and its functions.

Unit 3: Student shall acquire knowledge about lipids, their classification and its importance.

Unit 4: Acquire knowledge of structure of nucleic acids and its denaturation.
Student shall know about RNA and its types.

Recommended References:

- Campbell, M. K., & Farrell, S. O. (2012). *Biochemistry*. Belmont, CA: Brooks/Cole, Cengage Learning. ISBN: 9780840068583 0840068581.
- Rastogi, S. C., *Biochemistry* (2015), 2nd Edi. ISBN:9788171339389.

Further reading:

- Berg and Stryer, (2007) *Biochemistry*, 6th Ed. W H Freeman pub., ISBN: 9780716746843
- Murray, R. K., Granner, D. K., Mayes, P. A., & Rodwell, V. W. (2015). *Harper Biochemistry*, 30th Edi. Appleton and Lange.
- Voet and Voet, (2008) *Fundamentals of biochemistry*, 3rd Ed, Johns Wiley & Sons, Asia ISBN: 978-0470129302

MB 402: Mycology, Phycology and protozoology

Course description

Course code: MB 402
Course title: Mycology, Phycology and protozoology
Course type: Core
Course credit: 02
Course overview:
This paper includes the study of eukaryotic microorganisms such as fungi, algae and protozoa. The student shall learn the diversity of eukaryotic microbes and its differences in terms of morphology, reproduction and cultivation. The objective of the paper is to give an understanding of the ecological and economic impact of eukaryotic microbial population.

Course Objectives

- To understand eukaryotic microorganisms and its importance.
- To study distinguishing characteristics, reproduction and cultivation of fungi.
- To understand major classes of fungi.
- To give understanding of characteristics of algae and its economic importance.
- To gain knowledge of occurrence, importance and reproduction of protozoa

Course Content

	UNIT 1	Mycology
		Teaching Duration: Lectures 07
1.1	Importance of fungi	
1.2	Distinguishing characteristics of fungi	
1.3	Morphology of fungi	
1.4	Reproduction of fungi	
1.5	Cultivation of fungi	

	UNIT 2	Classification of fungi
		Teaching Duration: Lectures 08
2.1	The Chytridiomycota	
2.2	The Zygomycota	
2.3	The Ascomycota	
2.4	The Basidiomycota	
2.5	The Microsporidia	
2.6	The Glomeromycota	

	UNIT 3	Phycology
		Teaching Duration: Lectures 08
3.1	Occurrence of algae	
3.2	Characteristics of algae	
3.3	Algae and diseases	
3.4	Biological and economic importance of algae	
3.5	Lichen	

	UNIT 4	Protozoology
		Teaching Duration: Lectures 07
4.1	Occurrence of protozoa	
4.2	Ecology of protozoa	
4.3	The importance of protozoa	
4.4	Morphology of protozoa	
4.5	Reproduction of protozoa	

Student learning Outcome

Unit 1: Enable the students to understand the structural differences of prokaryotic and eukaryotic microorganisms.
Shall understand fungal structure, reproduction, cultivation and importance.
Unit 2: Give an insight of different fungal groups and its importance.
Unit 3: Students shall learn algal ecology, its characteristic and importance.
Unit 4: Gain knowledge of occurrence, importance and reproduction of protozoa.

Recommended References:

- Pelczar M. J. and Chan E. C. S., (1998), *Microbiology*, 5th Ed., Tata-Mc Graw Hill.
- Sherwood, L., Willey, J. M., Woolverton, C. J. (2017). *Prescott Microbiology*. Singapore: McGraw-Hill Education.10th Edition, 2017. ISBN: 9789813151260, 9813151269.

Further reading:

- Tortora G.J., and Funke B.R. (2016), *Microbiology: an Introduction*, 12 Ed., Benjamin Cummings.

MB 403: Microbial ecosystems

Course description

Course code: MB 403
Course title: Microbial ecosystems
Course type: Core
Course credit: 02
Course overview:
Microbial ecology is concerned with microbial processes that occur in ecosystem. It explains how nutrient availability and environmental factors influence microbial growth in various ecosystems. Student shall understand the role of microorganisms in evolution of life and balance of ecosystem. The objective of the paper is to give an understanding of the varied microbial interactions and its impact in sustenance of ecosystem.

Course Objectives

- To understand the role of microbial evolution in ecological development.
- To learn the methods to study microbial ecology.
- To gain an understanding of biogeochemical cycling and effect of global climate change.
- To develop insight about microbial interactions.
- To understand the role of microorganisms in ecosystem.

Course Content

UNIT 1	MICROBIAL EVOLUTION AND ECOLOGY	
		Teaching Duration: Lectures 08
1.1	The origin of life	
1.2	Chemical evolution	
1.3	Cellular Evolution	
1.4	Ribosomal RNA analysis for tracing microbial evolution	
1.5	Genetic basis of evolution	

1.6	Methods in microbial ecology

	UNIT 2	BIOGEOCHEMICAL CYCLING AND GLOBAL CLIMATE CHANGE
		Teaching Duration: Lectures 08
2.1	Global Climate Change; Global Infectious Disease Change	
2.2	Biogeochemical Cycling 2.2.1 Carbon cycle 2.2.2 Nitrogen Cycle 2.2.3 Phosphorus Cycle 2.2.4 Sulfur Cycle	
2.3	Interaction between Elemental Cycles	
2.4	Global Climate Change: Biogeochemical cycling out of balance	

	UNIT 3	MICROBIAL INTERACTIONS
		Teaching Duration: Lectures 07
3.1	Mutualism	
3.2	Cooperation	
3.3	Commensalism	
3.4	Predation	
3.5	Parasitism	
3.6	Amensalism	
3.7	Competition	

	UNIT 4	MICROORGANISMS AND ECOSYSTEMS
		Teaching Duration: Lectures 07
4.1	Microorganisms in terrestrial environments 4.1.1 Soils as an important microbial habitat 4.1.2 Microbe-plant interactions	
4.2	Microorganisms in marine and freshwater ecosystems 4.2.1 Water as a microbial habitat 4.2.2 Microorganisms in marine ecosystems 4.2.3 Microorganisms in freshwater ecosystems	

Student learning Outcome

Unit 1: Shall give an insight of microbial role in evolution of life.
Shall learn methods to study evolution.
Unit 2: Give an understanding of biogeochemical cycling.
Unit 3: Students shall gain knowledge of microbial interactions and its significance.
Unit 4: Gain knowledge of distribution and role of microorganisms in different habitats and ecosystems.

Sharma

Recommended References:

- Ronald M. Atlas & Richard Bartha (2005) *Microbial Ecology: Fundamentals and Applications*, 4thEd., Pearson Education. ISBN: 81-297-0771-3.
- Wiley, J., & Sherwood, L. (2013). *Prescott, Harley, and Klein's Microbiology*, 10th Ed., McGraw-Hill Science/Engineering/Math, ISBN: 9780073402406.

Further reading:

- McArthur, J. Vaun (2006). *Microbial Ecology: An Evolutionary Approach*, Academic Press. 416 pp. ISBN 0123694914.
- Mitchell R., Gu Pelczar Ji Dang, Chan and Krieg, (1993), *Microbiology-Concepts and Application*, International Edition, McGraw-Hill.
- Tortora G.J., and Funke B.R. (2016), *Microbiology an Introduction*, 12 Ed., Benjamin Cummings.

S.Y.B.Sc. Microbiology

Semester– IV Practicals

(Time Duration: 06 Hours/week)

MBP 404: Practicals

1. Qualitative analysis of carbohydrate (Any four sugar)
2. Qualitative analysis of proteins (Any three protein)
3. Study of extracellular enzymatic activity: Amylase, Caseinase, Gelatinase, Lipase
4. Study of intracellular enzymatic activity: Deaminase, Decarboxylase, Catalase, Dehydrogenase, Oxidase.
5. Cultivation and identification of economical important fungi. (9 genera) (*Aspergillus, Penicillium, Mucor, Rhizopus, Curvularia, Helminthosporium, Cunninghamella, Fusarium*, *Alternaria*)
6. Study of permanent slides of algae (*Volvox, Spirogyra*, Diatoms)
7. Study of permanent slides of algae Cyanobacteria (*Nostoc, Anabena*)
8. Study of permanent slides of Protozoa (*Amoeba, Paramoecium, Euglena*).
9. Isolation of nonsymbiotic nitrogen fixing aerobic bacteria- *Azotobacter* spp.
10. Isolation of *Rhizobium* spp. from root nodules of legume plants.
11. Isolation and identification of Actinomycetes from soil.
12. Isolation of protozoa from soil

References:

- Aneja, K.R., (2003). *Experiments in Microbiology, Plant Pathology, Tissue Culture and Mushroom Production Technology,* 4th edition., New Age International Publishers.
- Cappuccino, J.G., (2016). *Microbiology: A Laboratory Manual,* 11th ed., Pearson Education (Singapore) Pvt. Ltd.
- Patel, R. J., & Patel, K. R., (2011). *Experimental Microbiology,* Vol. 2, 8th ed., Aditya.
- Patel, R. J., & Patel, K. R., (2015). *Experimental Microbiology*, Vol. 1, 9th ed., Aditya.

એકેડેમિક કાઉન્સિલ તા. ૨૫/૦૬/૨૦૨૧
બાબત : ૨૬ બિડાણ : ૧૮

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS FOR B.Sc. MEDICAL TECHNOLOGY

A student offering Medical Technology as a special subject will study papers MT 01 to MT 22 and Practicals based on theory papers. Teaching period and credit with internal and external marks are shown in table.

SEMESTER: I & II
Effective from June 2017

Semester	Paper No.	Name of Paper	Hours/ week	Credit	External Marks	Internal Marks	Total Marks
I	MT-01	Organization of Clinical Laboratory	2	2	50	20	70
	MT-02	Equipments and Instruments in Medical Technology Laboratory	2	2	50	20	70
Practical	MTP-01		04	2	40	20	60
II	MT-03	Fundamentals of Medical Technology	2	2	50	20	70
	MT-04	Introduction to Microbial World	2	2	50	20	70
Practical	MTP-02		04	2	40	20	60

SEMESTER: III & IV
Effective from June 2018

Semester	Paper No.	Name of Paper	Hours/ week	Credit	External Marks	Internal Marks	Total Marks
III	MT-05	Environment & Food Microbiology	2	2	50	20	70
	MT-06	Human anatomy and physiology-1	2	2	50	20	70
	MT-07	General biochemistry-1	2	2	50	20	70
Practical	MTP-03		6	3	60	30	90
IV	MT-08	Microbial Metabolism and Genetics	2	2	50	20	70
	MT-09	Human anatomy and physiology-2	2	2	50	20	70
	MT-10	General biochemistry-2	2	2	50	20	70
Practical	MTP-03		6	3	60	30	90

5/11/20

25/11/2021

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS FOR B.Sc. MEDICAL TECHNOLOGY

SEMESTER: V & VI

Effective from June 2019

Semester	Paper No.	Name of Paper	Hours/ week	Credit	External Marks	Internal Marks	Total Marks
V	MT-11	Bacteriology and Virology	2	2	50	20	70
	MT-12	Clinical Pathology	2	2	50	20	70
	MT-13	Clinical Biochemistry and Enzymology	2	2	50	20	70
	MT-14	Haematology	2	2	50	20	70
	MT-15	Clinical Laboratory Instrumentation	2	2	50	20	70
	MT-16	Laboratory Management	2	2	50	20	70
Practical	MTP-05		12	6	120	60	180
VI	MT-17	Parasitology and Mycology	2	2	50	20	70
	MT-18	Immunology	2	2	50	20	70
	MT-19	Histology and Cytology	2	2	50	20	70
	MT-20	Pathophysiology	2	2	50	20	70
	MT-21	Blood Banking	2	2	50	20	70
	MT-22	Recent Advances in Diagnostic Techniques	2	2	50	20	70
Practical	MTP-06		12	6	120	60	180

VEER NARMAD SOUTH GUJARAT UNIVERSITY

Board of Studies (Physics)

Syllabus for T. Y. B. Sc. (Physics) with effect from June 2021

(Semester V & VI)

Structure for B. Sc. Syllabus

Inforce from June 2021

B. Sc. (PHYSICS)

Semester V

Sr. No.	Course Code	Course Title	Credits
1	PH – 506	Physics Paper VI	02
2	PH – 507	Physics Paper VII	02
3	PH – 508	Physics Paper VIII	02
4	PH – 509	Physics Paper IX	02
5	PH – 510	Physics Paper X	02
6	PH – 511	Physics Paper XI	02
7	PH – 512	Practical	06
8	Elective Course	Elective Paper 1 or 2 or 3	02

Faculty code: Science **Subject code: PH**
Name of the Program: B. Sc. (Physics) **Subject: PHYSICS**

External Examination	Time Duration
Theory Examination	2 Hrs. per paper
Practical Examination	2 Hrs. per practical

Name of Exam	Semester	Paper No.	Course Group	Credit	Internal Marks	External Marks	Total Marks
B. Sc.	V	PH – 506	Theory	02	20	50	70
		PH – 507	Theory	02	20	50	70
		PH – 508	Theory	02	20	50	70
		PH – 509	Theory	02	20	50	70
		PH – 510	Theory	02	20	50	70
		PH – 511	Theory	02	20	50	70
		PH – 512	Practical	06	60	120	180
		Elective Course	Theory	02	20	50	70

Note:

1. Student must opt one Elective Paper in each semester (V & VI) out of different Elective Papers offered by the College. (Choice of the Elective Paper number exercised by student shall remain same in both the semesters)
2. College can offer more than one Elective Paper as a choice to the students depending on the available staff and infrastructure.

Veer Narmad South Gujarat University, Surat

T. Y. B. Sc. Sem V

Physics Paper VI (PH – 506)

Classical Mechanics and Solid State Physics

Unit 1	**Motion in Central Force Field (Introduction to Classical Mechanics by R G Takwale and P S Puranik, McGraw Hill Edu. (India) Pvt. Ltd., 2017)**
	Equivalent one-body problem (5.1), Motion in a central force field (5.2), General features of the motion (5.3), Motion in an inverse-square law force field (5.4), Equation of the orbit (5.5), Kepler's laws of planetary motion (5.6)
Unit 2	**Lagrangian Formulation (Introduction to Classical Mechanics by R G Takwale and P S Puranik, McGraw Hill Edu. (India) Pvt. Ltd., 2017)**
	Constraints (8.1), Generalised coordinates (8.2), D'Alembert's principle (8.3), lagrange's equations (8.4), General expression for kinetic energy (8.5), Symmetries and laws of conservation (8.6), Cyclic or ignorable coordinates (8.7), Velocity-dependent potential of electromagnetic field (8.8), Reyleigh's dissipation function (8.9)
Unit 3	**Free Electron Fermi Gas (Solid State Physics Charles Kittel , John Wiley & Sons, 8th ed., 2005)**
	Ch:6 Energy levels in one dimension, Effect of temperature on the fermi dirac distribution, Free electron gas in 3 dimensions, Heat capacity of the electron gas, Electrical conductivity and Ohm's law, Motion in magnetic field, Thermal conductivity of metals (Including subtopics)

Unit 4	**Energy Bands (Solid State Physics Charles Kittel , John Wiley & Sons, 8th ed., 2005)**
	Ch:7 Nearly free electron model, Bloch functions, Kronig – Penny model, Wave equation of electron in periodic potential, Number of orbitals in a band (Including subtopics)

Additional References:

1. An Introduction to Mechanics by Daniel Kleppner and Robert Kolenkow, McGraw Hill Edu. 2017
2. Classical Mechanics by G. Aruldhas, PHI, 2015
3. Solid State Physics by S O Pillai, New Age International Publishers, 2018.

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T. Y. B. Sc. Sem V

Physics Paper VII (PH – 507)
Electrodynamics and Optics

Unit 1	**Electric Fields in Matter (Introduction to Electrodynamics by David J. Griffiths, Pearson India Education, 4th ed., 2015)**
	Ch – 4 Electric Fields in Matter **1 Polarization:** Dielectrics (1.1), Induced dipoles (1.2), Alignments of polar molecules (1.3), Polarization (1.4) **2 The field of a polarized object:** Bound Charges (2.1), Physical interpretation of bound charges, The field inside a dielectric (2.3) **3 The electric displacement:** Gauss's law in presence of dielectrics (3.1), A deceptive parallel (3.2), Boundary conditions (3.3) **4 Linear dielectrics:** Susceptibility, permittivity, Dielectric constant (4.1), Boundary value problems with linear dielectrics(4.2), Energy in dielectric systems(4.3), Forces on dielectrics (4.4)
Unit 2	**Magnetic Fields in Matter (Introduction to Electrodynamics by David J. Griffiths, Pearson India Education, 4th ed., 2015)**
	Ch – 6 Electric Fields in Matter **1 Magnetization:** Diamagnets, paramagnets, ferromagnets (1.1), Torques and forces on magnetic dipoles (1.2), Effect of magnetic field on atomic orbits (1.3), Magnetization (1.4) **2 The field of a magnetized object:** Bound currents (2.1), Physical interpretation of bound currents (2.2), The Magnetic field inside matter (2.3) **3 The Auxiliary Field H:** Ampere's law in magnetized materials (3.1), A deceptive parallel (3.2) **4 Linear and Non-linear media:** Magnetic susceptibility and permeability (4.1), Ferromagnetism (4.2)

Unit 3	**Multiple Beam Interferometry (Optics by Ajoy Ghatak, McGraw Hill Edu. (India) Pvt. Ltd., 6th ed. 2017)**
	Introduction (16.1), Multiple reflections from a plane parallel film (16.2), The Fabry-Perot etalon (16.3), The Fabry-Perot interferometer (16.4), Resolving power (16.5), The Lummer-Gehrcke plate (16.6), Interference filters (16.7) (Including subtopics)
Unit 4	**Holography (Optics by Ajoy Ghatak, McGraw Hill Edu. (India) Pvt. Ltd., 6th ed. 2017)**
	Introduction (21.1), Basic theory (21.2), Requirements (21.3), Some applications of Holography (21.4) (Including subtopics)

Additional References:

1. Electricity and Magnetism by D C Tayal, Himalaya Publishing House, 2014
2. Fundamentals of Optics by F A Jenkins and H E White, McGraw Hill, 2017
3. Optics by Eugene Hecht and A. R. Ganeshan, Pearson Education, 2019

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T. Y. B. Sc. Sem V

Physics Paper VIII (PH – 508)

Atomic and Nuclear Physics

Unit 1	**Quantum Theory of Hydrogen Atom (Concepts of Modern Physics by Arthur Beiser, McGraw Hill Publishing Co. Ltd. New Delhi, 6th ed., 2006)**
	Schrodinger's equation for the hydrogen atom (6.1), Separation variables (6.2), Quantum numbers (6.3), Principal quantum number (6.4), Orbital quantum number (6.5), Magnetic quantum number (6.6)
Unit 2	**Quantum Theory of Hydrogen Atom (Concepts of Modern Physics by Arthur Beiser, McGraw Hill Publishing Co. Ltd. New Delhi, 6th ed., 2006)**
	Electron probability density (6.7), Radiative transitions (6.8), Selection rules (6.9), Zeeman effect (6.10), Electron spin (7.1), Exclusion principle (7.2), Symmetric and antisymmetric wave functions (7.3)
Unit 3	**Nuclear Models (Introduction to Nuclear and Particle Physics by V.K. Mittal, R.C. Verma, S.C. Gupta, PHI, 3rd ed., 2014)**
	Introduction (2.1), Liquid drop model (2.2), Shell model (2.3), Fermi gas model (2.4), Collective model (2.5) (Including subtopics)
Unit 4	**Radioactivity (Introduction to Nuclear and Particle Physics by V.K.Mittal, R.C. Verma, S.C. Gupta, PHI, 3rd ed., 2014)**
	Alpha emission (3.5), Beta decay (3.6) Gamma decay (3.7), Artificial or induced radioactivity (3.8), Applications of radioactivity (3.9) (Including subtopics)

Additional References:

1. Quantum Physics by Robert Eisberg & Robert Resnick, Wiley, 2006
2. Nuclear Physics by D C Tayal, Himalaya Publications, 2017.

3. Nuclear and Particle Physics by Satadal Bhattacharyya, University Press (India) Private Ltd., 2019

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T. Y. B. Sc. Sem V

Physics Paper IX (PH – 509)

Statistical Mechanics and Special Relativity

Unit 1	**Blackbody radiation (Thermal Physics by Garg, Bansal and Ghosh, McGraw Hill Education (India) Pvt Ltd. Chennai, 2nd ed., 2012)**
	Blackbody radiation as a thermodynamics system (11.4), The Stefan-Boltzmann law (11.4.1), Isothermal and adiabatic expansion of blackbody radiation (11.4.2), Spectral distribution of radiant energy (11.5), Wien's law (11.5.1), Rayleigh-Jeans law (11.5.2), Planck's law (11.5.3)
Unit 2	**Basic concepts of Statistical Mechanics (Thermal Physics by Garg, Bansal and Ghosh, McGraw Hill Education (India) Pvt Ltd. Chennai, 2nd ed., 2012)**
	Introduction (12.1), Bridging microscopic and macroscopic behaviours (12.2), Phase space and quantum states (12.3), Specification of the state of the system (12.4), Macrostate and microstates (12.5), Probability calculations (12.6), Types of Ensembles (12.7), Entropy and probability (12.8) (Including subtopics)
Unit 3	**The Experimental Background of the Theory of Special Relativity (Introduction to Special Relativity by Robert Resnick, Wiley India Pvt. Ltd., 2007)**
	Introduction (1.1), Galilean transformations (1.2), Newtonian relativity (1.3), Electromagnetism and newtonian Relativity (1.4), Attempts to locate the absolute frame; the Michelson-Morley experiment (1.5), Attempts to preserve the concept of a preferred ether frame; the lorentz-fitzgerald contraction hypothesis (1.6), Attempts to preserve the concept of a preferred ether frame; the ether-drag hypothesis (1.7), Attempts to modify electrodynamics (1.8), The postulates of special relativity theory (1.9)
Unit 4	**Relativistic Kinematics (Introduction to Special Relativity by Robert Resnick, Wiley India Pvt. Ltd., 2007)**
	The relativity of simultaneity (2.1), Derivation of the Lorentz transformation equations (2.2), Some consequences of the Lorentz transformation equations (2.3), The relativistic addition of velocities (2.6), Aberration and Doppler effect of relativity (2.7)

Additional References:

1. Fundamentals of Thermal and Statistical Physics by Fredrick Reif, Sarat Book Distributors, 2010
2. The Special Theory of Relativity by S Banerji and Asit Banerjee, PHI Learning Pvt. Ltd. New Delhi, 2012

Veer Narmad South Gujarat University, Surat

T. Y. B. Sc. Sem V

Physics Paper X (PH – 510)

Analog and Digital Electronics

Unit 1	**MOSFET, Thyristor & UJT (Electronic Principles by A Malvino and D. Bates, McGraw Hill Edu. (India) Pvt. Ltd, New Delhi, 7th ed., 2017)**
	MOSFETS: The Depletion-mode MOSFET (14.1), D-MOSFET curves (14.2), Depletion-Mode MOSFET amplifiers (14.3), The Enhancement-mode MOSFET (14.4), The Ohmic region (14.5), Digital switching (14.6), CMOS (14.7), Power FETs (14.8), E-MOSFET amplifiers (14.9) **Thyristors:** The Four – Layer diode (15.1),The Silicon controlled rectifier (15.2), The SCR crowbar (15.3), SCR phase control (15.4), Bidirectional thyristors (15.5), Other thyristors (15.7)
Unit 2	**Differential Amplifier (Electronic Principles by A Malvino and D. Bates, McGraw Hill Edu. (India) Pvt. Ltd, New Delhi, 7th ed., 2017)**
	Differential amplifier (17.1), DC analysis of a differential amplifier (17.2), AC analysis of differential amplifier (17.3), Input characteristic of an Op Amp (17.4), Common mode gain (17.5), Integrated circuits (17.6), The current mirror (17.7), The loaded diff amp (17.8)
Unit 3	**Digital logic and combinational logic circuit (Digital Principles and Applications by D. Leach, A Malvino and G. Saha, McGraw Hill Edu. (India) Pvt. Ltd. 7th ed., 2010)**
	Digital Logic: The Basic gates-NOT, OR, AND (2.1), Universal logic gates (2.2), AND –OR invert gates (2.3) **Combinational Logic Circuit:** Boolean law and theorems (3.1), Sum of product method (3.2), Truth table to karnaugh map (3.3), Pairs, quads And octets (3.4) Karnaugh simplifications (3.5), Don't care conditions (3.6), Product of sum method (3.7), Product of sum simplification (3.8)
Unit 4	**Digital logic and combinational logic circuit (Digital Principles and Applications by D. Leach, A Malvino and G. Saha, McGraw Hill Edu. (India) Pvt. Ltd 7th ed., 2010)**
	Multiplexer (4.1), Demultiplexer (4.2), 1 of 16 Decoder, BCD to decimal decoders (4.4), Encoders (4.6), Exclusive OR gate (4.7), Parity generators and checkers (4.8), Magnitude comparator (4.9), Binary number system (5.1), Binary to decimal conversion (5.2), Decimal To binary conversion (5.3), Octal number (5.4), Hexadecimal numbers (5.5)

Additional References:

1. Functional Electronics by K.V. Ramanan – McGraw Hill Edu. (India) Pvt. Ltd Publication
2. Electronics Devices and Circuits by Allen Mottershed – PHI Publication.
3. Modern Digital Electronics by R P Jain, McGraw Hill Education, New Delhi, 2009.

Veer Narmad South Gujarat University, Surat

T. Y. B. Sc. Sem V

Physics Paper XI (PH – 511)

Mathematical Methods of Physics and C-Programming

Unit 1	**Vector Analysis : (Mathematical Method for Physicists by Arfken and Weber, Academic Press, 6th ed., 2010)**
	Orthogonal coordinates in R^3 (2.1), Differential vector operators (2.2), Spatial coordinate system; Introduction (2.3), Circular cylindrical coordinates (2.4), Spherical polar coordinates (2.5)
Unit 2	**Numerical Methods (Introductory Methods of Numerical Analysis by S.S.Sastry, PHI publication, 4th ed., 2006)**
	Solutions of algebraic equations: Introduction (2.1), The bisection method (2.2), The method of false position (2.3), The iteration method (2.4), Newton-Raphson method (2.5) **Interpolation:** Introduction (3.1), Errors in polynomial interpolation (3.2), Finite differences (3.3), Forward differences (3.3.1), Backward differences (3.3.2), Central differences (3.3.3), Symbolic relations and separation of symbols (3.3.4), Detection of errors by use of difference tables (3.4), Differences of a polynomial (3.5), Newton's formula for interpolation (3.6) Divided differences and their properties (3.10), Newton's general interpolation formula (3.10.1)
Unit 3	**C Programing (Computer Programing in C by V Rajaraman by PHI Learning Private Ltd, Delhi (24th Printing))**
	Numerical Constant and Variables: Constants (5.1), Scalar variable (5.2), Declaring variable names (5.3), Defining constants (5.4) **Arithmetic Expressions:** Arithmetic operators and modes of expressions (6.1), Integer expressions (6.2), Floating point expressions (6.3), Operator precedence in expressions (6.4), Examples of arithmetic expressions (6.5), Assignment statements (6.6), Defining variables (6.7), Arithmetic conversion (6.8), Assignment expressions (6.9), Increment and decrement operators (6.10), Multiple assignments (6.11)
Unit 4	**C Programing (Computer Programing in C by V Rajaraman by PHI Learning Private Ltd, Delhi (24th Printing))**
	Input and Output in C Programs Output function (7.1), Input function (7.2) **Conditional Statements** Relation Operators (8.1), Compound statement (8.2), Conditional statements (8.3), Example programs using conditional statements (8.4) **Implementing Loops in Programs** The *while* loop (9.1), The *for* Loop (9.2), The *do while* loop (9.3)

Additional References:

1. Mathematical Physics by H K Dass and Dr. Rama Verma, S.Chand Co.7th ed., 2019
2. Let us C by Y. Kanetkar, BPB Publications, 17th ed., 2017
3. Numerical Method for Scientists and Engineers by K. S. Rao, PHI, 2001.
4. Numerical Mathematical analysis by J. B. Scarborough, John Hopkin Press, 1930.

Veer Narmad South Gujarat University, Surat

Practicals for T. Y. B. Sc. Sem V

PH-512

LIST OF EXPERIMENTS

	GROUP A
1	To determine Young's modulus of a wire using optical lever.
2	To determine Gravitational acceleration by Keter's pendulum
3	To study Measurement of susceptibility of paramagnetic material
4	To determine Elastic constants for the material of flat spiral spring
5	To determine angle of contact and surface tension of mercury by Quinck's method.
6	To determine Moment of Inertia by Bifilar suspension.
	GROUP B
1	To determine wave length of light by constant deviation spectrometer
2	To determine the cardinal points of a lens system using turn table.
3	To determine separation between plates of a Fabry Perot Etalon.
4	To determine the resolving power of a telescope.
5	To determine Hartman formula using prism.
6	To determine refractive index of a liquid by total internal reflection.
	GROUP C
1	To determine activation energy of semiconductor
2	To determine electronic charge 'e' using photo – emissive cell.
3	To determine absorption coefficient of liquid using photo cell.
4	To determine dielectric constant of a dielectric material with frequency.
5	To determine value of Planck's constant using LEDs of at least 4 different colors.
6	To determine thermal conductivity of Rubber Tubing
	GROUP D
1	Study of Parallel resonance using LCR circuit.
2	To determine Temperature Coefficient of Resistance for Platinum using Carey-Foster's bridge
3	To determine self-inductance by Anderson's bridge
4	To determine absolute value of capacitance using ballistic galvanometer.
5	Comparison of capacitance by the method of mixture.
6	To determine figure of merits of ballistic galvanometer.
	GROUP E
1	Design built and test adder/ subtractor using IC 741
2	Design built and test astable multivibrator using IC-555/Op-Amp
3	Design built and study Wien bridge oscillator
4	Design built and test Integrator and differentiator using IC 741.
5	Design built and test AND, OR, NOT gates using NAND/NOR gates.
6	Design built and test two stage RC coupled amplifier.
	GROUP F
1	C-program for calculation of days between two dates of a year
2	C-program to solve the sum of the sine and cosine series and print out the curve.
3	C-program to convert a given integer into binary and octal systems and vice versa.
4	C-program to find Inverse of a matrix
5	Find roots of f(x) = 0 by using Newton-Raphson method
6	Find roots of f(x) = 0 by using iteration method
7	Use of Newton's forward, backward and general interpolation formula

8	Use of Newton's interpolation formula to estimate the first order and the second order differentials numerically.

Additional References:

1. D.C.Tayal ,University Practical physics, Edited by Ila Agarwal, Himalaya Publishing House
2. B. L. Worsnop and H. T. Flint, Advanced Practical Physics, Asia Publishing House, New Delhi.
3. P. Khandelwal, A Laboratory Manual of Physics for Undergraduate Classes, Vani Publication House, New Delhi.
4. Geeta Sanon, BSc Practical Physics, 1st Edn. (2007), R. Chand & Co.

Note (for Sem-V Practical) :

1. The duration of each experiment is of 2 hours.
2. In the external exam, a student shall perform six experiments, one from each group. Each experiment will be of 2 hours duration.
3. There shall not be more than 20 students per batch in the external exam.
4. The external exam of each batch should be completed in two days by arranging three sessions of 2 hours each in a day.

Veer Narmad South Gujarat University, Surat

T. Y. B. Sc. Sem V

Elective Paper - I

Modern Digital and Analog Communication System-I

Unit 1	**Introduction : Communication System (Modern Digital And Analog Communication System by B P Lathi & Zhi Ding, Oxford University Press, 4th ed., South Asia Edition, 2017)**
	Communication systems (1.1), Analog and digital messages (1.2), Channel effect, Signal-to-Noise ratio and capacity (1.3), Modulation and detection (1.4) (Including subtopics)
Unit 2	**Amplitude Modulations and Demodulations (Modern Digital And Analog Communication System by B P Lathi & Zhi Ding, Oxford University Press, 4th ed., South Asia Edition, 2017)**
	Baseband versus carrier communications (3.1), Double-Sideband amplitude modulation (3.2), Amplitude modulation (AM) (3.3), Bandwidth-Efficient amplitude modulations (3.4), Amplitude modulations: vestigial sideband(VSB) (3.5), Local carrier synchronization (3.6), Frequency division multiplexing (FDM) (3.7), Phase-Locked loop and some applications (3.8) (Including subtopics)
Unit 3	**Angle Modulation and Demodulation (Modern Digital And Analog Communication System by B P Lathi & Zhi Ding, Oxford University Press, 4th ed., South Asia Edition, 2017)**

	Nonlinear modulation (4.1), Bandwidth of Angle-Modulated waves (4.2), Generating FM waves (4.3), Demodulation of FM signals (4.4), Effects of nonlinear distortion and interference (4.5), Superheterodyne analog AM/FM receivers (4.6), FM broadcasting system (4.7)
Unit 4	**Sampling and analog-to-Digital Conversion (Modern Digital And Analog Communication System by B P Lathi & Zhi Ding, Oxford University Press, 4th ed., South Asia Edition, 2017)**
	Sampling theorem (5.1), Pulse code modulation (PCM) (5.2), Digital telephony: PCM in T1 carrier systems (5.3), Digital multiplexing (5.4), Differential pulse code modulation (DPCM) (5.5), Adaptive differential PCM (ADPCM) (5.6), Delta modulation (5.7) Vocoders and video compression (5.8) (Including subtopics)

Additional References:

1. Electronic Communications by Ruddy and coolen, Pearson Education, 4th ed., 2008
2. Introduction to Analog & Digital Communications : Simon Haykin & Michael Moher, 2014
3. Electronic Communication system by G. Kennedy & B. Devis, McGraw Hills Education, 6th ed., 2017.

Veer Narmad South Gujarat University, Surat
T. Y. B. Sc. (Physics) Sem V
Elective Paper II
Astrophysics-I

Unit 1	**Astronomical Instruments (An Introduction to Astrophysics by Baidyanath Basu, Tanuka Chattopadhyay and Sudhindra Nath Biswas PHI Learning Private Ltd, 2nd ed., 2017)**
	Optical telescopes (1.3), Radio telescopes (1.4), The hubble space telescope (HST) (1.5), Astronomical spectrograph (1.6), Spectrophotometry (1.9)
Unit 2	**Star (An Introduction to Astrophysics by Baidyanath Basu, Tanuka Chattopadhyay and Sudhindra Nath Biswas PHI Learning Private Ltd, 2nd ed., 2017)**
	Magnitudes, Motions, and Distances of Stars Stellar magnitude sequence (3.1), Absolute magnitude and the distance module (3.2), Radiometric magnitudes (3.5), The colour index of a star (3.6), Luminosities of star (3.7) **Spectral Classification of Stars** Introduction (4.1), Boltsmann's formula (4.2), Saha's equation of thermal ionization (4.3), Importance of ionization theory in astrophysics (4.6)
Unit 3	**The Sun (An Introduction to Astrophysics by Baidyanath Basu, Tanuka Chattopadhyay and Sudhindra Nath Biswas PHI Learning Private Ltd, 2nd ed., 2017)**
	Sun- A typical star (5.1), The photosphere: limb- darkening (5.2), Solar granulation (5.3), The chromosphere (5.5), Solar corona (5.6), Prominences (5.7), The 11 Year solar cycle and sunspots (5.8), The solar magnetic fields (5.9), Theory of sunspots

	(5.10), Solar flares (5.11), Radio emission from the sun (5.12), Solar wind (5.13), The solar neutrino puzzle (5.14)
Unit 4	**Binary and Multiple Stars (An Introduction to Astrophysics by Baidyanath Basu, Tanuka Chattopadhyay and Sudhindra Nath Biswas PHI Learning Private Ltd, 2nd ed., 2017)**
	Introduction (7.1), Visual binary (7.2), Spectroscopic binary (7.3), Eclipsing binary (7.4), Multiple stars (7.5), Origin of binary stars (7.6), Steller masses and mass luminosity relation (7.7), Mass transfer in close binary systems (7.8)

Additional References:

1. Astrophysics: Stars and Galaxies by K D Abhyankar, Unievrsity Press, 2001
2. Introduction to Cosmology by Jayant Narlikar, Cambridge University Press, 2002.

Veer Narmad South Gujarat University, Surat

T. Y. B. Sc. (Physics) Sem V
Elective Paper III
Measurements and Instrumentation-I

Unit 1	**Optoelectronic measurement (Electrical and Electronic Measurements and Instrumentation By A.K. Sawhney, Dhanpat Rai & Co., 19th ed., 2021)**
	Introduction (19.1), Monochromatic light (19.2), Polarized wave shape (19.3), Refraction and refractive index (19.4), Reflection, Absorption and transmission (19.5), Radiometry and photometry (19.6), Terms relating to photometry (19.7), Laws of illumination (19.11), Terms relating to radiometry (19.12), Photometry/radiometry measurement systems (19.13), Optical sources (19.14), Optical detectors (19.15).
Unit 2	**Electronic Instruments (Electrical and Electronic Measurements and Instrumentation By A.K. Sawhney, Dhanpat Rai & Co., 19th ed., 2021)**
	Introduction (20.1), Electronic voltmeter and their advantages (20.2), Vacuum tube voltmeter (20.3), Differential amplifier (20.4), Difference amplifier type of electronic voltmeter (20.5), Source follower types of electronic voltmeter (20.6), DC voltmeter with direct-coupled amplifier (20.7), Chopper stabilized amplifier (20.8), Electronic voltmeter using rectifier (20.9)
Unit 3	**Cathode Ray Oscilloscope (Electrical and Electronic Measurements and Instrumentation By A.K. Sawhney, Dhanpat Rai & Co., 19th ed., 2021)**
	Introduction (21.1), Cathode ray tube (21.2), Electron gun (21.3), Electrostatic focusing(21.4), Electrostatic deflection (21.5), Post deflection acceleration of electron beam (21.6), Effect of beam transit time and frequency limitations (21.7), Deflection plates (21.8), Graticule (21.10), Time base generator (21.13), Oscilloscope amplifiers (21.14), Vertical input and sweep generator signal synchronization (21.15), Attenuators (21.16), Basic CRO circuits (21.17), Observation of waveform on CRO (21.18), Measurements of voltage and currents (21.19), measurements of phase and frequency (21.20)

Unit 4	**Transducers (Electrical and Electronic Measurements and Instrumentation By A.K. Sawhney, Dhanpat Rai & Co., 19th ed., 2021)**
	Transducers (25.6), Electric-transducers (25.7), Classification transducers (25.8), Characteristics and choice of transducers (25.9), Summary of factors influencing the choice of transducers (25.10), Resistive transducers (25.11), Potentiometers (25.12), Materials used for potentiometer (25.14), Advantages and disadvantages of resistance potentiometer (25.15)

Additional References:

1. Electrical and electronic measurements and instrumentation By R.K.Rajput, S.Chand Publication
2. Electronic instrumentation by H.S.Kalsi, Mc Graw Hill (third Edition), 2017
3. Electrical and electronic measurements and instrumentation by Syed Imam and Vibhav Kumar Published by Wiley, 2020

Structure for B. Sc. Syllabus

Inforce from June 2021

B. Sc. (PHYSICS)

Semester VI

Sr. No.	Course Code	Course Title	Credits
1	PH – 606	Physics Paper VI	02
2	PH – 607	Physics Paper VII	02
3	PH – 608	Physics Paper VIII	02
4	PH – 609	Physics Paper IX	02
5	PH – 610	Physics Paper X	02
6	PH – 611	Physics Paper XI	02
7	PH – 612	Practicals	06
8	Elective Course	Elective Paper 1 or 2or 3	02

Faculty code: Science **Subject code: PH**

Name of the Program: B. Sc. (Physics) **Subject: PHYSICS**

External Examination	Time Duration
Theory Examination	2 Hrs. per paper
Practical Examination	2 Hrs. per practical

Name of Exam	Semester	Paper No.	Course Group	Credit	Internal Marks	External Marks	Total Marks
B. Sc.	VI	PH – 606	Theory	02	20	50	70
		PH – 607	Theory	02	20	50	70
		PH – 608	Theory	02	20	50	70
		PH – 609	Theory	02	20	50	70
		PH – 610	Theory	02	20	50	70
		PH – 611	Theory	02	20	50	70
		PH – 612	Practical	06	60	120	180
		Elctive Course	Theory	02	20	50	70

Veer Narmad South Gujarat University, Surat

T. Y. B. Sc. Sem VI

Physics Paper VI (PH – 606)

Classical Mechanics and Solid State Physics

Unit 1	**Moving Coordinate Systems (Introduction to Classical Mechanics by R G Takwale and P S Puranik, McGraw Hills Edu. Pvt. Ltd., 2017)**
	Coordinate system with relative translational motion (9.1), Rotating coordinate system (9.2), The Coriolis force (9.3), Motion on the Earth (9.4), Effect of Coriolis force on a freely falling particles (9.5)
Unit 2	**Motion of a Rigid Body (Introduction to Classical Mechanics by R G Takwale and P S Puranik, McGraw Hills Edu. Pvt. Ltd., 2017)**
	Euler's theorem (10.1), Angular Momentum and Kinetic Energy (10.2), the inertia tensor (10.3), Euler's equations of motion (10.4), Torque-free motion (10.5), Euler's angles (10.6), Motion of a symmetric top (10.7)
Unit 3	**Fermi Surfaces and Metals (Solid State Physics Charles Kittel , John Wiley & Sons, 8th ed., 2005)**
	Ch: 9 Reduced zone scheme, Periodic zone scheme, Construction of fermi surfaces, Electron orbits, Hall orbits and open orbits, Calculation of energy bands, Experimental methods in fermi surface studies (including of subtopics)
Unit 4	**Superconductivity (Solid State Physics Charles Kittel , John Wiley & Sons, 8th ed., 2005)**
	Ch:10 Experimental Survey, Theoretical Survey, High Temperature Superconductors (including subtopics)

Additional References:

1. An Introduction to Mechanics by Daniel Kleppner and Robert Kolenkow, McGraw Hill Edu. 2017
2. Classical Mechanics by G. Aruldhas, PHI, 2015
3. Solid State Physics by S O Pillai, New Age International Publishers, 2018.

Veer Narmad South Gujarat University, Surat

T. Y. B. Sc. Sem VI

Physics Paper VII (PH – 607)

Electrodynamics and Optics

Unit 1	**Electrodynamics (Introduction to Electrodynamics by David J. Griffiths, Pearson India Education, 4th ed., 2015)**
	Ch-7 Electrodynamics **1 Electromotive Force:** Ohm's law (1.1), Electromotive force (1.2), Motional emf (1.3) **2 Electromagnetic Induction** Faraday's law (2.1), The induced electric field (2.2), Inductance (2.3), Energy in magnetic field (2.4)
Unit 2	**Electrodynamics (Introduction to Electrodynamics by David J. Griffiths, Pearson India Education, 4th ed., 2015)**
	Ch-7 Electrodynamics **3 Maxwell's Equations :** Electrodynamics before maxwell (3.1), How maxwell fix Ampere's law (3.2), Maxwell's equation (3.3), Magnetic charge (3.4), Maxwell's equations in matter (3.5), Boundary conditions (3.6) **Conservation laws:** The continuity equation (1.1), Poynting's theorem (1.2)
Unit 3	**Reflection and Refraction of Electromagnetics Waves (Optics by Ajoy Ghatak, McGraw Hill Edu. (India) Pvt. Ltd., 6th ed., 2017)**
	Introduction (24.1), Reflection and refractions at an interface of two media (24.2), Normal incidence on a medium (24.3), Oblique incidence: E Parallel to the plane of incidence (24.4), Polarization by reflection: Brewster's law (24.5), Total internal reflection and the evanescent wave (24.6), Oblique incidence: E perpendicular to the plane of incidence (24.7), Expressions for reflectivity and transmittivity (24.8)
Unit 4	**Optical Fiber Basics using Ray Optics (Optics by Ajoy Ghatak, McGraw Hill Edu. (India) Pvt. Ltd., 6th ed., 2017)**
	Why glass fibers? (28.5), The coherent bundle (28.6), The numerical aperture (28.7), Attenuation in optical fibers (28.8), Multimode fibers (28.9)

Additional References:

1. Electricity and Magnetism by D C Tayal, Himalaya Publishing House, 2014.
2. Fundamentals of Optics by F A Jenkins and H E White, McGraw Hill, 2017.
3. Optics by Eugene Hecht and A. R. Ganeshan, Pearson Education., 2019.

Veer Narmad South Gujarat University, Surat

T. Y. B. Sc. Sem VI

Physics Paper VIII (PH – 608)

Atomic and Nuclear Physics

Unit 1	**Many Electron Atoms (Concepts of Modern Physics by Arthur Beiser, McGraw Hill Publishing Co. Ltd. New Delhi, 6 ed., 2006)**
	Periodic table (7.4), Atomic structures (7.5), Explaining the Periodic table (7.6), Spin-Orbit Coupling (7.7), Total Angular Momentum (7.8), X-Ray spectra (7.9)
Unit 2	**Molecular Physics (Concepts of Modern Physics by Arthur Beiser, McGraw Hill Publishing Co. Ltd. New Delhi, 6 ed., 2006)**
	The Molecular bond (8.1), Electron sharing (8.2), The H2+ Molecular ion (8.3), The Hydrogen molecule (8.4), Complex molecules (8.5), Rotational energy levels (8.6), Vibrational energy levels (8.7), Electronic spectra of molecules (8.8)
Unit 3	**Particle Accelerators and Radiation Detectors (Introduction to Nuclear and Particle Physics by V. K. Mittal, R. C. Verma, S. C. Gupta, PHI, 3rd ed., 2014)**
	Introduction (6.1) Cockcroft and Walton accelerator (6.2), Tandem accelerator (6.4), Linear Accelerator (LINAC) or Drift Tube accelerator (6.5), Introduction (7.1), Gas-Filled detectors (7.2), Ionizations chamber (7.3), Proportional counters (7.4), Geiger-Muller (GM) counters (7.5), Scintillations detectors (7.6), Semiconductors radiations detectors (7.7), Cloud chamber (7.8), Cerenkov counters (7.12) (Including subtopics)
Unit 4	**Particle Physics (Introduction to Nuclear and Particle Physics by V. K. Mittal, R. C. Verma, S. C. Gupta, PHI, 3rd ed., 2014)**
	Introduction (8.1), Productions of elementary particles (8.2), Types of interaction (8.3), Classification of elementary particles (8.4), Mass spectra and decays of elementary particles (8.5), Quantum numbers (8.6), Conservation laws (8.7) (Including subtopics)

Additional References:

1. Quantum Physics by Robert Eisberg & Robert Resnick, Wiley, 2006
2. Nuclear Physics by D C Tayal, Himalaya Publications, 2017
3. Nuclear and Particle Physics by Satadal Bhattacharyya, University Press (India) Private Ltd, 2019

Veer Narmad South Gujarat University, Surat

T. Y. B. Sc. Sem VI

Physics Paper IX (PH – 609)

Statistical Mechanics and Special Relativity

Unit 1	**Classical and Quantum Statistics (Thermal Physics by Garg, Bansal and Ghosh, McGraw Hill Education (India) Pvt Ltd. Chennai, 2nd ed., 2012)**
	Classical and quantum statistics (12.9), Distribution functions (12.9.1), Partition function and thermodynamics properties of a system (13.2), The partition function for an ideal monatomic gas(13.3), Single partition function (13.3.1), N-particle partition function and thermodynamic variables (13.3.2), Some deductions from MB statistics (13.4), Distribution law for molecular speeds (13.4.1), specific heat capacity of gases (13.4.2), partition function of a diatomic molecule (13.4.3), specific heat capacity of hydrogen (13.4.5)
Unit 2	**Specific Heat Capacity of Solids (Thermal Physics by Garg, Bansal and Ghosh, McGraw Hill Education (India) Pvt Ltd. Chennai, 2nd ed., 2012)**
	Specific heat capacity of solids (13.5), Einstein's theory (13.5.1), Debye theory (13.5.2), Thermodynamic functions of systems with finite number of energy levels (13.6), negative temperatures (13.6.1), transition between states: Einstein's formulation of spontaneous and stimulated emission of radiation (13.6.2), Laser action (13.6.3)
Unit 3	**Relativistic Dynamics (Introduction to Special Relativity by Robert Resnick, Wiley India Pvt. Ltd.)**
	The need to redefine momentum (3.2), Relativistic momentum (3.3), Alternative views of mass in relativity (3.4), The relativistic force law and the dynamics of a single Particle (3.5), The equivalence of mass and energy (3.6)
Unit 4	**Relativity and Electromagnetism (Introduction to Special Relativity by Robert Resnick, Wiley India Pvt. Ltd.)**
	Introductions (4.1) The interdependence of electric and magnetic fields (4.2), The transformation for **E** and **B** (4.3), The field of a uniformly moving point charge (4.4), Forces and fields near a current carrying wire (4.5), Forces between moving charges (4.6), The invariance of Maxwell's equations (4.7), The possible limitations of Special Relativity (4.8)

Additional References:

1. Fundamentals of Thermal and Statistical Physics by Fredrick Reif, Sarat Book Distributors, 2010
2. The Special Theory of Relativity by S Banerji and Asit Banerjee, PHI Learning Pvt. Ltd. New Delhi, 2012

Veer Narmad South Gujarat University, Surat

T. Y. B. Sc. Sem VI

Physics Paper X (PH – 610)

Analog and Digital Electronics

Unit 1	**Operational Amplifiers and Linear Op-Amp circuits (Electronic Principles by A Malvino and D. Bates, McGraw Hill Edu. (India) Pvt. Ltd, New Delhi, 7th ed.)**
	Introduction : Introduction to OP Amps (18.1), The 741 Op Amp (18.2), The inverting amplifiers (18.3), The Non-inverting amplifiers (18.4), Two Op-Amp applications (18.5) Inverting-amplifier circuits (20.1), Noninverting-amplifier circuits (20.2), Inverter/Noninverter circuits (20.3), Differential amplifiers (20.4), Instrumentation amplifiers (20.5), Summing amplifier circuits (20.6)
Unit 2	**Feedback & Oscillators (Electronic Principles by A Malvino and D. Bates, McGraw Hill Edu. (India) Pvt. Ltd, New Delhi, 7th ed.)**
	Feedback: Four types of negative feedback (19.1), VCVS Voltage gain (19.2) **Oscillators:** Theory of sinusoidal oscillators (23.1), The Wein Bridge oscillator (23.2), Other RC oscillators (23.3), The Colpitt oscillator (23.4), Other LC oscillators (23.5), The 555 timer (23.7), Astable operation of 555 timer (23.8), 555 circuits (23.9)
Unit 3	**Arithmetic Circuits (Digital Principles And Applications by D. Leach, A Malvino and G. Saha, McGraw Hill Edu. (India) Pvt. Ltd, 7th ed., 2010)**
	Clock waveforms (7.1), TTL clock (7.2), Schmitt trigger (7.3), 555 timer – Astable (7.4), 555 timer – monostable (7.5), Monostables with input logic (7.6), Pulse-forming circuits (7.7)
Unit-4	**Flip-Flop (Digital Principles And Applications by D. Leach, A Malvino and G. Saha, McGraw Hill Edu. (India) Pvt. Ltd, 7th ed., 2010)**
	RS Flip-Flop (8.1), Gated Flip-Flops (8.2),Edged-Triggered RS Flip-Flops (8.3), Edged-Triggered D Flip-Flops (8.4), Edged-Triggered, Jk Flip-Flops (8.5), Flip-Flops Timing (8.6),Edge Triggering through input lock out (8.7), JK Master-Slave Flip-Flops (8.8).

Additional References:

1. Functional Electronics by K.V. Ramanan – McGraw Hill Edu. Pvt. Ltd, New Delhi Publication
2. Electronics Devices and Circuits by Allen Mottershed – PHI Publication.
3. Modern Digital Electronics by R P Jain, McGraw Hill Education, New Delhi, 2009.

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T. Y. B. Sc. Sem VI

Physics Paper XI (PH – 611)

Mathematical Method of Physics and C-Programming

Unit 1	**Differential equations (Mathematical Method for Physicists by Arfken and Weber, Academic Press 6th ed., 2010)**
	Partial Differential Equations (9.1), First order Differential Equations (9.2), Separation of variables (9.3), Singular Points (9.4) Series solutions-Frobenius method (9.5)
Unit 2	**Matrices (Mathematical Method for Physicists by Arfken and Weber, Academic Press 6th ed., 2010)**
	3.2 **Matrices** Basic Definitions, Rank, Equality, Addition, Subtraction, Multiplication by Scalar, Matrix Multiplication- inner product, Direct product, Diagonal matrices, Matrix inversion, 3.3 **Orthogonal Matrices** Direction cosines, Applications to vectors, Orthogonality conditions: Two Dimensional case, Transpose matrix 3.5 **Diagonalization of Matrices:** Moment of inertia matrix, Eigen vector, Eigen values, Hermitian matrices, Anti-Hermitian matrices, Functions of matrices, Diagonal matrices
Unit 3	**C Programing (Computer Programing in C by V Rajaraman by PHI Learning Private Ltd, Delhi (24th Printing))**
	Defining and Manipulating Arrays: Array Variable (10.1), Syntax rules for arrays (10.2), Use of multiple subscripts in array (10.3), Reading and writing multidimensional arrays (10.4), Examples of for Loops with arrays (10.5) **Logical Expressions and More Control Statements:** Introduction (11.1), Logical operators and expressions (11.2), Precedence rules for logical operators (11.3), Some example of use of logical expressions (11.4), The switch statement (11.5), The break statement (11.6), The continue statement (11.7)
Unit 4	**C Programing (Computer Programing in C by V Rajaraman by PHI Learning Private Ltd, Delhi (24th Printing))**
	Functions: Introduction (13.1), Defining and using functions (13.2), Syntax rules for function declaration (13.3), Array in functions (13.4), Global local and static variables (13.5)

Additional References:

1. Mathematical Physics by H K Das and Dr. Rama Verma, S. Chand Co., 7th ed., 2019
2. Mathematical Physics by P K Chattopadhaya, New Age International publishers, 2006
3. Let us C by Y. Kanetkar, BPB Publications, 17th ed., 2017

Veer Narmad South Gujarat University, Surat

Practicals for T. Y. B. Sc. Sem VI

PH-612

LIST OF EXPERIMENTS

	GROUP A
1	To determine Young's modulus by Koeing's method.
2	To study Resonance Pendulum
3	To study coupled oscillator
4	To determine the oscillation of mass in the case of combination of two spring.
5	To determine Young's modulus by the method of vibration
6	To determine the moment of inertia of a flywheel
	GROUP B
1	To determine refractive index of liquid using hollow prism
2	To determine the wavelength of light using Fresnel's biprism
3	To determine the resolving power of diffraction grating
4	To determine cardinal points of a lens system using Searle's goniometer
5	To determine the wavelength of light using Lloyd's mirror
6	To determine wavelength of light using Edser butler plate
	GROUP C
1	To determine the constants of thermocouple
2	To determine e/m by Thomson's method
3	To determine the constants of BG using solenoid
4	To study LDR
5	To study Colpitt's oscillator
6	To study Hartley's oscillator
	GROUP D
1	To determine high resistance using method of leakage
2	To determine mutual inductance by Carey-Foster's method
3	To determine self-inductance of a given coil by Rayleigh's method
4	To determine self-inductance of a given coil using Maxwell's Induction bridge
5	To determine the ratio of capacities using Desauty's method
6	To determine mutual inductance using ballistic galvanometer

References:

1. University Practical Physics by D C Tayal, Edited by Ila Agarwal, Himalaya Publishing House
2. Advanced Practical Physics by B. L. Worsnop and H. T. Flint, Asia Publishing House, New Delhi.
3. A Laboratory Manual of Physics for Undergraduate Classes by P. Khandelwal, Vani Publication House, New Delhi.
4. BSc Practical Physics by Geeta Sanon, S. Chand & Co., 1st ed. 2007

Note (for Sem-VI Practical):

1. The duration of each experiment is of 2 hours.
2. In the external exam, a student shall perform four experiments, one from each group. Each experiment will be of 2 hours duration.
3. The experiments in Sem-VI divided in four groups (A,B,C and D) carrying 4 credits (8hrs/week) as per list attached above.
4. In addition to experiments, students have to perform project work (4 hr/week, 2 credits) under the guidance of a faculty as per the guidelines mentioned below:
5. There shall not be more than 20 students per batch in the external exam.
6. The external exam of each batch of 20 students should be completed in two days by arranging three sessions of 2 hours each in a day. Last two sessions per batch shall be allotted for evaluation of project work.

Guidelines for Project Work:

It is expected that,

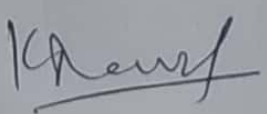
1. As project work the student does work equivalent to twelve hours laboratory experiments through sixth semester under the guidance of faculty.
2. A project shall be carried out either individually or in a group of not more than four students. The Head of the Department shall assign one teacher per project. The equivalent workload should be credited to the teacher who has been assigned the project guideship and must be added in the time schedule of practical.
3. The project work is a practical course and it is intended to develop a set of skills pertaining to the laboratory work apart from the cognition of students. Therefore, the guides should not permit projects that involve no contribution on part of student.
4. The project must have a clear and strong link with the principles of basic physics and/or their applications.
5. The theme chosen should be such that it promotes better understanding of physics concepts and brings out the creativity in the students.
6. The evaluation of the project work must give due credit to the amount of the project work actually done by a student, skills shown by the student, understanding of the physics concepts involved and the presentation of the final report at the time of viva voce.
7. Any ready-made material used in the report (such as downloaded pages from the web) must be clearly referred to and acknowledged.
8. Time schedule for project work shall be decided by the guide in such a way that the final report submission is completed along with submission of journal of laboratory work.
9. Any non-adherence to this norm should attract a penalty by way of deduction in the marks awarded to a student.

Minimum 4 hours per student/group should be spent by the faculty member for the guidance of project work to the students which shall be considered as work load of practical.

Evaluation of the project work:

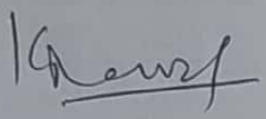
The following points shall be considered during evaluation of project work:

1. Working model (Experimental or Concept based simulation)
2. Understanding of the project
3. Data collection
4. Data Analysis
5. Innovation/difficulty
6. Report.



Scheme of external examination: (Total 120 marks)

1. The University (external) examination for Practical shall be conducted at the end of each Semester and the evaluation of Project work at the end of the sixth semester along with practical examination.
2. The candidates shall appear for external examination of Practical course carrying
   (i) 120 marks at the end of fifth semester (Six practical of two hours each)
   (ii) 80 marks (Four sessions of two hours each) + 40 marks project work.
3. The evaluation of project work should be conducted based on presentation and report. Extra care must be taken in the evaluation of projects done in a pair or group. Delegation of the work done by individuals must be sought from the students in such cases.
4. The candidate shall prepare and submit a certified Journal for practical examination based on the practical course with at least 80% of total experiments from each group.
5. At the time of practical examination, the candidate must also submit the certified Project Report prepared as per the guidelines given in the Syllabus.
6. A candidate will be allowed to appear for the practical examination in each semester only if the candidate submits a certified journal of that semester or a certificate from the Head of the Department to the effect that the candidate has completed the practical course of that semester as per the minimum requirements and a project completion report duly certified by the project in-charge and Head of the Department.
7. The scheme for internal marks (total 60 marks) shall also be followed to include project work evaluation.
8. During the external practical examination the number of students per batch should be twenty (20).



Veer Narmad South Gujarat University, Surat

T. Y. B. Sc. Sem VI

Elective Course – I

Modern Digital and Analog Communication System-II

Note: The prerequisite for this course is that a student should have taken the Elective paper: Modern Digital and Analog Communication System-I in Semester V.

Unit 1	**Principles of Digital Data Transmission (Modern Digital And Analog Communication System by B P Lathi & Zhi Ding, Oxford University Press, 4th ed., South Asia Edition (2017)**
	Digital communication systems(8.1), Line coding (8.2), Pulse shaping (8.3) (Including subtopics)
Unit 2	**Principles of Digital Data Transmission (Modern Digital And Analog Communication System by B P Lathi & Zhi Ding, Oxford University Press, 4th ed., South Asia Edition (2017)**
	Scrambling (8.4), Digital receivers and regenerative repeaters (8.5), Eye diagrams: An important tool (8.6), PAM: Mary baseband signalling for higher data rate (8.7), Digital carrier systems (8.8), Mary digital carrier modulation (8.9)
Unit 3	**Performance Analysis of Digital Communication Systems (Modern Digital And Analog Communication System by B P Lathi & Zhi Ding, Oxford University Press, 4th ed., South Asia Edition (2017)**
	Optimum linear detector for binary polar signaling (9.1), General binary signaling (9.2), Coherent receivers for digital carrier modulations (9.3), Signal space analysis of optimum detection (9.4), Vector decomposition of white noise random processes (9.5) (Including subtopics)
Unit 4	**Performance Analysis of Digital Communication Systems (Modern Digital And Analog Communication System by B P Lathi & Zhi Ding, Oxford University Press, 4th ed., South Asia Edition (2017)**
	Optimum receiver for while gaussian noise channels (9.6), General expression for error probability of optimum receivers (9.7), Equivalent signal sets (9.8), Nonwhite (Colored) Channel noise (9.9), Other useful performance criteria (9.10), Noncoherent detection (9.11) (Including subtopics)

Additional References:

1. Electronic Communications by Ruddy and coolen, Pearson Education, 4th ed., 2008
2. Introduction to Analog & Digital Communications : Simon Haykin & Michael Moher, 2014
3. Electronic Communication system by G. Kennedy & B. Devis, McGraw Hills Education, 6th ed., 2017.

Veer Narmad South Gujarat University, Surat

T. Y. B. Sc. Sem VI

Elective Paper II

Astrophysics-II

Note: The prerequisite for this course is that a student should have taken the Elective paper: Astrophysics-I in Semester V.

Unit 1	**Structure and Evolution of Stars (An Introduction to Astrophysics by Baidyanath Basu, Tanuka Chattopadhyay and Sudhindra Nath Biswas PHI Learning Private Ltd 2nd ed.)**
	Introduction (14.1), The equation of state for stellar interior (14.3), Mechanical and thermal equilibrium in stars (14.4), Energy generation in stars (14.6), Steller evolution (14.7) White dwarfs (14.8)
Unit 2	**Pulsars, Neutron Stars and Black Holes (An Introduction to Astrophysics by Baidyanath Basu, Tanuka Chattopadhyay and Sudhindra Nath Biswas PHI Learning Private Ltd 2nd ed.)**
	Discovery of pulsars (15.1), Rotating neutron stars model of pulsars (15.2), Period distribution and loss of rotational energy (15.3), Binary pulsars (15.7), Black holes (15.8)
Unit 3	**Quasars (An Introduction to Astrophysics by Baidyanath Basu, Tanuka Chattopadhyay and Sudhindra Nath Biswas PHI Learning Private Ltd 2nd ed.)**
	The discovery (20.1), Radio properties (20.2), Optical properties (20.3), The redshift of quasars (20.4), Active galactic nuclei (20.5)
Unit 4	**Cosmology (An Introduction to Astrophysics by Baidyanath Basu, Tanuka Chattopadhyay and Sudhindra Nath Biswas PHI Learning Private Ltd 2nd ed,)**
	Introduction (21.1), Redshift and the Exapansion of the Universe (21.2), Matter Density in the universe and the deceleration parameter (21.3), The Cosmological Principle: The perfect Cosmological principle (21.4), Fundamental equations of cosmology (21.5), The Cosmic Microwave Background Radiation (21.8)

Additional References:

1. Astrophysics: Stars and Galaxies by K D Abhyankar, University Press, 2001
2. Introduction to Cosmology by Jayant Narlikar, Cambridge University Press, 2002.

Veer Narmad South Gujarat University, Surat
T. Y. B. Sc. Sem VI

Elective Paper III

Measurements and Instrumentation-II

Note: The prerequisite for this course is that a student should have taken the Elective paper: Measurements and Instrumentation-I in Semester V.

Unit 1	**Primary Sensing Elements and Trasducers 1 (Electrical and Electronic Measurements and Instrumentation By A.K. Sawhney, Dhanpat Rai & Co., 19th ed., 2021)**
	Resistance Thermometer (25.19), Thermistors (25.20), Integrated circuits temperature transducers (25.22), Variable inductance transducers (25.23), Linear Variable Differential Transformer (LVDT) (25.24), Rotary Variable Differential Transformer (RVDT)(25.25), Synchros (25.26), Resolvers (25.27)
Unit 2	**Primary Sensing Elements and Trasducers 2 (Electrical and Electronic Measurements and Instrumentation By A.K. Sawhney, Dhanpat Rai & Co., 19th ed., 2021)**
	Capacitive transducers (25.28), Piezo-electric transducers (25.29), Hall effect transducers (25.30), Magneto-Resistors (25.31), Magneto-elastic and magneto-strictive trasducers (25.32), Optoelectronic transducers (25.33)
Unit 3	**Display Devices (Electrical and Electronic Measurements and Instrumentation By A.K. Sawhney, Dhanpat Rai & Co., 19th ed., 2021)**
	Introduction (28.1), Electrical indicating instruments (28.2), Digital instruments (28.3), Electronic counters (28.4), Digital display methods (28.5), Digital display units (28.6), Segmental displays (28.7), DOT matrices (28.8), Rear projection display (28.9), Light emitting diode (28.11), Liquid crystal diodes (28.12), Nixie tubes (28.13), Segmental gas discharge displays (28.14), Decade counting assemblies (DCAs) (28.15), Display systems (28.16)
Unit 4	**Modern Sensors and Chemical Sensors (Electrical and Electronic Measurements and Instrumentation By A.K. Sawhney, Dhanpat Rai & Co., 19th ed., 2021)**
	Types of modern sensors (32.2), Neno-sensors (32.3), Biosensors (32.4), Introduction (34.1), Probe analysers (34.2), Differential refractometers (34.3), Spectrophotometers (34.4), Detectors (34.5), Filters (34.6), Chromatography (34.7), Electrochemical sensors (34.8),

Additional References:

1. Electrical and electronic measurements and instrumentation By R.K.Rajput, S.Chand Publication
2. Electronic instrumentation by H.S.Kalsi, Mc Graw Hill (third Edition), 2017
3. Electrical and electronic measurements and instrumentation by Syed Imam and Vibhav Kumar Published by Wiley, 2020

વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી ,સુરત

શૈક્ષણિક વર્ષ ૨૦૨૧-૨૨ થી અમલમાં આવનાર એસ.વાય. બી.એ. સંસ્કૃત

મુખ્ય તથા ગૌણ CBCS સેમેસ્ટર -૩ નો અભ્યાસક્રમ

સેમેસ્ટર -૩

પ્રશ્નપત્ર -5-A Core Comp & Core Elective **Sem -3**

Credit -03 **કુલ ગુણ – ૫૦**

લલિત સાહિત્ય – સંસ્કૃત નાટ્ય સાહિત્ય

कृति - कालिदासविरचितम् - विक्रमोर्वशीयम्

ઉદ્દેશ – સંસ્કૃત નાટ્ય સાહિત્યમાં સર્વશ્રેષ્ઠ નાટયકારોના સર્જનનો પરિચય કરાવી ભારતીય સંસ્કૃતિ અને સભ્યતા સાથે સાહિત્યનો પરિચય કરાવવો.

અભ્યાસક્રમના મુદ્દાઓ : નાટયકૃતિનાં કર્તાનો પરિચય – જીવન- કવન -સમય , સંસ્કૃતિના ઉદ્ગાતા કાલિદાસનું નાટ્યકાર તરીકે તથા વિક્રમોર્વશીયમનું નાટયકૃતિ તરીકે મૂલ્યાંકન, નાટ્ય સ્વરૂપ, દરેક અંકનાં પ્રસંગો, કૃતિનું સર્વાંગી વિવેચન, કાલિદાસનું પ્રદાન વગેરે.

Unit -1 કવિ પરિચય , જીવન, સમય – કવન, સંસ્કૃત નાટ્ય સ્વરૂપનો પરિચય અને કૃતિલક્ષી મૂલ્યાંકન. ૧૨

Unit -2 અંક -૧ અને ૨ ૧૩

Unit- 3 અંક ૩ અને ૪ ૧૨

Unit -4 અંક -૫ ૧૩

(નોંધ – અનુવાદના શ્લોકો તથા સંદર્ભ અંક --૧ અને ૨ માંથી પુછાશે)

સંદર્ભગ્રંથ સૂચિ :

૧ કાલિદાસ- ઝાલા (અંગ્રેજી)

૨ કાલિદાસ- વી. વી. મીરાશી (હિન્દી)

૩ સંસ્કૃત નાટકોનો પરિચય-નાન્દી

૪ કાલિદાસ પરિશીલન – રાધા વલ્લભ ત્રિપાઠી , સંસ્કૃત પરિષદ , સાગર-૧૯૮૯

૫ **History of Sanskrit literature – A .B . Kieth**

૬ સંસ્કૃત સાહિત્ય પરિચય-ડૉ . એ.ડી . શાસ્ત્રી

૭ સંસ્કૃત સાહિત્યનો ઈતિહાસ – પ્રો. એ. મેક્ડોનલ કૃત

શૈક્ષણિક વર્ષ ૨૦૨૧-૨૨ થી અમલમાં આવનાર એસ.વાય. બી.એ. સંસ્કૃત

મુખ્ય તથા ગૌણ CBCS સેમેસ્ટર -૩ ના <u>પ્રશ્નપત્ર -5-A</u> પ્રશ્નપત્રનું પ્રારૂપ

Core Comp & Core Elective **Sem -3**

Credit -03 કુલ ગુણ – ૫૦

લલિત સાહિત્ય – સંસ્કૃત નાટ્ય સાહિત્ય

कृति - कालिदासविरचितम् - विक्रमोर्वशीयम्

પ્ર-૧ ટૂંકમાં જવાબ આપો (૭ માંથી ૫) (Unit – I to IV)	(૧૦)
પ્ર-૨ (અ) અનુવાદ કરો (૪ માંથી ૨) (Unit-II)	(૦૮)
(બ) સસંદર્ભ સમજાવો (૨ માંથી ૧) (Unit-II)	(૦૫)
પ્ર-૩ સામાન્ય પ્રશ્ન અથવા સામાન્ય પ્રશ્ન (Unit I to IV)	(૧૩)
પ્ર-૪ ટૂંકનોંધ લખો. (૪ માંથી ૨) (Unit I to IV)	(૧૪)

વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી ,સુરત

શૈક્ષણિક વર્ષ ૨૦૨૧-૨૨ થી અમલમાં આવનાર એસ.વાય. બી.એ. સંસ્કૃત

મુખ્ય તથા ગૌણ CBCS સેમેસ્ટર -૩ નો અભ્યાસક્રમ

સેમેસ્ટર -૩

પ્રશ્નપત્ર -5-B Core Comp & Core Elective **Sem -૩**

Credit -૦૩ **કુલ ગુણ – ૫૦**

લલિત સાહિત્ય – સંસ્કૃત નાટ્ય સાહિત્ય

કૃતિ - હર્ષવિરચિતમ્ - રત્નાવલી

ઉદ્દેશ – સંસ્કૃત નાટ્ય સાહિત્યમાં સર્વશ્રેષ્ઠ નાટયકારોના સર્જનનો પરિચય કરાવી ભારતીય સંસ્કૃતિ અને સભ્યતા સાથે સાહિત્યનો પરિચય કરાવવો.

અભ્યાસક્રમના મુદ્દાઓ : રત્નાવલીનાં કર્તાનો પરિચય – જીવન- કવન -સમય , હર્ષનું નાટ્યકાર તરીકે મૂલ્યાંકન, રત્નાવલીનું રૂપક તરીકે મૂલ્યાંકન, નાટ્ય સ્વરૂપ, દરેક અંકનાં પ્રસંગો, કૃતિનું સર્વાંગી વિવેચન, હર્ષનું સંસ્કૃત સાહિત્ય ક્ષેત્રે પ્રદાન વગેરે.

Unit -1 કવિ પરિચય , જીવન, સમય – કવન, સંસ્કૃત નાટ્ય સ્વરૂપનો પરિચય અને કૃતિલક્ષી મૂલ્યાંકન. ૧૨

Unit -2 રત્નાવલી અંક -૧ અને ૨ ૧૩

Unit- 3 રત્નાવલી અંક - 3 ૧૨

Unit -4 રત્નાવલી અંક - ૪ ૧૩

(નોંધ – અનુવાદના શ્લોકો તથા સંદર્ભ અંક -૧ અને ૨ માંથી પુછાશે)

સંદર્ભગ્રંથ સૂચિ :

1. **રત્નાવલી** -ડૉ સી.એલ. શાસ્ત્રી વગેરે , સરસ્વતી પુસ્તક ભંડાર, અમદાવાદ, ૧૯૮૫
2. સંસ્કૃત નાટકોનો પરિચય-નાન્દી
3. **History of Sanskrit literature – A .B . Kieth**
4. સંસ્કૃત સાહિત્ય પરિચય-ડૉ . એ.ડી . શાસ્ત્રી
5. સંસ્કૃત સાહિત્યનો ઈતિહાસ – પ્રો. એ. મેક્ડોનલ કૃત

શૈક્ષણિક વર્ષ ૨૦૨૧-૨૨ થી અમલમાં આવનાર એસ.વાય. બી.એ. સંસ્કૃત

મુખ્ય તથા ગૌણ **CBCS** સેમેસ્ટર -૩ ના **<u>પ્રશ્નપત્ર -5-B</u>** પ્રશ્નપત્રનું પ્રારૂપ

Core Comp & Core Elective **Sem -3**

Credit -03 કુલ ગુણ – ૫૦

લલિત સાહિત્ય – સંસ્કૃત નાટ્ય સાહિત્ય

कृति - हर्षविरचितम् - प्रियदर्शिका

પ્ર -૧ ટૂંકમાં જવાબ આપો (૭ માંથી ૫) (Unit – I to IV)	(૧૦)
પ્ર -૨ (અ) અનુવાદ કરો (૪ માંથી ૨) (Unit-II)	(૦૮)
(બ) સસંદર્ભ સમજાવો (૨ માંથી ૧) (Unit-II)	(૦૫)
પ્ર -૩ સામાન્ય પ્રશ્ન અથવા સામાન્ય પ્રશ્ન (Unit I to IV)	(૧૩)
પ્ર -૪ ટૂંકનોંધ લખો. (૪ માંથી ૨) (Unit I to IV)	(૧૪)

વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી ,સુરત

શૈક્ષણિક વર્ષ ૨૦૨૧-૨૨ થી અમલમાં આવનાર એસ.વાય. બી.એ. સંસ્કૃત

મુખ્ય તથા ગૌણ **CBCS** સેમેસ્ટર -૩ નો અભ્યાસક્રમ

સેમેસ્ટર -૩

Core Comp & Core Elective **Credit** -૦૩

પ્રશ્નપત્ર -6 **काव्यशास्त्रम्** કુલ ગુણ – ૫૦

कृति : मम्मटाचार्यकृत काव्यप्रकाशः उल्लासः -१ અને **१०** (નિયત અલંકારો), **नियतछन्दाः**

ઉદ્દેશ : સાહિત્યના સ્વરૂપોને સમજવા, સાહિત્યના આસ્વાદ માટે અંગોપાંગરૂપ રસ, રીતિ વગેરેનો શાસ્ત્રીય પરિચય મેળવવા, અલંકારશાસ્ત્રના પાયાના સિદ્ધાંતો જાણવા, અલંકારશાસ્ત્રનો પરિચય કરાવવો.

અભ્યાસક્રમના મુદ્દાઓ : અલંકાર, અલંકારશાસ્ત્ર, સાહિત્યશાસ્ત્ર – વ્યાખ્યા અને વિશેષતા, કાવ્યશાસ્ત્રની પરંપરાના આચાર્યો- સંપ્રદાયો, કાવ્યશાસ્ત્રનાં ઉપાદેય વિષયો, મમ્મટનો પરિચય, પ્રથમ તથા દસમા ઉલ્લાસના શાસ્ત્રીય વિષયોનું મૂલ્યાંકન, છંદોનો પરિચય.

Unit -1 काव्यप्रकाशः उल्लासः -१, कारिका -१,२,३ ૧૨

Unit -2 काव्यप्रकाशः उल्लासः - २, कारिका - ४ , ५, ६ ૧૩

Unit -3 काव्यप्रकाशः उल्लासः -१०, (नियतः) ૧૨

अलंकाराः- उपमा, उत्प्रेक्षा, रूपक , ससन्देह, अपह्नुति, श्लेष , समासोक्ति, विभावना , विशेषोक्ति

Unit -4 नियतछन्दाः - अनुष्टुप, इन्द्रवज्रा, उपेन्द्रवज्रा, प्रहर्षिणी, मालिनी , वसन्ततिलका, वंशस्थ ૧૩

સંદર્ભગ્રંથ સૂચિ :

1. **History of Alankarshastra - P.V. Kane**
2. કાવ્યપ્રકાશ : ગજેન્દ્ર ગડકર
3. કાવ્યપ્રકાશ : આચાર્ય વિશ્વેશ્વર
4. **बृहद पिङ्गल-** રામનારાયણ પાઠક

શૈક્ષણિક વર્ષ ૨૦૨૧-૨૨ થી અમલમાં આવનાર એસ.વાય. બી.એ. સંસ્કૃત

મુખ્ય તથા ગૌણ CBCS સેમેસ્ટર -૩ ના <u>પ્રશ્નપત્ર -6</u> પ્રશ્નપત્રનું પ્રારૂપ

Core Comp & Core Elective **Sem -3**

Credit -03 **કુલ ગુણ – ૫૦**

काव्यशास्त्रम्

कृति : मम्मटाचार्यकृत काव्यप्रकाशः उल्लासः -१ અને ૧૦ (નિયત અલંકારો), **नियतछन्दाः**

પ્ર-૧ ટૂંકમાં જવાબ આપો (૭ માંથી ૫)(Unit – I to IV) (૧૦)

પ્ર-૨ (અ) વાક્યનું વિવરણ કરો (૪ માંથી ૨) (Unit-I, III) (૦૮)

(બ) છંદ બંધારણ તથા ઉદાહરણ સહિત સમજાવો(૨માંથી૧)(Unit-IV) (૦૫)

પ્ર -૩ સામાન્ય પ્રશ્ન અથવા બે ટૂંકનોંધ લખો (Unit I to II) (૧૩)

પ્ર -૪ (અ) અલંકાર લક્ષણ તથા ઉદાહરણ સહિત સમજાવો(૨માંથી૧)(Unit-III) (૦૪)

(બ) સામ્ય-ભેદ ચર્ચો (૨માંથી૧) (Unit-III) (૦૬)

(ક) અલંકાર ઓળખી સમજાવો (૨માંથી૧) (Unit-III) (૦૪)

વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી ,સુરત

શૈક્ષણિક વર્ષ ૨૦૨૧-૨૨ થી અમલમાં આવનાર એસ.વાય. બી.એ. સંસ્કૃત

મુખ્ય તથા ગૌણ **CBCS** સેમેસ્ટર -૩ નો અભ્યાસક્રમ

સેમેસ્ટર -૩

Core Comp **Credit** -૦૩

પ્રશ્નપત્ર -7 **-वैदिकवाङ्गमय** કુલ ગુણ – ૫૦

कृति : ऋग्वेदः

ઉદ્દેશ : ભારતીય આર્ય સંસ્કૃતિના મૂળભૂતજ્ઞાનનાં ભંડાર- વેદોનો પરિચય કરાવી, સૂકતોમાં રહેલ સામાજીક અને રાષ્ટ્રીય એકતા-ચેતના અને દાર્શનિક સૂક્તોનું રહસ્ય સમજાવવું.

અભ્યાસક્રમના મુદ્દાઓ : વૈદિક સાહિત્યનો પરિચય, ઋગ્વેદનું મહત્વ, દાર્શનિક સૂક્તોનું મહત્વ

Unit -1 વૈદિક સાહિત્યનો સંક્ષિપ્ત પરિચય, દાર્શનિક અને સામાજીક સૂક્તો અને તેમાં રહેલ તત્વજ્ઞાનનો પરિચય ૧૨

Unit -2 અગ્નિ (૧ -૧), ઇન્દ્ર (૨ -૧૨), વરુણ (૭-૮૬) ઉષા (૪-૫૧) ૧૩

Unit -3 પુરુષ સૂક્ત(૧૦ -૧૦), નાસદીય સૂક્ત(૧૦ -૧૨૯), સંજ્ઞાન સૂક્ત (૧૦-૧૯૧), અક્ષ સૂક્ત (૧૦ -૩૪) ૧૨

Unit – 4 વૈદિક વ્યાકરણ-પદપાઠ, વૈદિક હેત્વર્થ કૃદંત , સંબંધક ભૂતકૃદંત,વૈદિક સંશયાર્થ, છંદ, સ્વરિત અને તેના પ્રકારો. ૧૩

સંદર્ભગ્રંથ સૂચિ :

1 ऋग्सूक्तवैजयन्ती - H D Velankar - Bombay -1972

2. ऋग्वेद- भाष्यम् - जगन्नाथ पाठक, वाराणसी

3. वैदिक साहित्य और संस्कृत - बलदेव उपाध्याय , वाराणसी

4. A vedic Grammar for Student -A A Macdonell, MLBD

શૈક્ષણિક વર્ષ ૨૦૨૧-૨૨ થી અમલમાં આવનાર એસ.વાય. બી.એ. સંસ્કૃત

મુખ્ય તથા ગૌણ CBCS સેમેસ્ટર -૩ ના <u>પ્રશ્નપત્ર -7</u> પ્રશ્નપત્રનું પ્રારૂપ

Core Comp **Sem -3**

Credit -03 કુલ ગુણ – ૫૦

वैदिकवाङ्गमय

कृति : ऋग्वेदः

પ્ર-૧(અ)ટૂંકમાં જવાબ આપો (૬ માંથી ૪) (Unit– IV) (૦૮)

(બ)પદપાઠ કરો (પદપાઠની ઋચા Unit–II માંથી લેવી) (૦૨)

પ્ર-૨(અ)ઋચાઓ અર્થદર્શક નોંધ આપી સાનુવાદ સમજાવો(૬ માંથી ૩)(Unit-II ,III) (૧૩)

પ્ર -૩ સામાન્ય પ્રશ્ન અથવા સામાન્ય પ્રશ્ન (Unit I to III) (૧૩)

પ્ર -૪ ટૂંકનોંધ લખો. (૪ માંથી ૨) (Unit I to III) (૧૪)

વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી ,સુરત

શૈક્ષણિક વર્ષ ૨૦૨૧-૨૨ થી અમલમાં આવનાર એસ.વાય. બી.એ. સંસ્કૃત

મુખ્ય તથા ગૌણ **CBCS** સેમેસ્ટર -૪ નો અભ્યાસક્રમ

સેમેસ્ટર -૪

Core Comp & Core Elective **Credit** -03

પ્રશ્નપત્ર **-8 -A** કુલ ગુણ – ૫૦

સંસ્કૃત પદ્યસાહિત્ય અને અર્થાવબોધ

કૃતિ - જગન્નાથકૃત ગઙ્ગાલહરી તથા અર્થાવબોધ

ઉદ્દેશ : સંસ્કૃત લલિત સાહિત્યમાં વૈદિક સ્તોત્ર પરંપરામાંથી સર્જાયેલ સ્તોત્ર સાહિત્યનો પરિચય આપો.

અભ્યાસક્રમના મુદ્દાઓ : સંસ્કૃત સ્તોત્ર કાવ્ય – ઉદ્ગમ , વિકાસ , કવિ જીવન-કવન-સમય , જગન્નાથની કવિગત વિશેષતા, દર્પોક્તિઓ , કૃતિ ગત લાક્ષણિકતા , મૂલ્યાંકન વગેરે

Unit -1 કવિ પરિચય, કવિ જીવન-કવન-સમય, સ્તોત્ર કાવ્ય–ઉદ્ગમ, વિકાસ, કૃતિ પરિચય,મૂલ્યાંકન	૧૨
Unit -2 ગંગાલહરી	૧૩
Unit- 3 ગંગાલહરી	૧૨
Unit –4 ગંગાલહરી અને અર્થાવબોધ	૧૩

સંદર્ભગ્રંથ સૂચિ :

1. સંસ્કૃત સ્તોત્રકાવ્ય ઉદ્ગમ અને વિકાસ – મણીલાલ પ્રજાપતિ
2. સંસ્કૃત સાહિત્યનો પરિચય -ડૉ . એ. ડી.શાસ્ત્રી
3. સંસ્કૃત વ્યાકરણ – શ્રીધર વશિષ્ઠ

શૈક્ષણિક વર્ષ ૨૦૨૧-૨૨ થી અમલમાં આવનાર એસ.વાય. બી.એ. સંસ્કૃત

મુખ્ય તથા ગૌણ **CBCS** સેમેસ્ટર -૪ ના **<u>પ્રશ્નપત્ર -8 -A</u>** પ્રશ્નપત્રનું પ્રારૂપ

Core Comp & Core Elective **Sem -4**

Credit -03 કુલ ગુણ – ૫૦

સંસ્કૃત પદ્યસાહિત્ય અને અર્થાવબોધ

कृति - जगन्नाथकृत गङ्गालहरी तथा अर्थावबोध

પ્ર-૧ ટૂંકમાં જવાબ આપો (૭ માંથી ૫) (Unit – I to III)	(૧૦)
પ્ર-૨ (અ) સાનુવાદ સમજાવો (૪ માંથી ૨)(શ્લોક ૧ થી ૪૦માંથી)	(૦૮)
(બ) **અર્થાવબોધ** (સંસ્કૃત ગદ્યખંડ) (Unit-IV)	(૦૫)
પ્ર-૩ સામાન્ય પ્રશ્ન અથવા સામાન્ય પ્રશ્ન (Unit I to IV)	(૧૩)
પ્ર-૪ ટૂંકનોંધ લખો. (૪ માંથી ૨) (Unit I to IV)	(૧૪)

વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી ,સુરત

શૈક્ષણિક વર્ષ ૨૦૨૧-૨૨ થી અમલમાં આવનાર એસ.વાય. બી.એ. સંસ્કૃત

મુખ્ય તથા ગૌણ **CBCS** સેમેસ્ટર -૪ નો અભ્યાસક્રમ

સેમેસ્ટર -૪

Core Comp & Core Elective **Credit** -૦૩

પ્રશ્નપત્ર -૪ -B કુલ ગુણ – ૫૦

સંસ્કૃત પદ્યસાહિત્ય અને અર્થાવબોધ

કૃતિ - जगन्नाथकृत प्रास्ताविकविलास तथा अर्थावबोध

ઉદ્દેશ : સંસ્કૃત સૂક્તિ કાવ્યોમાં સમાજના દરેક વિષયનું નીતિમૂલક જ્ઞાન પ્રાપ્ત થાય છે, તેનાથી જીવન જીવવાની તરેહ પ્રાપ્ત કરાવવી, સૂક્તિ – મુક્તક સાહિત્યનો પરિચય કરાવવો

અભ્યાસક્રમના મુદ્દાઓ : સંસ્કૃત કાવ્ય – ઉદ્ભમ , વિકાસ , કવિ જીવન-કવન-સમય , જગન્નાથની કવિગત વિશેષતા, દર્પોક્તિઓ , કૃતિ ગત લાક્ષણિકતા , મૂલ્યાંકન વગેરે

Unit -1 કવિ પરિચય, કવિ જીવન-કવન-સમય, મુક્તક કાવ્ય પરિચય, વિશેષતા, કૃતિલક્ષી મૂલ્યાંકન વગેરે ૧૨

Unit -2 प्रास्ताविकविलास ૧૩

Unit -3 प्रास्ताविकविलास ૧૨

Unit –4 प्रास्ताविकविलास અને અર્થાવબોધ ૧૩

સંદર્ભગ્રંથ સૂચિ :

1. **History of Sanskrit literature – A .B . Kieth**
2. **સંસ્કૃત સાહિત્યનો પરિચય -ડૉ . એ. ડી.શાસ્ત્રી**
3. **સંસ્કૃત વ્યાકરણ – શ્રીધર વશિષ્ઠ**
4. વ્યાકરણ પથદીપ- પ્રા. જતીન પંડ્યા – ગજાનન પુસ્તકાલય,સુરત

શૈક્ષણિક વર્ષ ૨૦૨૧-૨૨ થી અમલમાં આવનાર એસ.વાય. બી.એ. સંસ્કૃત

મુખ્ય તથા ગૌણ CBCS સેમેસ્ટર -૪ ના <u>પ્રશ્નપત્ર -૪ -B</u> પ્રશ્નપત્રનું પ્રારૂપ

Core Comp & Core Elective **Sem -4**

Credit -03 **કુલ ગુણ – ૫૦**

સંસ્કૃત પદ્યસાહિત્ય અને અર્થાવબોધ

કૃતિ - જગન્નાથકૃત પ્રાસ્તાવિકવિલાસ તથા અર્થાવબોધ

પ્ર-૧ ટૂંકમાં જવાબ આપો (૭ માંથી ૫) (Unit – I to III) (૧૦)

પ્ર-૨ (અ) સાનુવાદ સમજાવો (૪ માંથી ૨)(શ્લોક ૧ થી ૪૦ માંથી) (૦૮)

(બ) **અર્થાવબોધ** (સંસ્કૃત ગદ્યખંડ) (Unit-IV) (૦૫)

પ્ર-૩ સામાન્ય પ્રશ્ન અથવા સામાન્ય પ્રશ્ન (Unit I to IV) (૧૩)

પ્ર-૪ ટૂંકનોંધ લખો. (૪ માંથી ૨) (Unit I to IV) (૧૪)

વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી ,સુરત

શૈક્ષણિક વર્ષ ૨૦૨૧-૨૨ થી અમલમાં આવનાર એસ.વાય. બી.એ. સંસ્કૃત

મુખ્ય તથા ગૌણ **CBCS** સેમેસ્ટર -૪નો અભ્યાસક્રમ

સેમેસ્ટર -૪

Core Comp & Core Elective **Credit** -૦૩

પ્રશ્નપત્ર -9 **काव्यशास्त्रम्** કુલ ગુણ – ૫૦

कृति : धनञ्जय कृत दशरूपकम् -प्रथम प्रकाशः (नियत कारिका) ममम्टकृत काव्यप्रकाशः दशम् उल्लासः - नियत अलङ्काराः , नियत छन्दाः

ઉદ્દેશ : સંસ્કૃત નાટ્ય સાહિત્ય સાથે સંકળાયેલ વિશિષ્ટ અને આવશ્યક પારીભાષિક સંજ્ઞાઓના પરિચય સાથે નાટકનો અભ્યાસ કરાવવો

અભ્યાસક્રમના મુદ્દાઓ : ધનંજયનો પરિચય , નાટ્ય વિષયક પારિભાષિક સંજ્ઞાઓનો પરિચય , કથાનકના પ્રકારો, અર્થ પ્રકૃતિઓ , અવસ્થાઓ, સંધિઓના સંબંધ સાથે સંકળાયેલ વિશેષ બાબતોની નોંધ, અર્થોપક્ષેપકો , પતાકાસ્થાનકનો પરિચય, અલંકારની વ્યાખ્યા, પ્રકારો, નિયત છંદોનો પરિચય, બંધારણ, ઉદાહરણ વગેરે

Unit -1 दशरूपकम् -प्रथम प्रकाशः कारिका - ૧ થી ૨૪ ૧૨

Unit -2 दशरूपकम् -प्रथम प्रकाशः कारिका - ૫૬ થી ૬૮ ૧૩

Unit -3 काव्यप्रकाशः उल्लासः -१० , (नियतः) अलंकाराः- निदर्शना , प्रतिवस्तूपमा, द्रष्टान्त, दीपक, तुल्ययोगिता, व्यतिरेक, अर्थान्तरन्यास, व्याजस्तुति , व्याजोक्ति ૧૨

Unit -4 नियतछन्दाः -शिखरीणी, मन्दाक्रान्ता, हरिणी, शार्दूलविक्रीडित, पृथ्वी, स्त्रग्धरा, आर्या ૧૩

સંદર્ભગ્રંથ સૂચિ :

1. **History of Alankarshastra - P.V. Kane**
2. કાવ્યપ્રકાશ : ગજેન્દ્ર ગડકર
3. કાવ્યપ્રકાશ : ગજેન્દ્ર ગડકર(હિન્દી),પુના પ્રાચ્ય વિદ્યા સંસ્થા
4. કાવ્યપ્રકાશ : આચાર્ય વિશ્વેશ્વર
5. **बृहद पिङ्गल्-** રામનારાયણ પાઠક

6. સાહિત્યશાસ્ત્ર બલદેવ ઉપાધ્યાય
7. **दशरूपकम्** – (હિન્દી) અવલોકસહિત- ચંદ્રકલા હિન્દી ટીકા – ચૌખમ્બા પ્રકાશન, દ્વિતીય સંસ્કરણ – વિક્રમ સંવત -૨૦૧૯
8. કાવ્ય કલ્પલતાવૃત્તિ – અમરચંદ્ર યતિ

શૈક્ષણિક વર્ષ ૨૦૨૧-૨૨ થી અમલમાં આવનાર એસ.વાય. બી.એ. સંસ્કૃત

મુખ્ય તથા ગૌણ CBCS સેમેસ્ટર -૪ ના <u>પ્રશ્નપત્ર -9</u> પ્રશ્નપત્રનું પ્રારૂપ

Core Comp & Core Elective **Sem -4**

Credit -03 કુલ ગુણ – ૫૦

काव्यशास्त्रम्

कृति : धनञ्जय कृत दशरूपकम् -प्रथम प्रकाशः (नियत कारिका),

ममम्टकृत काव्यप्रकाशः दशम् उल्लासः - नियत अलङ्काराः, नियत छन्दाः

પ્ર -૧ ટૂંકમાં જવાબ આપો (૭ માંથી ૫)(Unit – I to IV)	(૧૦)
પ્ર -૨ (અ) કારિકા સમજાવો (૪ માંથી ૨) (Unit-I,)	(૦૮)
(બ) છંદ બંધારણ તથા ઉદાહરણ સહિત સમજાવો(૨માંથી૧)(Unit-IV)	(૦૫)
પ્ર -૩ ટૂંકનોંધ લખો (૪ માંથી ૨) (Unit I to II)	(૧૩)
પ્ર -૪ (અ) અલંકાર લક્ષણ તથા ઉદાહરણ સહિત સમજાવો(૨માંથી૧)(Unit-III)	(૦૪)
(બ) સામ્ય-ભેદ ચર્ચો (૨માંથી૧) (Unit-III)	(૦૬)
(ક) અલંકાર ઓળખી સમજાવો (૨માંથી૧) (Unit-III)	(૦૪)

વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી ,સુરત

શૈક્ષણિક વર્ષ ૨૦૨૧-૨૨ થી અમલમાં આવનાર એસ.વાય. બી.એ. સંસ્કૃત

મુખ્ય તથા ગૌણ **CBCS** સેમેસ્ટર -૪ નો અભ્યાસક્રમ

સેમેસ્ટર -૪

Core Comp **Credit** -03

પ્રશ્નપત્ર -**10 વૈદિકવાઙ્ગમય** કુલ ગુણ – ૫૦

કૃતિ : યજુર્વેદઃ અધ્યાય ૨૫ના નિયત મંત્રો , અધ્યાય ૩૪ ના નિયત મંત્રો

ઈશાવાસ્યોપનિષદ્

ઉદ્દેશ : માનવ જીવન વ્યવહારમાં ઉપયોગી યજુર્વેદ, તત્કાલીન સમાજ-દર્શન દ્વારા આધુનિક કાળમાં પણ વેદોનો અભ્યાસ આવશ્યક છે અને ઉપનિષદોનો જ્ઞાન વારસો પણ જીવનનું ઉપાદેય અંગ બની રહે તે બતાવવું .

અભ્યાસક્રમના મુદ્દાઓ : યજુર્વેદનો પરિચય, નિયત મંત્રોનું તત્ત્વજ્ઞાન, પરમેશ્વરની પ્રાર્થના, યજ્ઞની પ્રશંસા, સૃષ્ટિના પદાર્થોના ગુણોનું વર્ણન, ધર્મની વિચારણા વગેરે, ઉપનિષદનો અર્થ, ઇશાવાસ્યોપનિષદ્નું તત્ત્વજ્ઞાન.

Unit -1 યજુર્વેદઃ અધ્યાય ૨૫ - મન્ત્ર ૧૦ તઃ મન્ત્ર ૨૩ પર્યન્તમ્ ૧૨

Unit -2 યજુર્વેદઃ અધ્યાય ૩૪ - (મન્ત્ર ૧ તઃ મન્ત્ર ૬ પર્યન્તમ્) તન્મે મનઃ શિવસઙ્કલ્પમસ્તુ | ૧૩

Unit -3 ઈશાવાસ્યોપનિષદ્ ૧૨

Unit -4 ઈશાવાસ્યોપનિષદ્ ૧૩

સંદર્ભસૂચિઃ

1. ऋक् सूक्त वैजयन्ती - HD . Velankar , Bombay , 1972
2. યજુર્વેદ સંહિતા – સાતવલેકર
3. યજુર્વેદ સંહિતા-વિધિ -ભાષા -ભાષ્ય -આ. વિષ્ણુદેવ પંડિત, વેદ પ્રકાશન સમિતિ, અમદાવાદ ,

4. Thirteen Principle Upnisads – રાધાકૃષ્ણન્
5. वैदिक साहित्य और संस्कृति - बलदेव उपाध्याय
6. शुक्ल यजुर्वेद संहिता-(तत्त्वबोधिनी हिन्दी व्याख्या सहित)पण्डित रामकृष्ण शास्त्री
7. यजुर्वेद मूल-मन्त्र भावार्थ, वैदिकवाङ्गमय प्रकाशनवानप्रस्थसाधक आश्रम, आर्यवन, रोजड , गुजरात

શૈક્ષણિક વર્ષ ૨૦૨૧-૨૨ થી અમલમાં આવનાર એસ.વાય. બી.એ. સંસ્કૃત

મુખ્ય તથા ગૌણ CBCS સેમેસ્ટર -૪ ના <u>પ્રશ્નપત્ર -10</u> પ્રશ્નપત્રનું પ્રારૂપ

Core Comp & Core Elective **Sem -4**

Credit -03 કુલ ગુણ – ૫૦

वैदिकवाङ्गमय

कृति : यजुर्वेदः અધ્યાય ૨૫ ના નિયત મંત્રો , અધ્યાય ૩૪ ના નિયત મંત્રો

ईशावास्योपनिषद्

પ્ર-૧ ટૂંકમાં જવાબ આપો (૭ માંથી ૫) (Unit – I to IV) (૧૦)

પ્ર-૨ (અ) મંત્રો સાનુવાદ સમજાવો (૨ માંથી૧) (Unit-I, II) (૦૫)

(બ) મંત્રો સાનુવાદ સમજાવો (૪ માંથી ૨) (Unit-III, IV) (૦૮)

પ્ર-૩ ટૂંકનોંધ લખો. (૪ માંથી ૨) (Unit I , II) (૧૩)

પ્ર-૪ ટૂંકનોંધ લખો. (૪ માંથી ૨) (Unit III, IV) (૧૪)