



Re-Accredited 'B++' 2.86 CGPA by NAAC

VEER NARMAD SOUTH GUJARAT UNIVERSITY

University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.

વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી

યુનિવર્સિટી કેમ્પસ, ઉદ્દના-મગદલા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.

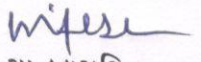
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-: પરિપત્ર :-

કોમ્પ્યુટર સાયન્સ એન્ડ ઈન્ફોર્મેશન ટેકનોલોજી વિદ્યાશાખા હેઠળની સંલગ્ન તમામ બીસીએ કોલેજોના આચાર્યશ્રીઓ જણાવવાનું કે, NEP-2020 અંતર્ગત શૈક્ષણિક વર્ષ ૨૦૨૪-૨૫ થી અમલમાં આવનાર B.C.A. (Semiconductor, Sensors and IoT)(Honours) સેમે.-૧ અને સેમે.-૨ નો પેટાસમિતિ દ્વારા તૈયાર કરવામાં આવેલ અભ્યાસક્રમ કોમ્પ્યુટર સાયન્સ અભ્યાસ સમિતિનાં ચેરમેનશ્રીએ અભ્યાસ સમિતિ વતી તથા કોમ્પ્યુટર સાયન્સ એન્ડ ઈન્ફોર્મેશન ટેકનોલોજી વિદ્યાશાખાનાં અધ્યક્ષશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિદ્યાશાખા વતી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણને એકેડેમિક કાઉન્સિલની તા.૦૧/૩/૨૦૨૪ ની સભાનાં ઠરાવ ક્રમાંક:૧૦૪ અન્વયે માન.કુલપતિશ્રીને આપેલ સત્તા અંતર્ગત માનનીય ઈ.ચા.કુલપતિશ્રી ધ્વારા મંજૂર કરેલ છે. જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

(બિડાણ: ઉપર મુજબ)

ક્રમાંક : એસ./પરિપત્ર/૧૧૩૩૯/૨૦૨૪
તા.૨૯/૦૫/૨૦૨૪


ઈ.ચા.કુલસચિવ

પ્રતિ,

૧. યુનિવર્સિટી સંલગ્ન તમામ બીસીએ કોલેજોના આચાર્યશ્રીઓ.
.....આપશ્રીની કોલેજના સંબંધિત શિક્ષકોને જાણ કરી અમલ કરવા સારું.
- ૨) ડીનશ્રી, કોમ્પ્યુટર સાયન્સ એન્ડ ઈન્ફોર્મેશન ટેકનોલોજી વિદ્યાશાખા.
- ૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.
- ૪) એકેડેમિક વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.
- ૫) જોડાણ વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.

.....તરફ જાણ સારું.

Veer Narmad South Gujarat University, Surat



Computer Science and Information Technology Faculty

Syllabus for (Semester-I and Semester-II) of

B.C.A. (Semiconductor, Sensors and IoT)(Honours)

(With Multi-level Entry and Exit option)

As per NEP-2020

To be implemented from

Academic Year: June, 2024-2025

(Including Winter Session)

Veer Narmad South Gujarat University, Surat
Bachelor of Computer Application (Semiconductor, Sensors and IoT) (Honours)
Under the Faculty of
Computer Science and Information Technology

Name of Program:	Bachelor of Computer Application (Semiconductor, Sensors and IoT) (Honours)
Abbreviation:	B.C.A. (Semiconductor, Sensors and IoT) (Honours): Four-year Integrated Program. With Multi-Level Entry and Exit option
Multi-level Exit Criteria:	<p>(i) Under Graduate Certificate in Semiconductor, Sensors and IoT Application: If the student wish to exit after completion of First year (Semester-1 and Semeter-2) without any back-log and secure additional 4 credits from work based skill oriented university approved courses /vocational courses / summer internship / Apprenticeship in addition to 6 credits from skill-based courses earned during first and second semester.</p> <p>(ii) Diploma in Semiconductor, Sensors and IoT: If the student wish to exit after completion of Second year (Semester-1 to Semeter-4) without any back-log and secure additional 4 credits from work based skill oriented university approved courses /vocational courses / summer internship / Apprenticeship offered at end of first or second year in addition to 6 credits from skill-based courses earned during first four semesters.</p> <p>(iii) B.C.A. (Semiconductor, Sensors and IoT) (Semiconductor, Sensors and IoT) : If the student wish to exit after completion of Third year (Semeste-1 to semester-6) without any back-log and secure additional 4 credits from work based skill oriented university approved courses /vocational courses / summer internship / Apprenticeship offered at end of first or second year in addition to 6 credits from skill-based courses earned during first four semesters.</p>
Multi-Level Entry Criteria:	As per the norms of the Veer Narmad South Gujarat University.
Duration:	4 year of B.C.A. (Semiconductor, Sensors and IoT) (Honors) degree program with multi level exit options at 1 st , 2 nd and 3 rd Year to obtain Certificate, Diploma, Degree and Honours Degree in Computer Application respectively.
Eligibility:	<p>Candidate must have passed standard 12th (H.S.C.) Examination in Science (Any Group) / Commerce / vocational / General stream from Gujarat Higher Secondary Board (G.H.S.E.B.) or any other equivalent board (C.B.S.E. / I.C.S.E. etc. which must be approved and possess equivalence certificate from Veer Narmad South Gujarat University) with English as one of the subject.</p> <p>In case of candidates passed out from 12th Board from General Stream; Statistics/Economics/Business Mathematics/Accountancy/Computer must be one of the subjects. In case of Students passed out with 12th (H.S.C.) vocational stream, Computer and English must be one of the subject.</p>
Objective of the Program:	The B.C.A. specialization in "Semiconductor, Sensors, and IoT" aims to develop a comprehensive understanding of semiconductor technology,

	<p>sensor devices, and IoT systems. The program provides a solid foundation in analog and digital electronics, microcontrollers, and embedded systems, emphasizing hands-on skills for designing and implementing semiconductor circuits and IoT solutions. Students will learn to work with IoT communication protocols and technologies, fostering innovation and creativity in smart cities, healthcare, and industrial automation applications. Advanced coursework and research opportunities prepare students for specialized roles, while internships and industry collaborations ensure industry readiness. The program promotes critical thinking, problem-solving, and a global perspective, equipping graduates to excel in a rapidly evolving technological landscape and encouraging lifelong learning and professional growth.</p>
<p>Program Outcome:</p>	<p>PO1: Provide a solid foundation in semiconductor technology, sensor devices, and IoT systems.</p> <p>PO2: Develop hands-on skills in designing and implementing semiconductor circuits and IoT solutions.</p> <p>PO3: Foster innovation and creativity in solving real-world problems through practical projects.</p> <p>PO4: Prepare students for specialized roles with advanced coursework in IoT security and platforms.</p> <p>PO5: Ensure industry readiness through internships, collaborations, and exposure to current technologies.</p> <p>PO6: Promote critical thinking and a global perspective to address complex technological challenges.</p>
<p>Program Specific Outcome:</p>	<p>PSO1: Equip students with in-depth knowledge of semiconductor devices, digital and analog electronics, and their applications in modern technology.</p> <p>PSO2: Develop expertise in designing and implementing IoT systems, including sensor integration, communication protocols, and data management techniques.</p> <p>PSO3: Foster hands-on skills through laboratory work, projects, and internships, ensuring students can apply theoretical concepts to real-world scenarios.</p> <p>PSO4: Encourage advanced research and innovation in emerging areas like IoT security, smart sensors, and semiconductor technologies.</p> <p>PSO5: Align the curriculum with industry standards and trends to prepare students for immediate employment and successful careers in the tech industry.</p> <p>PSO6: Enhance problem-solving abilities and critical thinking skills to tackle complex challenges in semiconductor and IoT applications.</p> <p>PSO7: Promote awareness of ethical issues, sustainability, and global trends in technology, preparing students to work responsibly in a global environment.</p>

	PSO8: Lifelong Learning and Professional Development: Instill a commitment to lifelong learning and continuous professional growth to stay current with technological advancements and industry changes.								
PO and PSO mapping:		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
	PO1								
	PO2								
	PO3								
	PO4								
	PO5								
	PO6								
Medium of Instruction:	English								
Program Structure:	Semester-wise Breakup of the course is given as follows :								



Veer Narmad South Gujarat University, Surat
Program Structure: F.Y.B.C.A. (Semiconductor, Sensors and IoT) (Honours)
(SEM – 1 and SEM – 2)
(w.e.f. Academic Year June, 2024-2025)
Bachelor of Computer Application (B.C.A.) – Three Year Program
Bachelor of Computer Application (B.C.A.(Hon.)) – Four Year Integrated Program

Program Structure		Semester-wise break up for the courses :				
SEMESTER – 1						
Course Code	Course Title	Course Category	Level of Course	Course Credits	Teaching Hours/week	
					Th.+Pra.	Theory
101	Communication Skills (AEC-01) [Modern Indian Language (MIL) & English language focused on language and communication skills.]	Ability Enhancement Course	100-199 Foundation/ Introductory	2	2	0
102	Mathematics (Student will opt any one course of multi-disciplinary nature from other than the computer Science and Application faculty).	Multi-Disciplinary/ Inter-Disciplinary	100-199 Foundation/ Introductory	4	4	0
103	Introduction to Computers	Minor Course	100-199 Foundation/ Introductory	4	4	0
104	Computer Programming and Programming Methodology (CPPM)	Major Course	200-299 Intermediate Level Course	4	2	4
105-03	Introduction to Semiconductors	Major Course	200-299 Intermediate Level Course	4	4	0
	Practical (Based on Course Code:104)	No separate credits allocated for practical. The Practical exam/viva-voce will be based on Course 104.				
106	Skill Enhancement Course-I (SEC-01) [The student will undergo field training/ internship training <u>OR</u> Select minimum one University approved and recognized 2 credit certificate course from the skill based courses list offered by the respective institute/department.] (The student need to enrol separately and pay the fees as decided by the respective institute/department)	Skill Enhancement Course	100-199 Foundation / Introductory	2	-	2
107	Value Addition Course – I (VAC-01) [The student will select minimum one University approved and recognized 2 credits certificate course from the Value Addition courses list offered by the respective institute/department.] (The student need to enrol separately and pay the fees as decided by the respective institute/department)	Value Addition Course	100-199 Foundation/ Introductory	2	2	-
Other Activities	The student is expected to participate in activities related to National Service Scheme (NCC), National Cadet Corps (NCC), adult education/literacy initiatives, mentoring school students, Elderly literacy program/ Environment preservation activities and other similar activities.			-	-	-
Total				22	18	06

Course Code	Course Title	Course Credit	University Exam Type	Exam Duration	External Marks	Internal Marks	Total Marks
101	Communication Skills (AEC-01)	2	Theory/ Written	1 Hours	25	25	50
102	Mathematics	4	Theory/ Written	2 Hours	50	50	100
103	Introduction to Computers	4	Theory/ Written	2 Hours	50	50	100
104	Computer Programming and Programming Methodology (CPPM)**	4	Theory/ Written : Practical :	1 Hours 2 Hours	25 25	25 25	100
105-03	Introduction to Semiconductors	4	Theory/ Written :	2 Hours	50	50	100
106	Skill Enhancement Course-I# (SEC-01)	2	-	-	25	25	50 [#]
107	Value Addition Course-I# (VAC-01)	2	-	-	25	25	50 [#]
Total		22			275	275	550

For Practical and Project:

- Batch Size – 40 Maximum (Desirable). Maximum 45 students can be accommodated in a batch. Separate batch should be considered if the student strength exceed 45 numbers.
- Practical includes Practical sessions for course-104. **Minimum** Four Practical hours (for course-104) per week should be allocated per batch. Out of which 4 hours will be in supervised mode and 2 hours of practical are recommended in un-supervised mode.
- The journal must be certified by the concerned faculty and by the Head of the Department, failing which the student will not be allowed to appear for External Practical Examination. Student will submit softcopy of Minor Project duly certified by the internal guide.

Internship: A student who wish to exit after successfully completion of first year (Semester-1 and Semester-2) without any backlog is required to obtain Four credits at the end of the year either through the summer internship or university approved skill based certificate courses(two courses of 2-credits each or one 4-credit course). Student is required to enrol for the certificate courses separately by paying the course fees as decided by the college/institute. For summer training, the Institute/college will grant the permission and evaluate the training outcomes. Based on satisfactory completion of the summer training, the Institute head will recommend to the university to grant four credits for summer training. The Internship/summer training/skill based certificate courses will be an audit course.[The internship cost/fees will be bear by the student.]

Skill Enhancement Course : As per NEP(National Education Policy-2020), it is mandatory for students to select a 2 credit skill enhancement course out of the choices given by the college/institute (From available basket of courses as per University norms). It will be mandatory for the student to opt minimum one 2-credit Skill enhancement course out of offered courses recognised by University during semester-1 to semester-5.

(The student need to enrol separately and pay the fees as decided by the respective institute/department)

Value Addition Course: As per NEP(National Education Policy-2020), it is mandatory for students to select a 2 credit Value Addition Course out of the choices given by the college/institute (From available basket of courses as per University norms). It will be mandatory for the student to opt minimum one 2-credit Value Addition Course out of offered courses recognised by the University during semester-1 to semester-4.

(The student need to enrol separately and pay the fees as decided by the respective institute/department)

Marks: : The students will enrol for the course from the given university approved list of certificate courses offered by the respective college/department. The student will select and enrol separately for any of the offered list of courses at college/department/institute and obtain respective credits. The institute will evaluate the performance (preferably continuous evolution) as per the SOP of certificate courses and on successfully completion of the course, the student will be eligible to obtain respective credits for the course. These credits will be considered and reflect in student's mark-sheet as well as in ABC(Academic Bank of Credit). These courses are mandatory and student is required to obtain the specified credits in process to acquire the certificate/diploma/degree.

[The student is required to pay separately for these courses as prescribed by the college. The college will decide the fees for these courses based on the University norms certificate course per credit fees.]

** Major Practical based Subjects: Course 104 is major courses. This course is carrying 4 credits (2 Hours of theory and 4 hours of practical per week). This subject carry 100 marks of exam weightage (50 theory and 50 practical). External and Internal distribution of marks are in ratio of 50:50 respectively. Students are required to acquire minimum passing marks from theory and practical collectively. Practical exams for course-104 (2 hours duration) will be conducted.

External exam marks (25 marks for course-104)

Division of marks are: Exam evaluation: 20 marks + Viva-voce: 5 Marks.

Practical examination will be conducted for course code-104.

Students are required to pass in combined head (Theory + Practical) for each course.

Students are required to remain present in internal and external theory and practical exams for course code – 104.

Program Passing Rules:	As per University rules.
Program Fees : (Per Semester) (One time fees and exam fees are additional as prescribed by the university) (w.e.f. Academic Year : 2024-25)	Semester Tuition Fees : Rs. 21,500/- Semester Laboratory Utilization Fees : As per B.C.A. program Semester University Exam Fees : Rs. 1200/- [Other one time /affiliation /exam fees, will be as per the norms of the University] [The fees for all certificate courses, Skill Enhancement Courses and Value Addition Courses; fees will be as per the prescribed limit for per credit as per the SOP of certificate courses decided by the university.]



SEMESTER – 2

Course Code	Course Title	Course Category	Level of Course	Course Credits	Teaching per week	
					Theory	Practical/ Fieldwork/ Project/ Internship
201	Ability Enhancement Course-II (AEC-02)% [Modern Indian Language (MIL) & English language focused on language and communication skills.]	Ability Enhancement Course	100-199 Foundation/ Introductory	2	2	0
202-01 202-02	Computerized Financial Accounting OR Organizational Structure & Behaviour (Student will opt any one course of multi-disciplinary nature from other than the computer Science and Application faculty)	Multi-Disciplinary	100-199 Foundation/ Introductory	4	4	0
203	Operating System	Minor Course	100-199 Foundation/ Introductory	4	4	0
204	Programming Skills	Major Course	200-299 Intermediate Level Course	4	2	4
205-03	Introduction to Sensors and IoT Devices	Major Course	200-299 Intermediate Level Course	4	4	0
	Practical (Based on Course Code: 204)	No separate credits allocated for practical. The Practical exam/viva-voce will be based on Course CS-204				
206	Skill Enhancement Course-II (SEC-02) [The student will undergo field training/ internship training OR Select minimum one University approved and recognized 2 credit certificate course from the skill based courses list offered by the respective institute/department.] (The student need to enrol separately and pay the fees as decided by the respective institute/department)	Skill Enhancement Course	100-199 Foundation / Introductory	2	-	2
207	Value Addition Course – II (VAC-02) [To be selected minimum one University approved and recognized 2 credit certificate course from the Value Addition Courses list offered by the respective institute/department.] (The student can select and enrol separately for the course offered by the respective institute/department and need to pay separately as decided by the institute as per norms of university for certificate courses.)	Value Addition Course	100-199 Foundation / Introductory	2	2	-
Other Activities	The student is expected to participate in activities related to National Service Scheme (NCC), National Cadet Corps (NCC), adult education/literacy initiatives, mentoring school students, Elderly literacy program / Environment preservation activities and other similar activities.			-	-	-
Total				22	18	06

Course Code	Course Title	Course Credit	University Exam Type	Exam Duration	External Marks	Internal Marks	Total Marks
201	Ability Enhancement Course (AEC -02) ⁶	2	Theory/Written	1 Hours	25	25	50
202-01	Computerized Financial Accounting	4	Theory/Written	2 Hours	50	50	100
202-02	Organizational Structure & Behaviour						
203	Operating Systems	4	Theory/ Written	2 Hours	50	50	100
204	Programming Skills	4	Theory/Written : Practical :	1 Hours 2 Hours	25 25	25 25	100
205-03	Introduction to Sensors and IoT Devices	4	Theory/ Written	2 Hours	50	50	100
206	Skill Enhancement Course – II (SEC-02)#	2	-	-	25	25	50 [#]
207	Value Added Course – II (VAC-02)#	2	-	-	25	25	50 [#]
Total		22			275	275	550

For Practical and Project:

- Batch Size – 40 Maximum (Desirable). Maximum 45 students can be accommodated in a batch. Separate batch should be considered if the student strength exceed 45 numbers.
- Practical includes Practical sessions for course-204. **Minimum** Four Practical hours for course-204per week should be allocated per batch.
- The journal should be certified by the concerned faculty and by the Head of the Department, failing which the student should not be allowed to appear for External Practical Examination. Student will submit softcopy of Minor Project duly certified by the internal guide.

Major Course : Major discipline is the main focus (Core) dominant subject and the degree will be awarded in that discipline. Students must secure a prescribed number of credits (50% of total credits) through core courses in the major discipline. Students can choose the courses from the pool of courses. The number of courses (subjects) in Major may vary from semester to semester.

Minor Course : Minor discipline is the broader understanding course beyond the major discipline course. It contains generic-electives for students to choose from the pool of courses. It helps students to gain broader knowledge in addition to relevant major disciplines courses as per their choices. Minor subjects may be from same or different disciplines. Student may make choices according to their interest/need, from ODL courses also.

Interdisciplinary/Multidisciplinary/Allied Courses: This is constituent discipline of the major courses and it helps learners to acquire core competence in relevant or any other independent courses of their choices. This course may be major specific or other discipline specific. Learner shall have option to choose the course from available basket of approved courses provided by the university or from any other institutions as the learner's choice. The Credit allocated for these courses is 12 credits of total credits for 3 years' bachelor's degree and four years' bachelor's degree programme.

Internship: A student who wish to exit after successfully completion of first year (Semester-1 and Semester-2) without any backlog is required to obtain Four credits at the end of the year either through the summer internship or university approved skill based certificate courses(two courses of 2-credits each or one 4-credit course). Student is required to enrol for the certificate courses separately by paying the course fees as decided by the college/institute. For summer training, the Institute/college will grant the permission and evaluate the training outcomes. Based on satisfactory completion of the summer training, the Institute head will recommend to the university to grant four credits for summer training. The Internship/summer training/skill based certificate courses will be an audit course.[The internship cost/fees will be bear by the student.]

Ability Enhancement Course (AEC): To be offered to students to achieve competency in a Modern Indian Language and English Language focused on language and communication skills. It may be a major specific course. The Credit allocated for these courses is 10 credits of total credits for 3 years' bachelor's degree and four years' bachelor's degree programme. The courses can be selected by the college/institute from available basket of approved 2-credit certificate courses provided by the university.

Skill Enhancement Course : As per NEP(National Education Policy-2020), it is mandatory for students to select a 2 credit skill enhancement course out of the choices given by the college/institute (From available basket of courses as per University norms). It will be mandatory for the student to opt minimum one 2-credit Skill enhancement course out of offered courses recognised by University during semester-1 to semester-5.

(The student need to enrol separately and pay the fees as decided by the respective institute/department)

Value Addition Course: As per NEP(National Education Policy-2020), it is mandatory for students to select a 2 credit Value Addition Course out of the choices given by the college/institute (From available basket of courses as per University norms). It will

be mandatory for the student to opt minimum one 2-credit Value Addition Course out of offered courses recognised by the University during semester-1 to semester-4.

(The student need to enrol separately and pay the fees as decided by the respective institute/department)

Marks : The students will enrol for the course from the given university approved list of certificate courses offered by the respective college/department. The student will select and enrol separately for any of the offered list of courses at college/department/institute and obtain respective credits. The institute will evaluate the performance (preferably continuous evolution) as per the SOP of certificate courses and on successfully completion of the course, the student will be eligible to obtain respective credits for the course. These credits will be considered and reflect in student's mark-sheet as well as in ABC(Academic Bank of Credit). These courses are mandatory and student is required to obtain the specified credits in process to acquire the certificate/diploma/degree.

[The student is required to pay separately for these courses as prescribed by the college. The college will decide the fees for audit courses based on the University norms certificate course per credit fees.]

**** Major Practical based Subjects:** Course 204 is major courses. This course is carrying 4 credits (2 Hours of theory and 4 hours of practical per week). This subject carry 100 marks of exam weightage (50 theory and 50 practical). External and Internal distribution of marks are in ratio of 50:50 respectively. Students are required to acquire minimum passing marks from theory and practical collectively. Practical exams for course-204 (2 hours duration) will be conducted.

External exam marks (25 marks for course-204)

Division of marks are: Exam evaluation: 20 marks + Viva-voce: 5 Marks.

Practical examination will be conducted for course code-204.

Students are required to pass in combined head (Theory + Practical) for each course.

Students are required to remain present in internal and external theory and practical exams for course code – 204.

Program Passing Rules:	As per University rules.
Program Fees : (Per Semester) (One time fees and exam fees are additional as prescribed by the university) (w.e.f. Academic Year : 2024-25)	Semester Tuition Fees : Rs. 21,500/- Semester Laboratory Utilization Fees : As per B.C.A. Semester University Exam Fees : Rs. 1200/- [Other one time /affiliation /exam fees, will be as per the norms of the University] [The fees for all certificate courses, Skill Enhancement Courses and Value Addition Courses; fees will be as per the prescribed limit for per credit as per the SOP of certificate courses decided by the university.]



Semester - 1
Course Code: 101
Course Title: COMMUNICATION SKILLS

Course Code	101
Course Title	Communication Skills [Title of the course will be the one selected by the student from courses offered by college/institute out of the course basket offered by the University under the Ability Enhancement courses (AEC) basket.]
Credits	2
Course Category	Ability Enhancement Course (AEC-01) [Modern Indian Language (MIL) & English language focused on language and communication skills.]
Level of Course	100-199 (Foundation / Introductory)
Teaching per Week	2 Hrs
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	2022-2023
Implementation Year:	A.Y. 2023-2024
Purpose of Course	Effective communication is vital for the success in various situations. This course will help students develop and improve English Communication skills. To be offered to students to achieve competency in a Modern Indian Language and English Language focused on language and communication skills. The course will be selected by the institute from basket of courses under category AEC (Ability Enhancement Course) offered by the university. [Modern Indian Language (MIL) & English language focused on language and communication skills.]
Course Objective	The course aim at enabling the students to acquire and demonstrate the core linguistic skills, including critical reading and expository and academic writing skills that help students articulate their arguments and present their thinking clearly and coherently and recognize the importance of language as a mediator of knowledge and identity. They would also enable students to acquaint themselves with the cultural and intellectual heritage of the chosen MIL and English language, as well as to provide a reflective understanding of the structure and complexity of the language/literature related to both the MIL and English language. The courses will also emphasize the development and enhancement of skills such as communication, and the ability to participate/conduct discussion and debate.
Pre-requisite	Knowledge of English at H.Sc.(12 th) Level
Course Outcomes	CO1 : To make students understand the importance of effective communication skills in personal and professional life. CO2 : student's will be able to enhance their ability in reading ,writing ,listening and speaking as per the demand of corporate world. CO3 : To develop students individual as well as team work efficiency CO4; To enhance the inquisitiveness in students for updating knowledge to solve problems, and lead to build a successful professional career. CO5; Students will be able to understand the importance of digital communication.

Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)	<table border="1"> <thead> <tr> <th></th> <th>PSO 1</th> <th>PSO 2</th> <th>PSO 3</th> <th>PSO 4</th> <th>PSO 5</th> <th>PSO 6</th> <th>PSO 7</th> <th>PSO 8</th> </tr> </thead> <tbody> <tr> <td>CO1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO2</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>C04</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO5</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	CO1									CO2									CO3									C04									CO5								
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C04																																																							
CO5																																																							
Course Outcome	After studying the course, students will be able to Implement their skills at their workplace on varied roles such as computeroperator and programmer.																																																						
Course Content	<p>Unit : 1 : Fundamentals of Communication</p> <ol style="list-style-type: none"> 1.1 Definition and Meaning, Overview 1.2 Process of Communication 1.3 Features and Process of Professional communication 1.4 Role of creative and critical thinking in communication 1.5 Different forms of communication 1.6 Communication Network in an Organization 1.7 Barriers to communication <p>Unit : 2 :Developing Listening skills</p> <ol style="list-style-type: none"> 2.1 Listening Vs Hearing 2.2 Effective Listening 2.3 Process of Listening 2.4 Types of Listening 2.5 Barriers to effective listening <p>Unit : 3 : Speaking Skills</p> <ol style="list-style-type: none"> 3.1 Non-verbal Communication 3.2 Group –discussions- Conducting G.D on giventopics(Oral Practical) 3.3 Dynamics of Professional presentation/DraftingPresentation on given topics 3.4 Public speaking 3.5 Conversations and Dialogue writing <p>Unit : 4 Reading Skills</p> <ol style="list-style-type: none"> 4.1 Need for Developing Efficient Reading 4.2 Benefits of Effective Reading 4.3 Basic steps To Effective Reading 4.4 Types of Reading 4.5 Reading Comprehension <p>Unit : 5 Writing Skills</p> <ol style="list-style-type: none"> 5.1 Resume writing 5.2 The art of Condensation 5.3 Business Reports 5.4 E-mail writing 5.5 Blog Writing. 																																																						
Reference Books	<ol style="list-style-type: none"> 1.Handbook of practical Communication skills – Chrisle W. JAICO 2.Basic Managerial Skills for all – S. J. McGrath - PHI 3.Reading to learn – Sheila Smith & Thomas M. Methuen (London) 4.Communication conversation Practice _ Tata McGraw Hill 5. Communication in English – R. P. Bhatnagar & R. T. Bell – Orient Longman 																																																						

	6. Good English – G. H. Vallins – Rups & Co 7. Let's talk English – M. I. Joshi 8. Essentials of Business Communications – Pat & Sons, S. Chand
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	50% Internal assessment. 50% External assessment.

Course Code: 102
Course Title: MATHEMATICS

Course Code	102																																																															
Course Title	Mathematics (Multi-Disciplinary Course – 01) [Title of the course will be the one selected by the student from courses offered by college/institute out of the course basket offered by the University under the Multi-Disciplinary courses or Inter-disciplinary courses.]																																																															
Credits	4																																																															
Course Category	Multidisciplinary Course (MC-01)																																																															
Level of Course	100-199 (Foundation / Introductory)																																																															
Teaching per Week	4 Hrs.																																																															
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)																																																															
Review / Revision	2022-2023																																																															
Implementation Year:	A.Y. 2023-2024																																																															
Purpose of Course	To impart fundamental knowledge and develop mathematical abilities relevant to applications relevant to Computer Applications. [Student will opt any one course of multi-disciplinary nature from other than the computer Science and Application faculty. The course will be offered by the institute/college passed by the Board of Studies of University faculties other than the computer science and application faculty.]																																																															
Course Objective	To Provide a foundation in mathematical concepts and methods that are relevant to Computer Applications and develop the ability to apply mathematical knowledge and techniques to solve problems in computing.																																																															
Pre-requisite	Knowledge of Fundamentals of Mathematics of 10 th Grade Level																																																															
Course Outcomes	<p>CO1: Define and explain the fundamental concepts of Mathematical Abilities in organizations.</p> <p>CO2: Students can apply set theory concepts to real-world scenario, such as analyzing survey data.</p> <p>CO3: Enhance student’s logical reasoning to solve problems in various contexts, such as puzzles or legal arguments by learning Truth table.</p> <p>CO4: Course aims to equip students with the knowledge and skills to define and operate matrices, compute solutions to business problems through the use of mathematical concepts and techniques.</p> <p>CO5: Course aims to develop students' ability to think logically and critically, as well as to apply mathematical concepts and techniques to real-world problems.</p> <p>CO6: Develop independent learning skills, including the ability to research and explore mathematical concept.</p>																																																															
Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)	<table border="1"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> <th>PSO6</th> <th>PSO7</th> <th>PSO8</th> </tr> </thead> <tbody> <tr> <th>CO1</th> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>CO2</th> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>CO3</th> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> </tr> <tr> <th>CO4</th> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td></td> </tr> <tr> <th>CO5</th> <td></td> <td></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> </tr> <tr> <th>CO6</th> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> </tr> </tbody> </table>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	CO1									CO2									CO3									CO4									CO5									CO6								
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Course Outcome	After studying the course, students will be able to Implement acquired skills in writing codes using programming languages.																																																															

Course Content	<p>Unit 1. Set Theory</p> <p>1.1.Introduction 1.2.Representation 1.3.Operation and its properties 1.4.Venn Diagram 1.5.Cartesian product and graph</p> <p>Unit 2. Functions</p> <p>2.1.Definition 2.2.Types – Domain and Range 2.3.Construction and functions</p> <p>Unit 3. Mathematical Logic</p> <p>3.1.Introduction to logic 3.2.Truth Table</p> <p>Unit 4. Boolean Algebra</p> <p>4.1Definition & Examples of Boolean Algebra 4.2Boolean Functions 4.3Representation and minimization of Boolean Functions 4.4Design example using Boolean algebra</p> <p>Unit 5. Matrices and Determinants</p> <p>5.1.Matrices of order $M * N$ 5.2.Row and Column transformation 5.3.Addition, Subtraction and multiplication of Matrices 5.4.Computation of Inverse 5.5.Cramer’s Rule 5.6.Business Application of Matrices</p>
Reference Books	<p>1)Co-ordinate Geometry – Shanti Narayan 2)Linear Algebra – SushomaVerma 3)Advanced Mathematics – B.S. Shah & Co. 4)Schaum’s Outline of Boolean algebra and switching circuits – Elliot Mendelson 5)Digital Computer Fundamentals - Tata McGraw Hill, 6th Edition, Thomas C. Bartee 6)Business Mathematics - QaziZameeruddin, V. K. Khanna and S. K. Bhambri, Vikas Publishing House Pvt. Ltd.</p>
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	50% Internal assessment. 50% External assessment.



Course Code: 103
Course Title: Introduction to Computers

Course Code	103								
Course Title	Introduction to Computers								
Credits	4								
Course Category	Minor Course								
Level of Course	100-199 (Foundation / Introductory)								
Teaching per Week	4 Hrs.								
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)								
Review / Revision	2022-2023								
Implementation Year:	A.Y. 2023-2024								
Purpose of Course	<ul style="list-style-type: none"> - Concepts and types of computer and various hardware technologies relevant to computer as well as some important peripherals will be covered. - Introduction of computer internal memories, number systems and conversions from decimal to binary. - Exposure of various input and output devices as well as concepts of Internet and relevant gadgets and their application 								
Course Objective	to provide knowledge of functional units, number System, Devices and memory & its storage.								
Pre-requisite	-								
Course Outcomes	<p>CO1: Students will be able to develop interest in using computers for professional work.</p> <p>CO2: Students will be able to learn functional units of computers, how they process information with other computing systems and devices.</p> <p>CO3: Students will be able to understand basic computer hardware components.</p> <p>CO4: Students will be able to express the major concepts of Application software and System Software.</p> <p>CO5: Student will be able to learn how the computer represents and stores information using binary number system, and will be able to convert between binary and decimal number system.</p> <p>CO6: Students will be able to understand the functions of input output devices, know the different types of I/O Devices, and assess new technology used for I/O devices.</p> <p>CO7: Students will be able to understand types of internet services, internet connections, and also able to learn the concept of cloud applications, essential web browser technologies.</p>								
Mapping between Course Outcomes(CO) with Program Outcomes(PSO)		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
	CO1								
	CO2								
	CO3								
	CO4								
	CO5								
	CO6								
	CO7								

Course Outcome	On completion of this course, students will get knowledge about functional units, number System, devices and memory and storage.
Course Content	<p>UNIT-1: Introduction</p> <p>1.1 Introduction of Computer 1.2 Applications of Computer 1.3 Types of Computers – Super Computers, Mainframes, Mini Computers, Micro computers(Desktop, Laptop, Notebook, Tablet, Smart Phones) 1.4 Block Diagram and functional units of computer</p> <p>UNIT-2: Basic Computer Architecture</p> <p>2.1 Concepts of Address Bus and Data Bus 2.2 Concept of virtual memory and cache memory 2.3. Hardware Components 2.3.1. Motherboard 2.3.2. Types of Processor (CPU and GPU) 2.3.3. Understanding processor speed 2.3.4. Memory – RAM(SRAM,DRAM, SDRAM), ROM, EPROM, EEPROM 2.3.5. Storage Devices – Hard Disk, CD, DVD, USB flash memory 2.4. Introduction to Software 2.4.1. Purpose and significance of Operating System 2.4.2. Concept of System Software and Application Software</p> <p>UNIT-3: Number System</p> <p>3.1. Introduction of Decimal, Binary, Octal and Hexadecimal number Systems. 3.2 Conversion of Decimal to Binary and Binary to Decimal 3.3 Binary addition & subtraction 3.4 ASCII and ANSI character code</p> <p>Unit – 4: Input & Output Devices</p> <p>4.1. Introduction of Input Devices 4.1.1. Pointing Devices – Mouse, Trackball, Joystick, Touch Screen, Light Pen 4.1.2. Keyboard 4.1.3. RFID concepts and application in FastTag 4.2. Introduction and purpose of Scanning Devices 4.2.1. Optical Scanner 4.2.2. Bar Code Reader 4.2.3. Web Camera 4.3. Introduction and comparisons of Output Devices 4.3.1. Monitors – LED, LCD,TFT, OLED, TouchScreen Monitor 4.3.2. Printers – Dot Matrix Printer, Laser Printer, Inkjet Printer</p> <p>Unit - 5: Concepts of Internet</p> <p>5.1. Concepts of Internet and WWW 5.1.1 Types of Internet Services 5.1.2 Hardware – Modem, Router, Blue tooth, Fire-Stick 5.1.3 Internet connections using Hotspot, WiFi, cable 5.2 Introduction of Cloud 5.2.1 Concepts of cloud 5.2.2 Purpose and application of Cloud (Example of GoogleDoc) 5.2.3 Concepts of Online Data Backup 5.3 Introduction of Web Browser and relevant terminologies : 5.3.1 URL, Address bar, Domain, Links, Navigation Buttons 5.3.2 Tabbed browsing, Bookmarks, History</p>
Reference Books	<p>1. "Computer Fundamentals" by P.K. Sinha, BPB Publications, ISBN: 978-8176561064 2. "Fundamentals of Computers" by V. Rajaraman, PHI Learning, ISBN: 978-8120350670 3. "Introduction to Computers" by Peter Norton, McGraw-Hill Education, ISBN: 978-1259253089</p>

	<p>4. "Computers Today" by S.K. Basandra, Galgotia Publications, ISBN: 978-8175155578</p> <p>5. "Fundamentals of Computer" by Reema Thareja, Oxford University Press, ISBN: 978-0199452721</p> <p>6. "Introduction to Computer Science" by ITL Education Solutions, Pearson Education, ISBN: 978-8131760300</p> <p>7. "Computing Fundamentals" by J.S. Apte, McGraw-Hill Education, ISBN: 978-0070267282</p> <p>8. "Computer Organization and Design" by David A. Patterson and John L. Hennessy, Morgan Kaufmann, ISBN: 978-0124077263</p> <p>9. Introduction to Networking Rechar McMohan Tata McGraw Hill Publication</p> <p>10. HTML Black Book – Steven Holzner – Dreamtech Press</p> <p>11. Computer Network Fundamentals and application – R S Rajesh Vikas Publication</p> <p>12. HTML for the World Wide Web, Fifth Edition, with XHTML and CSS- Peachpit Press</p>
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	50% Internal assessment. 50% External assessment.



Course Code: 104

Course Title: Computer Programming & Programming Methodology (CPPM)

Course Code	104																																																						
Course Title	Computer Programming & Programming Methodology (CPPM)																																																						
Credits	4																																																						
Course Category	Major Course																																																						
Level of Course	200-299 (Intermediate Level)																																																						
Teaching per Week	4 Hrs. (2 Hours Theory + 4 Hours Practical work)																																																						
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)																																																						
Review / Revision	2022-2023																																																						
Implementation Year:	A.Y. 2023-2024																																																						
Purpose of Course	<ul style="list-style-type: none">- Computer programming is a process that leads from an original formulation of a computing problem to executable computer programs.- Programming involves activities such as analysis, developing, understanding, generating algorithms, verification of requirements of algorithms including their correctness, and implementation (commonly referred to as coding) of algorithms in a target programming language.- To emphasis on concepts of Compiler based programming language, structure of code, algorithms, flow-charts, problem solving attitude, concepts of variables and declaration mechanism of different datatypes, simple I/O statements, conditional statements, loops, compound iterations, strings and certain inbuilt functions, header files, concepts of arrays and one dimensional numeric array operations, numeric inbuilt functions and concepts of pointers																																																						
Course Objective	To introduce students the essentials of computer Programming and programming methodology using C Programming language.																																																						
Pre-requisite	-																																																						
Course Outcomes	<p>CO1: Students will be able to learn advanced programming concept of compiler based programming language.</p> <p>CO2: Students will be proficient working on conditional statements, iterative Statements and fundamentals of programming concepts using C and Python.</p> <p>CO3: Students will be able to represent compound data using lists, tuples and dictionaries in Python programs.</p> <p>CO4: Students will be able to develop real world application.</p> <p>CO5: Students will learn important libraries like Numpy, Pandas which are useful in Data analysis, Machine Learning.</p>																																																						
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CO5																																																							
Course Content	UNIT-1: Introduction <ul style="list-style-type: none">1.1 Concepts of Programming Language<ul style="list-style-type: none">1.1.1 Introduction of Source Code, Object Code and executable code1.1.2 Algorithm and Flowchart1.1.3 Concepts of Structured Programming Language1.2 Concepts of Editor, Interpreter and Compiler<ul style="list-style-type: none">1.2.1 Introduction of C program body structure1.2.2 Character Set, concepts of variables and constants																																																						

1.2.3 Identifiers, literals, Key words

1.2.4 Data types (signed and unsigned) (Numeric : int, short int, long, float, double) , (Character type: char, string) and void.

1.2.5 Concepts of source code, object code and executable code.

UNIT-2: Input/Output Statements and Operators:

2.1 Input/Output statements:

2.1.1 Concepts of Header files (STDIO,CONIO)

2.1.1.1 Concepts of pre-compiler directives.

2.1.1.2 Use of #include and #define

2.2 Input/Output Statements:

2.2.1 Input statements : scanf(), getc(), getch(), gets(), getchar()

2.2.2 Output Statements: printf(), putc(), puts(), putchar()

2.2.3 Type specifiers (formatting strings) : %d, %ld, %f, %c, %s, %lf

2.3 Operators :

2.3.1 Arithmetic operators (+, -, *, /, %, ++, --,)

2.3.2 Logical Operators (&&, ||, !)

2.3.3 Relational Operators (>, =, <=, !=)

2.3.4 Bit-wise operators (&, |, ^, <>)

2.3.5 Assignment operators (=, +=, -=, *=, /=, %=)

2.3.6 Ternary Operator and use of sizeof() function.

2.4 Important Built-in functions:

2.4.1 Use of : (strlen, strcmp, strcpy, strcat, strrev)

2.4.2 Use of : (abs(), floor(), round(), ceil(), sqrt(), exp(), log(), sin(), cos(), tan(), pow() and trunc())

UNIT-3: Decision Making statements :

3.1 if statements :

3.1.1 simple if statements

3.1.2 if...else statements

3.1.3 if...else if...else statements

3.1.4 Nested if statements.

3.2 Switch..case statements

3.2.1 Use of break and default

3.2.2 Difference between switch and if statements.

UNIT-4: Iterative statements :

4.1 Use of goto statement for iteration

4.2 while loop

4.3 do..while loop

4.4 for loop

4.5 Nested while, do..while and for loops

4.6 Jumping statement: (break and continue)

UNIT-5: Concepts of Arrays and pointer

5.1 Concepts of Single-dimensional Array

5.1.1 Numeric single dimensional Array

5.1.2 Numeric single dimensional array operations:

5.1.2.1 Sorting array in ascending or descending. (Bubble and selection)

5.1.2.2 Searching element from array (Linear Search)

5.1.3 Character Single dimensional Array

5.1.3.1 Character Single dimensional array operations:

5.1.3.2 Use of \0, \n and \t

5.2 Pointers:

5.2.1 Concepts of Pointers

5.2.2 Declaring and initializing int, float, char and void pointers

5.2.3 Pointer to single dimensional numeric array.

Reference Books	<ol style="list-style-type: none"> 1. Programming in C, Balaguruswami – TMH 2. C: How to Program, Deitel & Deitel - PHI 3. C Programming Language, Kernigham & Ritchie - TMH 4. Programming in C, Stephan Kochan - CBS 5. Mastering Turbo C, Kelly & Bootle - BPB 6. C Language Programming – Byron Gottfried - TMH 7. Let us C, Yashwant Kanetkar - BPB Publication 8. Magnifying C, Arpita Gopal - PHI 9. Problem Solving with C, Somashekara - PHI 10. Programming in C, Pradip Dey & Manas Ghosh – Oxford
Teaching Methodology	Class Work, Discussion, Lab work, Self-Study, Seminars and/or Assignments
Evaluation Method	<p>50% Internal assessment.</p> <p>50% External assessment.</p>

Course Code: 105-03
Course Title: Introduction to Semiconductor

Course Code	105-03
Course Title	Introduction to Semiconductor
Credits	4
Course Category	Major Course
Level of Course	200-299 (Intermediate Level)
Teaching per Week	4 Hrs.
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	-
Implementation Year:	A. Y. 2024-2025
Purpose of Course	The course "Introduction to Semiconductor" aims to provide students with a foundational understanding of semiconductor materials, its structure, and devices, which are the backbone of modern electronics. It introduces the fundamental concepts of semiconductor structure, including the behavior of electrons and holes, carrier transport mechanisms, and the properties of different semiconductor materials. The course also covers the essential devices such as diodes, transistors (BJTs and FETs), and other semiconductor components, explaining their operation, characteristics, and applications. Additionally, students will gain insight into the fabrication and testing techniques used in the semiconductor industry, preparing them for practical challenges in device manufacturing and quality control. By exploring both current technologies and emerging trends, such as nano-electronics and quantum devices, this course equips students with the knowledge needed to understand and contribute to advancements in semiconductor technology.
Course Objective	<ol style="list-style-type: none"> 1. Understand the fundamental properties and behavior of semiconductor materials. 2. Learn the principles of carrier transport, generation, and recombination in semiconductors. 3. Gain knowledge of the operation and characteristics of key semiconductor devices like diodes and transistors. 4. Acquire practical skills in semiconductor fabrication and testing techniques. 5. Explore current applications and future trends in semiconductor technology.
Pre-requisite	Students should have completed secondary school education with a foundational understanding of mathematics, physics, chemistry, and basic computer skills. A background in basic familiarity with fundamental concepts of electricity, magnetism, and atomic structure will be beneficial..
Course Outcomes	<p>CO1: Understanding Semiconductor Fundamentals: Demonstrate knowledge of semiconductor materials, their properties, and behavior.</p> <p>CO2: Analysis of Semiconductor Devices: Analyze the operation and characteristics of semiconductor devices like diodes and transistors.</p> <p>CO3: Application of Semiconductor Principles: Apply semiconductor principles to solve problems and design basic electronic circuits.</p> <p>CO4: Proficiency in Fabrication Techniques: Acquire practical skills in semiconductor fabrication processes and testing methods.</p> <p>CO5: Awareness of Emerging Trends: Recognize current applications and future trends in semiconductor technology and its impact on modern electronics.</p>

Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
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	CO4								
	CO5								
Course Content	<p>Unit 1: Basics of Semiconductors :</p> <p>1.1 Introduction to Semiconductors:</p> <p>1.1.1 Types of materials: Conductors, semiconductors, and insulators</p> <p>1.1.2 Atomic structure and bonding in semiconductors</p> <p>1.1.3 Intrinsic and extrinsic semiconductors</p> <p>1.2 Semiconductor Materials:</p> <p>1.2.1 Silicon, Germanium, and compound semiconductors</p> <p>1.2.2 Crystal structure and growth techniques (Czochralski process, Float-zone process)</p> <p>1.3 Charge Carriers in Semiconductors:</p> <p>1.3.1 Electrons and holes</p> <p>1.3.2 Carrier concentration and Fermi level</p> <p>1.3.2 Temperature dependence of carrier concentration</p> <p>Unit 2: Semiconductor Fundamentals</p> <p>2.1 Carrier Transport Mechanisms:</p> <p>2.2 Drift and diffusion</p> <p>2.2.1 Mobility and conductivity</p> <p>2.2.1 Generation and recombination of carriers</p> <p>2.3 P-N Junctions:</p> <p>2.3.1 Formation of p-n junctions</p> <p>2.3.2 Depletion region and built-in potential</p> <p>2.3.3 Current-voltage characteristics</p> <p>2.4 Semiconductor Diodes:</p> <p>2.4.1 Types of diodes (Zener, Schottky, LED)</p> <p>2.4.2 Diode characteristics and applications</p> <p>Unit 3: Semiconductor Devices</p> <p>3.1 Bipolar Junction Transistors (BJTs)</p> <p>3.1.1 Structure and operation</p> <p>3.1.2 Current gain and input/output characteristics</p> <p>3.1.2 Applications of BJTs</p> <p>Unit 4: Field-Effect Transistors (FETs):</p> <p>4.1 Types of FETs (JFET, MOSFET)</p> <p>4.2 Structure and operation of MOSFETs</p> <p>4.3 Characteristics and applications of FETs</p> <p>4.4 Other Semiconductor Devices</p> <p>4.4.1 Thyristors, SCR, and triacs</p> <p>4.4.2 Photonic devices (solar cells, photodiodes)</p> <p>Unit 5: Fabrication and Testing :</p> <p>5.1 Semiconductor Fabrication Techniques:</p> <p>5.2 Wafer fabrication, photolithography, and etching</p> <p>5.3 Doping methods (diffusion, ion implantation)</p> <p>5.4 Metallization and packaging</p> <p>5.5 Device Testing and Characterization:**</p> <p>5.6 Failure analysis and quality control</p>								

Reference Books	<ol style="list-style-type: none"> 1. "Semiconductor Physics and Devices", Donald A. Neamen, McGraw-Hill Education, ISBN: 9780073529585 2. "Principles of Semiconductor Devices", Sima Dimitrijevic, Oxford University Press, ISBN: 9780199543939 3. "Solid State Electronic Devices", Ben G. Streetman, Sanjay Kumar Banerjee, Prentice Hall, ISBN: 9780133356038 4. "Fundamentals of Semiconductor Devices", Betty Lise Anderson, McGraw-Hill Education, ISBN: 9780070054825 5. "Semiconductor Device Fundamentals", Robert F. Pierret, Addison-Wesley, ISBN: 9780201543933 6. "Semiconductor Physics and Devices: Basic Principles", Jasprit Singh, Tata McGraw-Hill Education, ISBN: 9780070634247 7. "Introduction to Semiconductor Materials and Devices", M.S. Tyagi, John Wiley & Sons, ISBN: 9788126546682 8. "Semiconductor Devices: Basic Principles", R. Singh, PHI Learning, ISBN: 9788120350062 9. "Semiconductor Devices: Modelling and Technology", S.M. Sze, Kwok K. Ng, Wiley India, ISBN: 9788126546439 10. "Semiconductor Optoelectronic Devices", Pallab Bhattacharya, Prentice Hall India, ISBN: 9788131720122
Teaching Methodology	Class Work, Discussion, Lab work, Self-Study, Seminars and/or Assignments
Evaluation Method	50% Internal assessment. 50% External assessment.

Course code: 106
Course Title: Skill Enhancement Course (SEC-01)

Course Code	106
Course Title	Skill Enhancement Course - I (SEC – 01)
Credit	2
Category of Course	Skill Enhancement Course
Level of Course	100-199 (Foundation / Introductory)
Teaching per Week	2 Hrs (Any or Combination of Theory/Practical/Fieldwork/Internship/Project)
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	2022-2023
Implementation Year:	A.Y. 2023-2024
Purpose of Course	<ul style="list-style-type: none"> - As per NEP(National Education Policy-2020), it is mandatory for students to select a 2 credit Skill Enhancement Course out of the choices given by the college/institute. - It will be mandatory for the student to opt minimum one 2-credit Skill Enhancement Course out of the list of offered courses recognised by the University during semester-1 to semester-5. - The student can start an alternative career in the field by obtaining higher degree of knowledge in the area. - It's aimed at imparting practical skills, embedded internship, hands-on training, soft skills, life skills, such approved online courses etc. to enhance the employability of students. This may also include courses as per the need of new evolving technology.
Course Objective	Obtaining skill in particular field along with the regular curriculum of the selected program is essential. It not only enhance the skill but also provide an opportunity to develop skill in particular area where one can pursue career in future. Skill enhancement provides the opportunity and knowledge for an individual to develop and strengthen the necessary skills to gain, maintain, and advance in a chosen area. Skill enhancement programs are focused around training that combines the best practices from varieties of areas. Skill enhancement or training typically uses a combination of cognitive and behaviour problem solving approaches, both of which are used to strengthen a person's positive skill develop.
Pre-requisite	-
Course outcome	<p>CO1: Student select the area of skill as per his/her interest. The choices will be given by the institute/department.</p> <p>CO2: The student acquire basic and fundamental level of knowledge in the field that the student opted.</p> <p>CO3: Understand the insight of the area and possibility of to explore more in the field.</p> <p>CO4: Understand effective representation of problems in terms addressing the problems.</p> <p>CO5: Learn to upskill and upgrade the knowledge in the area of selected subject.</p>
Course Content and Implementation road-map.	<ul style="list-style-type: none"> (i) University has categorised and prepared the basket of the courses including approved online courses that can be offered as Skill Enhancement Course. (ii) The institute/college/department can design and implement skill enhancement course by getting approval from the relevant apex body of the university considering the SOP of the certificate course policies of the University.

	<p>(iii) The institutes/college/departments can select more than one course out of the given sets of courses and offer them to their students.</p> <p>(iv) The students can select any of the courses offered by the institute/college/department from the given choices and enrol for the course.</p> <p>(v) The institute/college/department will arrange appropriate resource person(s) for the course.</p> <p>(vi) The course evaluation will be taken place at the college/institute/department level based on the nature of the course.</p> <p>(vii) The institute/college/department will assess the student based on the nature of the course. The student will be granted the credits on successful completion of the course.</p>
Reference Books	<ul style="list-style-type: none"> - The reference materials and books will be decided by the Institutes/Colleges/Departments based on the selected Courses. - Minimum five copies of relevant topics are recommended to keep in the library.
Teaching Methodology	Class Work/ Discussion/ Self-Study/ Seminars/ field works/ practical training/ field work and/or Assignments.
Evaluation Method	<p>50% Internal assessment.</p> <p>50% External assessment.</p> <p>Maximum Marks: 50</p> <p>(Evaluation and Assessment will be carried out at institute level. On successful completion of the course, the student will be granted 2 credits.)</p>



Course code: 107
Course Title: Value Addition Course-I (VAC-01)

Course Code	107
Course Title	Value Addition Course - I (VAC – 01)
Credit	2
Category of Course	Value Addition Course
Level of Course	100-199 (Foundation / Introductory)
Teaching per Week	2 Hrs (Any or Combination of Theory/Practical/Fieldwork/Internship/Project)
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	2022-2023
Implementation Year:	A.Y. 2023-2024
Purpose of Course	As per NEP(National Education Policy-2020), it is mandatory for students to select a 2 credit Value Addition Course out of the choices given by the college/institute. It will be mandatory for the student to opt minimum one 2-credit Value Addition Course out of the list of offered courses recognised by the University during semester-1 to semester-4. The student can start an alternative career in the field by obtaining higher degree of knowledge in the area.
Course Objective	Obtaining knowledge in all or any of the components/fields like (i) Understanding India (ii) Environmental Science/Education (iii) Digital/Technological solutions (iv) Health & Wellness, Yoga education, sports, and fitness are essential for holistic development (v) Indian Knowledge system(IKS). The course components should be among these five categories/fields and as per the Curriculum and Credit Framework for Undergraduate Programmes of the UGC (Page-22 of the document). The purpose is to impart knowledge and understand the necessities of these aspects in life to make the healthy society and nation. It help in development of a dedicated and responsible citizen of the country by adding value to the life.
Pre-requisite	-
Course outcome	CO1: Student select the area of Value addition as per his/her interest. The choices will be given by the institute/department. CO2: The student acquire basic and fundamental level of knowledge in the field that the student opted. CO3: Understand the insight of the area and possibility of to explore more in the field. CO4: Understand effective representation of problems, solutions and insights of the challenges and problems of the peer subject relevant to value addition. CO5: Learn to upskill and upgrade the knowledge in the area of selected subject.
Course Content and Implementation road-map.	(i) The university has categorised and prepared the list of the courses that can be offered as Value Addition Course. (ii) The institute/college/department can design and implement skill enhancement course by getting approval from the relevant apex body of the university considering the SOP of the certificate course policies of the University. (iii) The institutes/college/departments can select more than one course out of the given sets of courses and offer them to their students. (iv) The students can select any of the courses offered by the institute/college/department from the given choices and enrol for the course. (v) The institute/college/department will arrange appropriate resource person(s) for the course.

	<p>(vi) The evaluation will be taken place at the college/institute/department based on the nature of the course.</p> <p>(vii) The institute/college/department will assess the student based on the nature of the course. The student will be granted the credits on successful completion of the course.</p>
Reference Books	<ul style="list-style-type: none"> - The reference materials and books will be decided by the Institutes/Colleges/Departments or as per the university guidelines based on the selected Courses. - Minimum five copies of relevant topics are recommended to keep in the library.
Teaching Methodology	Class Work/ Discussion/ Self-Study/ Seminars/ field works/ practical training/ field work and/or Assignments.
Evaluation Method	<p>50% Internal assessment.</p> <p>50% External assessment.</p> <p>Maximum Marks: 50</p> <p>(Evaluation and Assessment will be carried out at institute level. On successful completion of the course, the student will be granted 2 credits.)</p>

Internship: Student willing to exit the program at the end of the two semesters and to avail the Certificate in Computer Application or exit the program at the end of the first four semesters and to avail the Diploma in Computer Application, it is essential to acquire four credits from internship. A key aspect of the internship is induction into actual work situations. Internships involve working with local industry, government or private organizations, business organizations, artists, crafts persons, and similar entities to provide opportunities for students to actively engage in on-site experiential learning. In option to these internships, the student can avail such four credits by availing two 2-credit university approved courses during any of these semesters. The student is required to enroll and avail these 4-credits and produce the evidence in process to opt the multi-level exit option after successfully completion of first year (two semester) or second year(four semesters).



Semester - 2

Course Code: 201

Course Title: Ability Enhancement Course-02

Course Code	201
Course Title	Ability Enhancement Course – 02 [Title of the course will be the one selected by the student from courses offered by college/institute out of the course basket offered by the University under the Ability Enhancement courses]
Credits	2
Course Category	Ability Enhancement Course (AEC-02)
Level of Course	100-199 (Foundation / Introductory)
Teaching per Week	2 Hrs
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	2022-2023
Implementation Year:	A.Y. 2023-2024
Purpose of Course	To be offered to students to achieve competency in a Modern Indian Language and English Language focused on language and communication skills. This will be an elective course. Can be selected from the list of elective options available under the basket of Ability Enhancement certificate Courses offered by the University.
Course Objective	The course aim at enabling the students to acquire and demonstrate the core linguistic skills, including critical reading and expository and academic writing skills that help students articulate their arguments and present their thinking clearly and coherently and recognize the importance of language as a mediator of knowledge and identity. They would also enable students to acquaint themselves with the cultural and intellectual heritage of the chosen MIL and English language, as well as to provide a reflective understanding of the structure and complexity of the language/literature related to both the MIL and English language. The courses will also emphasize the development and enhancement of skills such as communication, and the ability to participate/conduct discussion and debate.
Pre-requisite	Knowledge of English at H.Sc.(12 th) Level
Course Outcomes	The list of Electives are showing individual course's Course Outcomes.
Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)	The list of Ability Enhancement Elective courses are showing mapping between Course Outcomes(CO) with Program Specific Outcomes (PSO) for individual courses.
Course Content	The list of Electives are showing individual course's Course Contents.
Reference Books	<ul style="list-style-type: none">- The list of reference books will be decided by the Institutes/Colleges/Departments or as per the university guidelines based on the selected Courses.- Minimum five copies of five different titles relevant topics are recommended to keep in the library. Electives are showing individual course's reference books.
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	50% Internal assessment. 50% External assessment.

Course Code: 202-01
Course Title: Computerized Financial Accounting

Course Code	202-01
Course Title	Computerized Financial Accounting [Title of the course will be the one selected by the student from courses offered by college/institute out of the course basket offered by the University under the Multi-Disciplinary courses or Inter-disciplinary courses.]
Credit	4
Course Category	Multi Disciplinary Course – 02
Level of Course	100-199 (Foundation / Introductory)
Teaching Per Week	4 Hours
Review/Revision	2022-2023
Implementation Year	A.Y.2023-24
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)
Purpose of Course	<ul style="list-style-type: none"> - To impart knowledge about accounting and how the accounts can be maintained using computer software. - This will give an idea to understand the Financial accounting terminologies and the model which is computerized. - [This is constituent discipline of the major courses and it helps learners to acquire core competence in relevant or any other independent courses of their choices. This course may be major specific or other discipline specific. Learner shall have option to choose the course from available pool of courses or from any other institutions as the learner’s choice. - Interdisciplinary course can help to gain the skills needed to adapt to a rapidly changing workplace, combining theory with practice to help students develop valuable transferable skills. - Multi-disciplinary course allows the students to understand the power of new ideas. It helps them to develop a pragmatic attitude by allowing them to decide what subjects they will opt for and what could be their possible benefits. They get time to make a decision by calculating the risks & advantages. - Student can opt any one course of multi-disciplinary nature from other than the computer Science and Application faculty. The course will be offered by the institute/college passed by the Board of Studies of University faculties other than the computer science and application faculty.]
Course Objective	<p>The course will give fundamental ideas about the accounting software and as a course study, the students can understand how the accounting software works. It also give an idea about various terminologies related to the computerized financial accounting.</p> <ul style="list-style-type: none"> - Integration of Knowledge and Skills: One objective of a multidisciplinary course is to foster the integration of knowledge and skills from different disciplines. By combining various areas of study, students can gain a holistic understanding of a particular topic or problem. This objective aims to break down the traditional boundaries between subjects and encourage students to see connections and relationships across different fields. - Promoting Critical Thinking and Problem Solving: Another objective is to enhance students' critical thinking and problem-solving abilities. Multidisciplinary courses often involve complex real-world issues that require a multifaceted approach. By engaging with diverse perspectives and methodologies, students develop the capacity to analyze problems

	<p>from multiple angles, think creatively, and propose innovative solutions.</p> <ul style="list-style-type: none"> - Enhancing Collaboration and Communication Skills: Collaboration and effective communication are essential skills in today's interconnected world. Multidisciplinary courses aim to cultivate these skills by providing opportunities for students to work collaboratively with peers from different disciplines. Through group projects, discussions, and presentations, students learn how to articulate their ideas, listen actively to others, and collaborate effectively to achieve common goals. This objective prepares students for interdisciplinary work environments and encourages the exchange of ideas across disciplinary boundaries. 																																																															
Course Outcome	<p>CO1- After learning this subject student will be able to know the basic concepts of Financial Accounting & use of a good Financial Accounting Software</p> <p>CO2- student will able to learn basic about financial accounting and its concepts</p> <p>CO3- students will able to learn about transaction and types of accounts</p> <p>CO4- student will able to learn the book-keeping concept</p> <p>CO5- student will able to know about the journal and other related details</p> <p>CO6- student will learn about the ledger and trail balance</p>																																																															
Mapping Between Cos with PSOs	<table border="1"> <thead> <tr> <th></th> <th>PS01</th> <th>PS02</th> <th>PS03</th> <th>PS04</th> <th>PS05</th> <th>PS06</th> <th>PS07</th> <th>PS08</th> </tr> </thead> <tbody> <tr> <td>CO1</td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> </tr> <tr> <td>CO2</td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> </tr> <tr> <td>CO4</td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <td>CO5</td> <td></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> </tr> <tr> <td>CO6</td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> </tbody> </table>		PS01	PS02	PS03	PS04	PS05	PS06	PS07	PS08	CO1									CO2									CO3									CO4									CO5									CO6								
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Course Content	<p>Unit 1: Introduction to Accounting System</p> <p>1.1 Meaning & Definition of Accounting</p> <p>1.2 Objectives of Accounting</p> <p>1.3 Concepts and Features of Book Keeping</p> <p>1.4 Branches of Accounting (Financial Management, Cust)</p> <p>1.5 Basis of Accounting (Accrual Bases, Cash Bases)</p> <p>1.6 Accounting Concepts</p> <p>Unit 2: Accounting Equation & Transaction Analysis</p> <p>2.1 Introduction to Assets, Liabilities, Equities</p> <p>2.2 Concepts of Transaction Analysis</p> <p>2.3 Classification of Accounts (Real Account, Personal Account, Nominal Account)</p> <p>Unit 3: Concepts of Book-Keeping</p> <p>3.1 Introduction of Single Entry System and advantages/disadvantages</p> <p>3.2 Introduction of Double Entry System and its advantages</p> <p>3.3 Types of Business Transaction</p> <p>3.4 Concepts of important Terminologies : Opening Stock, Closing Stock, Goods, Inventory, Assets, Liabilities, Capital, Debit, Debtors, Creditors, Income, Expenses, Loss, Profit, Credit, Debit.</p> <p>Unit 4: Journal & Subsidiary Books (With Preliminary examples)</p> <p>4.1 Meaning of Journal</p>																																																															

	<p>4.2 Format of Journal 4.3 Concept of format of cash Book 4.4 Concept and format of Petty cash Book 4.5 Concept of format of Purchase Sale, Purchase Return and Sale Return Book</p> <p>Unit 5: Concepts of Accounting Mechanism 5.1 Meaning and Definition of Ledger 5.2 Types of Ledger 5.3 Trial Balance and its objectives</p>
Reference Books	<ol style="list-style-type: none"> 1) Accounting for Management – By Dr. Jawaharlal 2) Financial Management – By Dr. S. N. Maheshwari 3) Accounting for Management – By S. K. Bhattacharya & John Dearden 4) Advanced Accountancy – By S. P. Jain & K. I. Narang 5) Implementing Tally 6.3 – By K. K. Nathani – BPB Publication 6) Implementing Tally 7.2 – By A. K. Nathani & K. K. Nathani BPB Publication
Teaching Methodology	Classwork, Discussion, Self Study, Seminars and/or Assignment
Evaluation Method	50% Internal assessment 50% External assessment



Course Code: 202-02**Course Title: Organizational Structure and Behaviour**

Course Code	202-02
Course Title	Organization Structure & Behaviour (Multidisciplinary Course) [Title of the course will be the one selected by the student from courses offered by college/institute out of the course basket offered by the University under the Multi-Disciplinary courses or Inter-disciplinary courses.]
Credit	4
Course Category	Multidisciplinary Course (MC-02)
Level of Course	100-199 (Foundation / Introductory)
Teaching Per Week	4 Hours
Review/Revision	2022-2023
Implementation Year	A.Y. 2023-2024
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)
Purpose of Course	<p>Computer Science professionals work at different levels in the hierarchy of various jobs in IT. So it is essential to understand the Organization Structure and behavior.</p> <ul style="list-style-type: none">- Integration of Knowledge and Skills: One objective of a multidisciplinary course is to foster the integration of knowledge and skills from different disciplines. By combining various areas of study, students can gain a holistic understanding of a particular topic or problem. This objective aims to break down the traditional boundaries between subjects and encourage students to see connections and relationships across different fields.- Promoting Critical Thinking and Problem Solving: Another objective is to enhance students' critical thinking and problem-solving abilities. Multidisciplinary courses often involve complex real-world issues that require a multifaceted approach. By engaging with diverse perspectives and methodologies, students develop the capacity to analyze problems from multiple angles, think creatively, and propose innovative solutions.- Enhancing Collaboration and Communication Skills: Collaboration and effective communication are essential skills in today's interconnected world. Multidisciplinary courses aim to cultivate these skills by providing opportunities for students to work collaboratively with peers from different disciplines. Through group projects, discussions, and presentations, students learn how to articulate their ideas, listen actively to others, and collaborate effectively to achieve common goals. This objective prepares students for interdisciplinary work environments and encourages the exchange of ideas across disciplinary boundaries.
Course Objective	The objective of this course is to make students aware about the Structure of an Organization and provide them concepts that leads to better understanding of human behavior in an organization.
Course Outcome	CO1- After completion of the course the student will be aware about the Structure of an organization CO2- Also, will have better understanding of human behaviour in an organization CO3- Students will understand and develop their attitude CO4- Students will learn the importance of motivation

	CO5- Students will be able to understand the leader, skills of leader and leadership styles CO6- students will have idea about BPO and call centers								
Mapping Between Cos with PSOs		PS01	PS02	PS03	PS04	PS05	PS06	PS07	PS08
	CO1								
	CO2								
	CO3								
	CO4								
	CO5								
	CO6								
Course Content	<p>Unit 1: Introduction to Organization and Management</p> <p>1.1 What makes an organization 1.2 Structure of organization 1.3 What is Management 1.4 Scope of Management 1.5 Role of Management 1.6 Manager's Role (Interpersonal Role, Information Role and Decisional Role) 1.7 Managerial Skills (Technical Skills, Human Skills, Conceptual Skills)</p> <p>Unit 2: Attitude</p> <p>2.1 Meaning of Attitude 2.2 Characteristic of Attitude</p> <p>Unit 3: Motivation</p> <p>3.1 What is motivation? 3.2 Nature and Characteristics of Motivation 3.3 Importance & Benefits of Motivation</p> <p>Unit 4: Leadership</p> <p>4.1 What is Leadership? 4.2 Characteristics of Leadership 4.3 Leadership Styles 4.4 Leadership Skills (Technical Skills, Conceptual Skills, Personal Skills)</p> <p>Unit 5: BPO and Call Centre</p> <p>5.1 What is B.P.O? 5.2 What is out-sourcing? Benefits of outsourcing 5.3 What is Call Centre? 5.4 Call Centre setup & functions</p>								
Reference Books	<p>1)Management & Organization Development – By Ahmed Abod Rachana Prakashan, New Delhi 2) Organization Behaviour – By Applewhite Philip, Prentice hall 3) Management & Organization Development – By Argyris Chris McGraw Hill 4)Human Behaviour at work – By Devis Keith, Tata MacGraw Hill 5)Organization Behaviour – By L. M. Prasad 6)Principles and Practices of Management – By L. M. Prasad 7)Managing People at work – By Harris O Jeff, John Wiley & Sons Publication 8)Call Centres – By S. Pankaj (APII Publication)</p>								
Teaching Methodology	Classwork, Discussion, Self Study, Seminars and/or Assignment								
Evaluation Method	50% Internal assessment 50% External assessment								

Course Code: 203
Course Title: Operating System

Course Code	203								
Course Title	Operating System								
Credits	4								
Course Category	Minor Course								
Level of Course	100-199 (Foundation / Introductory)								
Teaching per Week	4 Hours								
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)								
Review / Revision	2022-2023								
Implementation Year:	A.Y. 2023-2024								
Purpose of Course	An Operating System (OS) is a software that manages computer hardware and software resources and provides common services for computer programs. The operating system is an essential component of the system software in a computer system. Application programs usually require an operating system to function. The course is based on open source operating systems like Linux.								
Course Objective	<ol style="list-style-type: none"> 1.To understand functionality provided by an Operating System. 2.To make aware with basic concepts of Windows O. S. Management. 3.To learn about device management. 								
Pre-requisite	Basic knowledge of computers.								
Course Outcomes	<p>CO1: Students will learn how operating system is important for computer system and what is the role of an OS, and also learn different types of operating system and their services.</p> <p>CO2: Students will be able to understand the structure and organization of file system.</p> <p>CO3: To differentiate between windows and linux OS</p> <p>CO4: To install and maintain linux workstation and also able to manage user accounts.</p> <p>CO5: To understand devices, usage of devices, scheduling algorithms and decide which is the best one.</p> <p>CO6: Students will be able to develop application the coordinate with respective OS in a much better way which is an essential.</p>								
Mapping between Course Outcomes(CO) with Program Outcomes(PSO)		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
	CO1								
	CO2								
	CO3								
	CO4								
	CO5								
	CO6								

<p>Course Content</p>	<p>Unit 1. Operating System Concepts</p> <p>1.1.Evolution of Operating System & History</p> <p>1.2.Need of an Operating System</p> <p>1.3.Single User & Multi User Operating System</p> <p> 1.3.1 Types of OS and their advantages and dis-advantages</p> <p> 1.3.2 Batch OS, Distributed OS, Multi-Tasking OS</p> <p> 1.3.3 Rea-time OS, Mobile OS</p> <p>1.4.Elements of an Operating System</p> <p>1.5.Operating System as a Resource Manager</p> <p>Unit 2. Introduction to File System and File Management</p> <p>2.1. File Concept</p> <p>2.2. Operations on File</p> <p>2.3. File Access Methods (Sequential Access and Direct Access)</p> <p>2.4. Directory Systems File Management Functions.</p> <p>2.5. File System and Directory Structure organization.</p> <p>2.6. File Protection.</p> <p>Unit 3. Introduction of Linux</p> <p>3.1.Introduction of Linux versions</p> <p>3.2.Components of Linux</p> <p>3.3.Comparison of Windows and Linux</p> <p>Unit 4. Linux Administration</p> <p>4.1. Installing Linux</p> <p>4.2. Installation of Open Source Software</p> <p>4.3.Maintaining User Accounts</p> <p>4.4.System Config Services (Package)</p> <p>Unit 5. Device Management</p> <p>5.1.Device Management Function</p> <p>5.2.Device Characteristics</p> <p>5.3.Disk space Management</p> <p>5.4.Allocation and Disk Scheduling Methods</p>
<p>Reference Books</p>	<p>1)Operating System Concepts: – James Peterson: – McGraw Hill</p> <p>2)Operating System: – Stallings - PHI</p> <p>3)Operating System Principles: – Silberschatz, Galvin, Gagne - Willey, India</p> <p>4)Operating Systems – A. S. Godbole – Tata McGraw Hill</p> <p>5)Linux – The Complete Reference – Richard Petersen – Tata McGraw Hill</p> <p>6)"Operating System Concepts" Author: Abraham Silberschatz, Greg Gagne, Peter B. Galvin ISBN: 978-1118063330 Publisher: Wiley</p> <p>7)"Linux System Programming: Talking Directly to the Kernel and C Library" Author: Robert Love ISBN: 978-1449339531 Publisher: O'Reilly Media</p> <p>8)"Linux Bible" Author: Christopher Negus ISBN: 978-1118999875 Publisher: Wiley</p> <p>9)"Understanding the Linux Kernel" Author: Daniel P. Bovet, Marco Cesati ISBN: 978-0596005658 Publisher: O'Reilly Media</p> <p>10)"Linux Command Line and Shell Scripting Bible" Author: Richard Blum ISBN: 978-1118983843 Publisher: Wiley</p>
<p>Teaching Methodology</p>	<p>Class Work, Discussion, Self-Study, Seminars and/or Assignments</p>
<p>Evaluation Method</p>	<p>50% Internal assessment.</p> <p>50% External assessment.</p>

Course Code: 204
Course Title: Programming Skills

Course Code	204																																																						
Course Title	Programming Skills																																																						
Credits	4																																																						
Course Category	Major Course																																																						
Level of Course	200-299 (Intermediate Level)																																																						
Teaching per Week	4 Hours (2 Hours Theory + 4 Hours Practical)																																																						
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)																																																						
Review / Revision	2022-2023																																																						
Implementation Year:	A.Y. 2023-2024																																																						
Purpose of Course	To understand concepts of programming using Compiler based programming language C and Interpreter based programming Language Python. To compare the code structures of Compiler based programming language 'C' and interpreter based programming language 'Python'. [Python codes can be executed using any open source IDE. This is not IDE specific course.]																																																						
Course Objective	i) Advance programming skills using compiler based programming language C. ii) Introduction of Interpreter based Programming language Python. iii) Enhancing basic programming skills using Interpreter based and Compiler based programming languages																																																						
Pre-requisite	Fundamental knowledge of computer programming using 'C' language. Knowledge of Python IDE installation is recommended.																																																						
Course Outcomes	CO1: Students will be able to learn advanced programming concept of compiler based programming language. CO2: Students will be proficient working on conditional statements, iterative Statements and fundamentals of programming concepts using C and Python. CO3: Students will be able to represent compound data using lists, tuples and dictionaries in Python programs. CO4: Students will be able to develop real world application. CO5: Students will learn important libraries like Numpy, Pandas which are useful in Data analysis, Machine Learning.																																																						
Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)	<table border="1"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> <th>PSO6</th> <th>PSO7</th> <th>PSO8</th> </tr> </thead> <tbody> <tr> <td>CO1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO2</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO4</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO5</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	CO1									CO2									CO3									CO4									CO5								
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CO5																																																							
Course Outcome	<ul style="list-style-type: none"> - On completion of the course, the Students will be conceptually clear about the two dimensional arrays, structures and unions using 'C' programming language. - Concept of conditional statements, iterative Statements and fundamentals of programming concepts using Python. 																																																						
Course Content	UNIT-1: Arrays, Structure & Union and User defined function in C programming Language 1.1 Concepts of Two-Dimensional Numeric Array 1.1.1 Declaring Two-Dimensional numeric array 1.1.2 Two-Dimensional numeric Array operations (Addition, Subtraction, Multiplication, Transpose) 1.1.3 Element Address in array(Row major and Column major)																																																						

1.1.4 Two-Dimensional Character Array:

1.1.4.1 Declaring& Initializing Two-Dimensional character array

1.1.4.2 Two-Dimensional character Array operations (Searching elements, copying, merging, finding length of given string)

1.2 Concepts of structure and Union

1.2.1 Defining, declaring and Initializing structure and Union

1.2.2 Typedef and accessing structure member

1.2.3 Difference between structure and union

1.3 User defined functions

1.3.1 Function return type, parameter list, local function variables

1.3.2 Passing arguments to function

1.3.3 Calling function from main() function or from other function.

1.3.4 Function with No arguments and no return value, No arguments and are turn value, with arguments and no return value, with arguments and are turn value.

1.3.5 Recursive Function

UNIT-2: Python Fundamentals

2.1 Concepts of Interpreter based programming language

2.1.1 Structure of Python Programming language.

2.1.2 Python code Indention and execution

2.2 Python Variables

2.2.1 Naming of variables and Dynamic declaration of variables

2.2.2 Comments in Python

2.2.3 Assigning values to multiple variables

2.2.4 Global variables

2.3 Python Data types

2.3.1 Text(str), Numeric Type(int, float, complex), Boolean(bool)

2.3.2 Setting Data types

2.3.3 Type conversion(int, float, complex), casting(int, float, str)

2.4 User defined function.

2.4.1 Defining function, Function with Parameters

2.4.2 Parameter with default value, Function with return value

UNIT-3: Python Strings and Operators

3.1 Python Strings

3.1.1 Multiline string, String as character array, triple quotes

3.1.2 Slicing string, negative indexing, string length, concatenation

3.1.3 String Methods: (centre, count, join, len, max, min, replace, lower, upper, replace, split)

3.2 Operators

3.2.1 Arithmetic Operators(+, -, *, /, %, **, //)

3.2.2 Assignment Operators(=, +=, -=, /=, *=, //=)

3.2.3 Comparison Operators (==, !=, >, <, >=, <=)

3.2.4 Logical Operators(and, or, not)

3.2.5 Identity and member operators(is, is not, in, not in)

UNIT-4: Python conditional and iterative statements

4.1 If statement, if..elif statement, if..elif...else statements, nested if

4.2 Iterative statements

	<p>4.2.1 While loop, nested while loop, break, continue statements.</p> <p>4.2.2 for loop, range, break, continue, pass and Else with for loop, nested for loop.</p> <p>4.3 List: creating list, indexing, accessing list members, range in list, List methods (append, clear, copy, count, index, insert, pop, remove, reverse, sort).</p> <p>UNIT-5: Python Collections and Library</p> <p>5.1 Python Collections</p> <p>5.1.1 Tuples: Declaring tuple, indexing tuple, changing tuple values, adding and removing data from tuple, Use of tuple() method to create tuple, count() and index() methods.</p> <p>5.1.2 Sets: declaring set, access set data, set methods (add, clear, copy, discard, pop, remove, union, update).</p> <p>5.1.3 Dictionary</p> <p>5.1.3.1 Creating Dictionary, Adding, Accessing and Removing element</p> <p>5.1.3.2 Dictionary methods: get(),pop(), popitem(),clear(),copy()</p> <p>5.2 Introduction to Numpy and Pandas</p> <p>5.2.1 Overview of numpy</p> <p>5.2.1.1 Numpy methods (Mean, Median, Mode, Standard Deviation and Variance)</p> <p>5.2.1.2 Implementation of Numpy methods on numeric data set created using list.</p> <p>5.2.2 Pandas Dataframe</p> <p>5.2.2.1 Creating dataframe using list</p> <p>5.2.2.2 Creating dataframe using dict of equal length list</p> <p>5.2.2.3 Reading data using csv file(read_csv())</p> <p>5.2.2.4 Retrieving rows and columns from data frame using index</p> <p>5.2.2.5 Retrieving rows and columns using loc and iloc functions.</p>
Reference Books	<p>1.Programming in C, Balaguruswami - TMH</p> <p>2. C Programming Language, Kernigham & Ritchie - TMH</p> <p>3. The spirit of C, Cooper H & Mullish H - Jaico Pub.</p> <p>4. Programming in C, Stephan Kochan - CBS</p> <p>5. Mastering Turbo C, Kelly & Bootle - BPB</p> <p>6. C Language Programming, Byron Gottfried –TMH</p> <p>7. Learning Python -Mark Lutz : O'Reilly Media</p> <p>8. Core Python Programming – by Wesley J Chun ISBN-13: 978- 0132269933</p> <p>9. Python for Everybody: Exploring Data in Python 3, by Charles Severance (Author), Aimee Andrion (Illustrator), Elliott Hauser (Editor), Sue Blumenberg (Editor)</p> <p>10. An Introduction to Python - by van Rossum Guido ISBN: 9780954161767, 0954161769</p> <p>11. Core Python Application Programming – by Wesley J Chun Prentice Hall</p>
Teaching Methodology	Class Work, Discussion, Lab work, Self-Study, Seminars and/or Assignments
Evaluation Method	50% Internal assessment. 50% External assessment.

Course Code: 205-03
Course Title: Introduction to Sensors and IoT

Course Code	205-03
Course Title	Introduction to Sensors and IoT
Credits	4
Course Category	Major Course
Level of Course	200-299 (Intermediate Level)
Teaching per Week	4 Hours
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	-
Implementation Year:	A.Y. 2024-2025
Purpose of Course	The purpose of the course "Introduction to Sensors and IoT" is to provide students with a comprehensive understanding of the foundational concepts and practical applications of sensors and the Internet of Things (IoT). By delving into the principles of sensing technologies and their integration into IoT systems, the course aims to equip students with the knowledge and skills necessary to navigate the rapidly evolving landscape of connected devices and smart technologies. Through theoretical instruction and hands-on experiences, students will learn to identify, select, and deploy various types of sensors and actuators in IoT applications, fostering critical thinking and problem-solving abilities. Moreover, the course seeks to instill an awareness of ethical and security considerations in IoT design and implementation, preparing students to address emerging challenges and contribute to the advancement of IoT technologies in diverse fields such as healthcare, transportation, and environmental monitoring. Ultimately, the course aims to empower students to leverage sensors and IoT technologies effectively to address real-world problems and drive innovation in an increasingly interconnected world.
Course Objective	<ol style="list-style-type: none"> 1. Understand the fundamental principles and operation of sensors. 2. Explore various types of sensors and their applications in real-world scenarios. 3. Gain knowledge of different actuators and their functionalities. 4. Learn about the basics of IoT devices, platforms, and communication protocols. 5. Develop practical skills in interfacing sensors, actuators, and IoT devices for basic IoT applications.
Pre-requisite	Basic understanding of electronics and familiarity with computer programming concepts.
Course Outcomes	<p>CO1: Demonstrate understanding of sensor principles and their applications in IoT systems.</p> <p>CO2: Identify and differentiate between various types of sensors and actuators.</p> <p>CO3: Utilize IoT devices, platforms, and communication protocols for basic IoT applications.</p> <p>CO4: Design and implement simple IoT systems integrating sensors, actuators, and microcontrollers.</p> <p>CO5: Analyze and evaluate the performance of IoT systems in real-world scenarios.</p>

<p>Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)</p>	<table border="1"> <thead> <tr> <th></th> <th>PSO 1</th> <th>PSO2</th> <th>PSO 3</th> <th>PSO 4</th> <th>PSO 5</th> <th>PSO 6</th> <th>PSO 7</th> <th>PSO 8</th> </tr> </thead> <tbody> <tr> <td>CO1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO2</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO4</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO5</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO6</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		PSO 1	PSO2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	CO1									CO2									CO3									CO4									CO5									CO6								
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<p>Course Content</p>	<p>Unit 1: Introduction to Sensors : 1.1 Definition and classification of sensors 1.2 Basic principles of sensing: Transduction methods (electrical, mechanical, optical) 1.3 Sensor characteristics: Sensitivity, accuracy, precision, and resolution</p> <p>Unit 2: Types of Sensors : 2.1 Temperature sensors: Thermistors, thermocouples, and resistance temperature detectors (RTDs) 2.2 Pressure sensors: Strain gauges, piezoelectric sensors, and capacitive sensors 2.3 Motion sensors: Accelerometers, gyroscopes, and proximity sensors</p> <p>Unit 3: Introduction to Actuators : 3.1 Definition and classification of actuators 3.2 Types of actuators: Electrical, hydraulic, pneumatic, and piezoelectric actuators 3.3 Actuator characteristics: Force, speed, and precision</p> <p>Unit 4: Introduction to IoT Devices : 4.1 Definition and components of IoT devices: Sensors, actuators, microcontrollers, and communication modules 4.2 IoT platforms and development boards: Arduino, Raspberry Pi, and ESP8266/ESP32 4.3 Hands-on exercises on interfacing sensors, actuators, and IoT devices</p> <p>Unit 5: IoT Applications and Case Studies : 5.1 Real-world IoT applications: Smart homes, smart cities, industrial IoT (IIoT), and healthcare 5.2 Case studies: Applications of IoT in areas like Environmental monitoring, home automation and asset tracking applications. 5.3 Application of IoT Case Study: Design and implementation of a basic IoT system using sensors, actuators, and IoT devices.</p>																																																															
<p>Reference Books</p>	<ol style="list-style-type: none"> "Internet of Things: A Hands-On Approach", Arshdeep Bahga, Vijay Madiseti, VPT, ISBN: 9780996025547 "Building Arduino Projects for the Internet of Things", Adeel Javed, Apress, ISBN: 9781484219393 "IoT Projects with ESP32: Build Exciting Projects with ESP32, MQTT, and Watson IoT Platform", Agus Kurniawan, Packt Publishing, ISBN: 9781789616646 "Getting Started with IoT: Connecting Sensors and Microcontrollers to the Cloud", Cuno Pfister, O'Reilly Media, ISBN: 9781449393571 "Practical Internet of Things Security: A Practical Guide to Secure Internet of Things Projects Using Encryption, Authentication, and Access Control", Brian Russell, Packt Publishing, ISBN: 9781788832688 "Internet of Things: Principles and Paradigms", Amir Albadawi, Haroon Sheikh, Syngress, ISBN: 9780128053959 "Internet of Things: Challenges, Advances, and Applications", R. Vijayakumar, A. Senthil Kumar, CRC Press, ISBN: 9780367336934 "Internet of Things (IoT): Technologies, Methodologies, Tools, and Applications", R. Sivakumar, IGI Global, ISBN: 9781799832385 "Internet of Things: A Complete Guide", Robert Stackowiak, Pearson India 																																																															

	<p>Education, ISBN: 9789332582080</p> <p>10. "IoT Solutions in Microsoft's Azure IoT Suite: Data Acquisition and Analysis in the Real World", Scott Klein, Apress, ISBN: 9781484222331</p>
Teaching Methodology	Class Work, Discussion, Lab work, Self-Study, Seminars and/or Assignments
Evaluation Method	<p>50% Internal assessment.</p> <p>50% External assessment.</p>

Course code: 206
Course Title: Skill Enhancement Course (SEC-02)

Course Code	206
Course Title	Skill Enhancement Course - II (SEC – 02)
Credit	2
Category of Course	Skill Enhancement Course
Level of Course	100-199 (Foundation / Introductory)
Teaching per Week	2 Hrs (Any or Combination of Theory/Practical/Fieldwork/Internship/Project)
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	2022-2023
Implementation Year:	A.Y. 2023-2024
Purpose of Course	<ul style="list-style-type: none"> - As per NEP(National Education Policy-2020), it is mandatory for students to select a 2 credit Skill Enhancement Course out of the choices given by the college/institute. - It will be mandatory for the student to opt minimum one 2-credit Skill Enhancement Course out of the list of offered courses recognised by the University during semester-1 to semester-5. - The student can start an alternative career in the field by obtaining higher degree of knowledge in the area. - It's aimed at imparting practical skills, embedded internship, hands-on training, soft skills, life skills, such approved online courses etc. to enhance the employability of students. This may also include courses as per the need of new evolving technology.
Course Objective	Obtaining skill in particular field along with the regular curriculum of the selected program is essential. It not only enhance the skill but also provide an opportunity to develop skill in particular area where one can pursue career in future. Skill enhancement provides the opportunity and knowledge for an individual to develop and strengthen the necessary skills to gain, maintain, and advance in a chosen area. Skill enhancement programs are focused around training that combines the best practices from varieties of areas. Skill enhancement or training typically uses a combination of cognitive and behaviour problem solving approaches, both of which are used to strengthen a person's positive skill develop.
Pre-requisite	-
Course outcome	<p>CO1: Student select the area of skill as per his/her interest. The choices will be given by the institute/department.</p> <p>CO2: The student acquire basic and fundamental level of knowledge in the field that the student opted.</p> <p>CO3: Understand the insight of the area and possibility of to explore more in the field.</p> <p>CO4: Understand effective representation of problems in terms addressing the problems.</p> <p>CO5: Learn to upskill and upgrade the knowledge in the area of selected subject.</p>
Course Content and Implementation road-map.	<ol style="list-style-type: none"> 4) University has categorised and prepared the basket of the courses including approved online courses that can be offered as Skill Enhancement Course. 5) The institute/college/department can design and implement skill enhancement course by getting approval from the relevant apex body of the university considering the SOP of the certificate course policies of the University. 6) The institutes/college/departments can select more than one course out of the given sets of courses and offer them to their students.

	<p>7) The students can select any of the courses offered by the institute/college/department from the given choices and enrol for the course.</p> <p>8) The institute/college/department will arrange appropriate resource person(s) for the course.</p> <p>9) The course evaluation will be taken place at the college/institute/department level based on the nature of the course.</p> <p>10) The institute/college/department will assess the student based on the nature of the course. The student will be granted the credits on successful completion of the course.</p>
Reference Books	<ul style="list-style-type: none"> - The reference materials and books will be decided by the Institutes/Colleges/Departments based on the selected Courses. - Minimum five copies of relevant topics are recommended to keep in the library.
Teaching Methodology	Class Work/ Discussion/ Self-Study/ Seminars/ field works/ practical training/ field work and/or Assignments.
Evaluation Method	<p>50% Internal assessment.</p> <p>50% External assessment.</p> <p>Maximum Marks: 50</p> <p>(Evaluation and Assessment will be carried out at institute level. On successful completion of the course, the student will be granted 2 credits.)</p>

Course code: 207
Course Title: Value Addition Course-II (VAC-02)

Course Code	207
Course Title	Value Addition Course - II (VAC – 02)
Credit	2
Category of Course	Value Addition Course
Level of Course	100-199 (Foundation / Introductory)
Teaching per Week	2 Hrs (Any or Combination of Theory/Practical/Fieldwork/Internship/Project)
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	2022-2023
Implementation Year:	A.Y. 2023-2024
Purpose of Course	As per NEP(National Education Policy-2020), it is mandatory for students to select a 2 credit Value Addition Course out of the choices given by the college/institute. It will be mandatory for the student to opt minimum one 2-credit Value Addition Course out of the list of offered courses recognised by the University during semester-1 to semester-4. The student can start an alternative career in the field by obtaining higher degree of knowledge in the area.
Course Objective	Obtaining knowledge in all or any of the components/fields like (i) Understanding India (ii) Environmental Science/Education (iii) Digital/Technological solutions (iv) Health & Wellness, Yoga education, sports, and fitness are essential for holistic development (v) Indian Knowledge system(IKS). The course components should be among these five categories/fields and as per the Curriculum and Credit Framework for Undergraduate Programmes of the UGC (Page-22 of the document). The purpose is to impart knowledge and understand the necessities of these aspects in life to make the healthy society and nation. It help in development of a dedicated and responsible citizen of the country by adding value to the life.
Pre-requisite	-
Course outcome	CO1: Student select the area of Value addition as per his/her interest. The choices will be given by the institute/department. CO2: The student acquire basic and fundamental level of knowledge in the field that the student opted. CO3: Understand the insight of the area and possibility of to explore more in the field. CO4: Understand effective representation of problems, solutions and insights of the challenges and problems of the peer subject relevant to value addition. CO5: Learn to upskill and upgrade the knowledge in the area of selected subject.
Course Content and Implementation road-map.	<ol style="list-style-type: none"> 1) The university has categorised and prepared the list of the courses that can be offered as Value Addition Course. 2) The institute/college/department can design and implement skill enhancement course by getting approval from the relevant apex body of the university considering the SOP of the certificate course policies of the University. 3) The institutes/college/departments can select more than one course out of the given sets of courses and offer them to their students. 4) The students can select any of the courses offered by the institute/college/department from the given choices and enrol for the course. 5) The institute/college/department will arrange appropriate resource person(s) for the course.

	<p>6) The evaluation will be taken place at the college/institute/department based on the nature of the course.</p> <p>7) The institute/college/department will assess the student based on the nature of the course. The student will be granted the credits on successful completion of the course.</p>
Reference Books	<ul style="list-style-type: none"> - The reference materials and books will be decided by the Institutes/Colleges/Departments or as per the university guidelines based on the selected Courses. - Minimum five copies of relevant topics are recommended to keep in the library.
Teaching Methodology	Class Work/ Discussion/ Self-Study/ Seminars/ field works/ practical training/ field work and/or Assignments.
Evaluation Method	<p>50% Internal assessment.</p> <p>50% External assessment.</p> <p>Maximum Marks: 50</p> <p>(Evaluation and Assessment will be carried out at institute level. On successful completion of the course, the student will be granted 2 credits.)</p>

Internship: Student willing to exit the program at the end of the two semesters and to avail the Certificate in Computer Application or exit the program at the end of the first four semesters and to avail the Diploma in Computer Application, it is essential to acquire four credits from internship. A key aspect of the internship is induction into actual work situations. Internships involve working with local industry, government or private organizations, business organizations, artists, crafts persons, and similar entities to provide opportunities for students to actively engage in on-site experiential learning. In option to these internships, the student can avail such four credits by availing two 2-credit university approved courses during any of these semesters. The student is required to enroll and avail these 4-credits and produce the evidence in process to opt the multi-level exit option after successfully completion of first year (two semester) or second year(four semesters).



Guidelines for Question paper style

- 1) Ideally each unit of the course should carry equal weightage of marks. However, it will vary upon the content of the units of the course.**
- 2) The objective of the written/theory exams for all courses are to analyze the student's understanding about the course contents, assessing the conceptual knowledge about the course contents and ability to explain the concepts in written forms.**
- 3) As the practical exams are conducted separately and viva-voce is also a part of the practical exam, the concepts and practical knowledge can be analyzed through the practical exams.**
- 4) Since the subjects/courses are technical in nature, the major objective is to evaluate conceptual and technical knowledge for major and minor courses instead of expecting student's ability to write lengthy literature writing skills and abilities.**
- 5) 20% of questions are recommended to ask from objective/short questions types having weightage of 1 to 2 marks per question. Purpose of such question is to analyze precise understanding for the topics/points/concepts.**
- 6) 30% of questions are expected to ask from short questions to answer in few lines having weightage of 3 to 4 marks. Purpose of such questions are to analyze conceptual understanding for the topics/points/concepts that can be describe in short.**
- 7) 50% of questions are expected to ask from long/descriptive/Short-notes questions to answer using charts/graphs/block diagrams/flowcharts/models having weightage of 5 to 7 marks. Purpose of such questions are to analyze the depth knowledge and ability to explain in detail emphasizing technical knowledge.**
- 8) The evaluation by the examiner is expected to evaluate overall technical understanding of the student, ability to express the technical and conceptual knowledge, clarity of thoughts and understanding of the subject and concepts.**