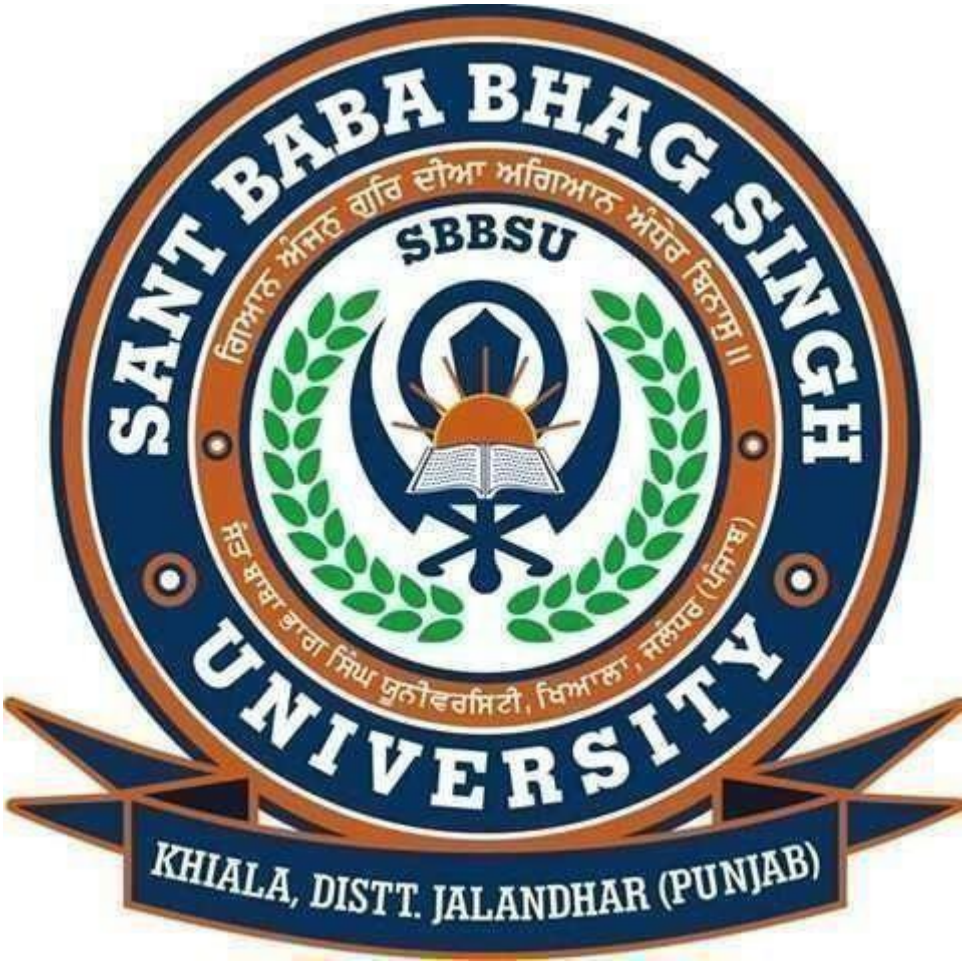
SCHEME AND SYLLABUS

B.Tech Computer Science and Engineering

(Cyber Security)



Department of Computer Science and Engineering

University Institute of Engineering Technology

Sant Baba Bhag Singh University

Batch 2026

Programme Code: UG059

ABOUT THE DEPARTMENT

The Department of Cyber Security focuses not only on theoretical foundations but also emphasizes the overall development of students to meet the growing challenges of the digital world. The department has Special Interest Groups among the faculty, each concentrating on critical research domains such as Network Security, Ethical Hacking, Cryptography, Digital Forensics, Cyber Threat Intelligence, Cloud Security, Internet of Things (IoT) Security, Artificial Intelligence in Cyber Defense, Malware Analysis, Blockchain Security, and Secure Software Development.

The department's key strengths include a high faculty-to-student ratio, modern cyber security laboratories, advanced computing infrastructure, and industry-relevant tools that support hands-on learning. Equal importance is given to teaching excellence and cutting-edge research, along with fostering leadership, professional ethics, and responsible digital practices.

The effectiveness of the teaching-learning process is reflected in the consistent academic achievements, successful cybersecurity projects, and participation in national and international competitions. To enhance professional competence, the department actively collaborates with industry experts, cybersecurity professionals, and research organizations.

Regular activities such as capture-the-flag (CTF) competitions, hackathons, cybersecurity workshops, industrial visits, expert talks, and hands-on training sessions are organized to provide real-world exposure. These initiatives enrich the learning experience and help develop analytical thinking, technical expertise, and leadership qualities in future cybersecurity professionals.

SALIENT FEATURES OF THE DEPARTMENT

1. The department provides a dynamic learning environment focused on **collaborative and interdisciplinary research in Cyber Security**, guided by experienced and highly qualified faculty members, many of whom hold **doctoral degrees and specialized expertise in security domains**.
2. The teaching program is designed with a strong emphasis on **Industry–Academia collaboration**, preparing students to address modern cyber threats and global challenges while developing **strong technical, analytical, and communication skills**.

3. The department regularly organizes **cybersecurity conferences, capture-the-flag (CTF) competitions, hackathons, seminars, student symposiums, short-term training programs, and value-added certification courses**. These activities help students and faculty explore their potential and develop **innovative solutions for real-world security problems**.
4. The department features **advanced cyber security laboratories**, including facilities for **ethical hacking, digital forensics, malware analysis, and network security testing**, along with a comprehensive repository of specialized software tools. In collaboration with premier institutions such as **IITs**, the department has also established **Virtual Labs for remote cybersecurity experiments**. Students and faculty are encouraged to participate in **NPTEL and MOOC courses** to enhance their professional knowledge.
5. A **Digital Library** provides access to **international journals, cybersecurity research papers, e-books, and video lectures by eminent professors and industry experts**, supporting continuous learning and research in the field of cyber security.

B.Tech (Bachelor of Technology)

Educational qualifications play a crucial role in achieving professional success. Along with strong academic knowledge, technical and analytical skills in cyber security are essential to tackle modern digital threats. With the rapid growth of the digital economy, the demand for cybersecurity professionals has increased significantly in both the corporate and government sectors.

Graduates can begin their careers in roles such as Cyber Security Analyst, Ethical Hacker, Security Analyst, Network Security Engineer, Digital Forensics Expert, Information Security Analyst, Penetration Tester, Security Consultant, and Malware Analyst.

Students completing the program have opportunities to work with leading organizations such as IBM, Intel, Hewlett-Packard, Tata Consultancy Services, Infosys, Wipro, Tech Mahindra, Cognizant, and Dell Technologies, both in India and abroad, as the need for skilled cybersecurity professionals continues to grow worldwide.

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VISION

"To empower students with innovative thinking, creativity, and advanced cybersecurity skills in Computer Science & Engineering, enabling them to protect digital systems, address emerging cyber threats, and contribute to a secure, resilient, and technologically advanced society while achieving a successful and meaningful life."

MISSION

"Our mission is to provide high-quality undergraduate and postgraduate education in Computer Science & Engineering cyber security that promotes the all-round growth of individuals. We aim to create a futuristic environment that fosters critical thinking, dynamism, and innovation, transforming students into globally competitive professionals. Additionally, we are committed to empowering youth in rural communities with computer education."

ELIGIBILITY CRITERIA

Passed the 10+2 examinations with Physics and Mathematics as compulsory subjects, along with one of the following: Chemistry, Computer Science, Biology, Biotechnology, or Technical Vocational subjects. Obtained at least 45% marks (40% in the case of candidates belonging to reserved categories) in the above subjects taken together.

B.Tech (Lateral Entry): A Diploma in Engineering & Technology from an AICTE-approved institution or a B.Sc (N.M.) from a UGC-approved university with at least 45% marks (40% in the case of reserved categories).

DURATION

B.Tech Cyber Security 4 years
B.Tech Cyber Security Leet-3 years

CAREER PATHWAY

Job openings for software professionals are much higher in the corporate sector than in the public sector. Professionals can join as junior programmers, database administrators, junior network

managers, data analysts, software developers, software engineers, and client-server systems managers, etc., in the initial stage.

Students have job opportunities in organizations like IBM, Intel, HP, TCS, Infosys, Wipro, Tech Mahindra, CTS, and Dell, both in India and abroad. These are some of the big names that aspiring software engineers are aware of. On the other hand, companies like Infosys, Capgemini, Accenture, Cognizant, etc., pay anywhere between 3–3.5 LPA to freshers.

All the companies mentioned above are leading organizations that hire B.Tech CSE freshers. So, as a B.Tech CSE graduate, a candidate can earn anywhere from 2 LPA to 10 LPA, depending on their skills and experience. There's definitely a lot of potential to earn.

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CHOICE BASED CREDIT SYSTEM (CBCS)

PREAMBLE:

The University Grants Commission, New Delhi, in its 12th Plan Guidelines, directed the Universities in the country to implement the Choice Based Credit System (CBCS) to set a benchmark in the University education and fulfil expectations of all the stakeholders.

OBJECTIVES

1. Shift in focus from Teacher-Centric to Learner-Centric education.
2. Allow students to choose according to their learning needs , interests and aptitude.
3. Provide flexibility to the students allowing them to choose inter-disciplinary courses, change majors, programs
4. Make education broad-based .Students can earn credits by choosing unique combinations.
5. Help self-paced learning with flexibility. Students can opt for asmanyas26creditspersemester.
6. Student can exercise the option to decide his/her own pace of learning- slow, normal or accelerated planned sequence the choice of courses, learn to face challenges through term/project work and may venture out to acquire extra knowledge/proficiency through add-on courses.

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All India Council for Technical Education, New Delhi

UPDATION/ADDENDUM

in

Model Curriculum for Undergraduate Degree Courses
in Engineering & Technology

January 2018 (Volume-II)

(As per Inputs of Experts)

1. The curriculum of **Humanities, Social Science including Management courses(HSMC)**

   (i) Human Values courses is updated.

   (i) Course Code HSMC(HU-102) may be read as(H-102) along with the following:-

   a. The name of the course "Universal Human Values 2: Self, Society, and Nature" has been renamed as "Universal Human Values 2: Understanding Harmony".

   b. The contents of "Universal Human Values 2: Understanding Harmony" will be included.

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All India Council for Technical Education Model Curriculum for Undergraduate Degree Courses in Engineering & Technology

COMPUTER SCIENCE AND ENGINEERING

Chapter-1

General, Course structure Theme&

General, Course Structure & Theme, and Semester-wise Credit Distribution

A. Definition of Credit:

1Hr.Lecture(L)per week	1credit
1 Hr. Tutorial(T)per week	1credit
1 Hr. Practical(P)per week 2 Hours Practical (Lab)/week	0.5credit 1credit

B. Range of credits-A range of credits from 150 to 160 for a student to be eligible to get Under Graduate degree in Engineering. A student will be eligible to get Under Graduate degree with Honours or additional Minor Engineering, if he/she completes an additional 20 credits. These could be acquired through MOOCs.

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C. Structure of Undergraduate Engineering program:

S. No.	Category	Credit Breakup for Cyber Security students
1	**Humanities and Social Sciences, including Management courses**	15
2	**Basic Science courses**	23
3	**Engineering Science courses, including workshop, drawing, basics of electrical/mechanical/computer, etc.**	29
4	**Professional core courses**	49
5	**Professional Elective courses relevant to chosen specialization/branch**	18
6	**Open subjects – Electives from other technical and/or emerging subjects**	12
7	**Project work, seminar, and internship in industry or elsewhere**	15
8	Mandatory Courses [Environmental Sciences, Induction Program, Indian Constitution, Essence of Indian Knowledge Tradition]	(non-credit)
	Total	**162**

**Minor variation is allowed as per need of the respective disciplines.*

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D. Course code and definition:

Course code	Definitions
L	Lecture
T	Tutorial
P	Practical
BS	Basic Science Courses
ES	Engineering Science Courses
HSMC	Humanities and Social Sciences including Management courses
PC	Professional core courses
PE	Professional Elective courses
OE	Open Elective courses
MC/ AU	Mandatory courses/ Audit Courses
EEC	Employment Enhancement Courses (Project/ Summer Internship/ Seminar)

- **Course level coding scheme**

Three-digit number (odd numbers are for the odd semester courses and even numbers are for even semester courses) used as suffix with the Course Code for identifying the level of the course. Digit at hundred's place signifies the year in which course is offered.

e.g. 101, 102 … etc. for

first year. 201, 202 ….

Etc. for second year. 301,

302 … for third year.

- **Course Level/Duration/System:**

Undergraduate / Three or Four years/6 or 8 Semesters with multiple entry and exit. The following option will be made available to the students joining Cyber Security Program:

A. **One year:** Under Graduate Certificate in Cyber Security.

B. **Two years:** Under Graduate Diploma in Cyber Security.

C. **Three years:** Bachelor of Vocational in Cyber Security (B.Voc.)

D. **Four years:** Bachelor of Engineering / Bachelor of Technology (B.E/B.Tech) in Cyber Security

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Concept of Minor Degree

All branches of Engineering and Technology shall offer Elective Subjects in the Emerging/ Multidisciplinary/ Region Specific Areas as specified in the Approval Process Hand book (APH).

a. Undergraduate Degree Subjects in Emerging / Multidisciplinary/ Region Specific Areas shall be allowed as specialization from the same department. The minimum additional Credits for such areas shall be in the range of 18-20 (including credit transferred from the SWAYAM platform) and the same shall be mentioned in the degree certificate, as specialization in that particular area. For example, doing extra credits for Cyber Security in Computer Science and Engineering shall earn B.E./B.Tech. (Hons.) Computer Science and Engineering with specialization in Cyber Security.

b. Minor specialization may be allowed in any Undergraduate Degree Courses where a student of another Department shall take the minimum additional Credits in the range of 18-20 and get a degree with a minor from another Department.

c. AICTE approval is not required for offering Minor Degree/Hons. in any such area, however the criteria is "Minor Degree or Hons. will cumulatively require additional 18 to 20 credits in the specified area in addition to the credits essential for obtaining the Undergraduate Degree in Major Discipline (i.e. 160 credits)".

Concept of Micro Credits / Micro Specialization

Micro Credits can be applied across various disciplines, including technical skills, soft skills, interdisciplinary topics, and emerging fields such as AI, data science, sustainability, and entrepreneurship.

Micro Credits are small, modular units of learning that allow students to gain specific skills or knowledge in a short time. These credits can be accumulated and used to meet the requirements for a diploma, undergraduate, or postgraduate degree.

Besides the core courses, programs normally have professional elective courses. Each HEI decides the electives it can or wishes to offer. In some areas may be desirable to organize a set of electives as micro specializations. A micro- specialization is to provide a limited specialization in some sub-

area of various disciplines, by offering suitable electives. The goal of micro specialization is to provide deeper understanding and skill development in that area, and can provide multiple pathways to students, as different students can graduate with 15 Model curriculum for UG Degree in Computer Science and Engineering different specializations (or not). The areas in which micro specialization are offered should be aligned to industry careers or higher studies. A micro specialization for various disciplines may be defined as follows:

- It has a core course as the head (starting) course for the micro specialization
- It has a clearly defined goal, and learning outcomes for the goal
- It can have 2 +/- 0.5 additional courses (besides the head course) in the sub- area aligned to the goal.

These courses can be full course (4-credits) or half-course (2 credit), and can be taken as electives by students (or extra credits.

Institutions can replace or add a course aligned to the micro specialization goal and also define a set of courses for a micro specialization and require that a subset be taken, with perhaps one being compulsory. It should be added that HEIs are completely free to decide whether to offer micro specializations or not, and if they decide to offer, which areas to provide the specialization in. How the micro specialization is to be reflected in a student's records/certificates is also to be decided entirely by HEIs based on their policies and practices.

Multiple pathways: For supporting multiple pathways within the academic program, we propose to provide for micro specializations through thematic course streams. These can be further enhanced by HEIs with programs like honors for advanced students with more credits or advanced learning outcomes, etc.

Benefits of Integrating Micro Credits:

Enhanced Learning Flexibility: Students can choose from a wide array of micro-courses, allowing them to tailor their education to their career goals and interests.

Skill Development: Micro Credits focus on specific, practical skills that are immediately applicable in the workplace, enhancing employability.

Lifelong Learning: Micro Credits support continuous learning, making it easier for students and professionals to upskill or reskill in response to industry changes.

Global Recognition: Micro Credits can often be recognized across institutions and countries, allowing students to study globally and transfer credits easily.

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Induction Program (Please refer Appendix-A for guidelines)

Induction program(mandatory)	**3 weeks duration** (Please refer Appendix-A for guidelines & also details available in the curriculum of Mandatory courses)
Induction program for students to be offered right at the start of the First year.	• Physical activity • Creative Arts • Universal Human Values • Literary • Proficiency Modules • Lectures by Eminent People • Visits to local Areas • Familiarization to Dept./Branch & Innovations

E. Mandatory Visits/ Workshop/Expert Lectures:

a. It is mandatory to arrange one industrial visit every semester for the students of each branch.

b. It is mandatory to conduct a One-week workshop during the winter break after fifth semester on professional/ industry/ entrepreneurial orientation.

c. It is mandatory to organize at least one expert lecture per semester for each branch by inviting resource persons from domain specific industry.

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Undergraduate Programme Outcomes(PO) **At the end of the Programme/Degree mentioned above, the graduates will be able to:**	
PO1.	**Engineering knowledge** Apply the knowledge of mathematics, science, engineering complex engineering specialization to the solution of complex engineering problems.
PO2.	**Problem analysis:** Identify, formulate, research literature, and analyze engineering problems to arrive at substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions:** Design solutions for complex engineering problems and design system components and processes to meet the specifications with consideration for public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems:** Use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
PO5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling to complex engineering activities, with an understanding of the limitations.
PO6	**Engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to professional engineering practice.
PO7	**Environment and sustainability:** Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for, sustainable development.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics, responsibilities, and norms of engineering practice.
PO9	**Individual and team work:** Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings.
P10	**Communication:** Communicate effectively with the engineering community and with society at large. Be able to comprehend and write effective reports and documentation. Make effective presentations and give and receive clear instructions.
P11	**Project management and finance**: Demonstrate knowledge and understanding of engineering and management principles, and apply these to one's own work, as a member and leader in a team. Manage projects in multidisciplinary environments.

P12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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Under Graduate Programme Specific Outcomes (PSO)	
PS O1	Ability to acquire knowledge in Computer Science and Engineering and develop innovative solutions to complex problems.
PS O2	Design and build websites, android apps, automated projects using the knowledge of programming, testing, lifecycle models, artificial intelligence , machine learning and CASE tools.
PSO3	Pursue lifelong learning in advanced technologies of Computer Science and Engineering and apply it for the benefit of the society.

Under Graduate Programme Educational Objective (PEO)
The Graduate/Undergraduate will be….
Acquiring knowledge of Computer Science and other engineering disciplines for analyzing and developing innovative solutions to real-world problems.
Developing interdisciplinary projects using the latest tools, techniques, and models for the benefit of society and the environment.
Demonstrating team leadership and effective communication skills while pursuing a career in life-long learning, research and development, or generating employment through startups.
Preparing for competitive examinations for higher studies abroad or for securing jobs in private, public, or multinational companies.

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cSemester-wise structure of curriculum

[L=Lecture, T=Tutorials, P=Practicals&C =Credits]

SEMESTER I

I. Theory Subjects

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	ES	CSE111	Introduction to programming in C	3:0:0	3:0:0	3	3
2	BS	MAT171	Engineering Mathematics-I	4:0:0	4:0:0	4	4
3	AEC-1/ HS	AEC0010	Communication Skills-I	2:0:0	2:0:0	2	2
5	BS	*PHY115	Engineering Physics	4:0:0	4:0:0	4	4
6	MC	EVS002	Environmental Sciences	3:0:0	NC	3	NC

II. Practical Subjects

S. No.	Type	Subject Code	Subject Name	Contact Hours(L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	ES	CSE113	Programming in C Practical	0:0:2	0:0:1	2	1
2	ES/SEC-I	ME105	Workshop/Manufacturing Practices Practical	0:0:6	0:0:3	6	3
3	BS	*PHY107	Engineering Physics Practical	0:0:2	0:0:1	2	1
4	EMC	EMC111	Entrepreneurship Mindset & Curriculum-I (Mandatory course by Punjab Government)	0:0:4	0:0:2	4	2
5	PT	*PT101/PT103 /PT105	Physical Training-I (Sports and Yoga/NCC/NSS)	0:0:2	NC	2	NC

Total Contact Hours=32

Total Credit Hours=20

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SEMESTER II

I. Theory Subjects

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	BS	CHM105	Engineering Chemistry	3:1:0	3:1:0	4	4
2	BS	MAT172	Engineering Mathematics-II	4:0:0	4:0:0	4	4
2	ES	ME101	Engineering Graphics and Design	2:0:4	2:0:2	6	4
3	ES	EE102	Basic Electrical Engineering	3:0:0	3:0:0	3	3
4	MC	MDC023	*Indian Knowledge System*	3:0:0	3:0:0	3	3

II. Practical Subjects

S. No	Type	Subject code	Subject Name	Contact Hours (L:T:P)	Credit Hours (L:T:P)	Total Contact Hours	Total Credit Hours
1	BS	CHM107	Engineering Chemistry Practical	0:0:2	0:0:1	2	1
2	ES	*EE104	Basic Electrical Engineering Laboratory	0:0:2	0:0:1	2	1
3	EMC	EMC112	Entrepreneurship Mindset & Curriculum-II (Mandatory course by Punjab Government)	0:0:4	0:0:2	4	2
4	PT	*PT102/PT104/ PT106	Physical Training- II (Sports and Yoga/NCC/NSS)	0:0:2	NC	2	NC

Note: Four weeks Institutional/Industrial Internship in campus/industry after 2nd semester and its evaluation in 3rd semester

Total Contact Hours= 30
Total Credits Hours= 22

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SEMESTER III

I. *Theory subjects:*

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PC	CSE247	Digital Communication and Networks	4:0:0	4:0:0	4	4
2	PC	CSE253	Data structure and Algorithms	4:0:0	4:0:0	4	4
3	PC	CSE255	Operating System	4:0:0	4:0:0	4	4
4	PC	CSR201	Blockchain and Modern Cryptography	4:0:0	4:0:0	4	4
5	PC	CSE259	Object Oriented Programming using C++	**4:0:0**	**4:0:0**	4	4

II. *Practical subjects:*

S. No.	Type	Subject Code	SubjectName	Contact Hours(L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PC	CSE263	Data structure and Algorithms Laboratory	0:0:2	0:0:1	2	1
2	PC	CSE267	Operating System Laboratory	0:0:2	0:0:1	2	1
3	PC	CSE269	Digital Communication and Networks Laboratory	0:0:2	0:0:1	2	1
	PC	CSE265	Object Oriented Programming using C++Laboratory	**0:0:2**	**0:0:1**	2	1
4	SI	CSE271	FOUR WEEKS INSTITUTIONAL/ INDUSTRIALTRAINING EVALUATION(undertaken after2nd sem)		0:0:3		3
5	EMC	EMC211	Entrepreneurship Mindset & Curriculum-III (Mandatory course by Punjab Government)	0:0:4	0:0:2	4	2
6	PT	PT201/PT203 /PT205	Physical Training- III(Sports and Yoga/NCC/NSS)	0:0:2	NC	2	NC

Total Contact Hours= 34
Total Credits Hours= 29

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SEMESTER IV

Sr. No	Type	Subject Code	**Subject Name**	**Contact Hours (L:T:P)**	**Credits (L:T:P)**	**Total Contact Hours**	**Total Credit Hours**
1	BS	MAT272	Discrete Mathematics	**4:0:0**	**4:0:0**	4	4
2	PC	CSR202	Ethical Hacking in Cloud	**4:0:0**	**4:0:0**	4	4
3	PC	CSE254	Database Management System	**4:0:0**	**4:0:0**	4	4
4	PC	CSE272	Computer Architecture	**4:0:0**	**4:0:0**	4	4
5	MDC	MDC019	Universal Human Values Understanding Harmony	**3:0:0**	**3:0:0**	3	3
6	AEC	AEC0015	Effective Technical Communication Skills	**2:0:0**	**2:0:0**	2	2

I. Theory Subjects:

Practical Subjects

Sr. No	**Type**	**Subject Code**	**Subject Name**	**Contact Hours (L:T:P)**	**Credits (L:T:P)**	**Total Contact Hours**	**Total Credit Hours**
1	PC	CSE260	Database Management System Laboratory	**0:0:2**	**0:0:1**	2	1
2	PC	CSE274	Computer Architecture Laboratory	**0:0:2**	**0:0:1**	2	1
3	PC	CSR204	Ethical Hacking in Cloud Laboratory	**0:0:2**	**0:0:1**	2	1
4	EMC	EMC212	Entrepreneurship Mindset & Curriculum-IV (Mandatory course by Punjab Government)	0:0:4	0:0:2	4	2
5	MC	PT202/PT204/PT206	Physical Training- IV (Sports and Yoga/NCC/NSS)	**0:0:2**	**NC**	2	NC

Note:4 weeks industrial training after 2nd year/4thsemester

Total Contact Hours = 33
Total Credit Hours = 26

PROGRAMME CODE- UG059

SEMESTERV

I. Theory Subjects

S. No.	Type	Subject Code	Subject Name	Contact Hours(L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PC	CSE351	Advanced Computer Networks	3:0:0	3:0:0	3	3
2	PC	CSE353	Design and Analysis of Algorithms	4:0:0	4:0:0	4	4
3	PC	CSR301	Mobile and Wireless Communication Networks	4:0:0	4:0:0	4	4
4	PE		Professional Elective-I	3:0:0	3:0:0	3	3
5	PE		Professional Elective-II	3:0:0	3:0:0	3	3
6	PC	CSE359	Computer Programming using Python	4:0:0	4:0:0	4	4

II. Practical Subjects

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PC	CSE357	Advanced Computer Networks Laboratory	0:0:2	0:0:1	2	1
2	PC	CSE377	Design and Analysis of Algorithms Laboratory	0:0:2	0:0:1	2	1
3	PC	CSR303	Mobile and Wireless Communication Networks Laboratory	0:0:2	0:0:1	2	1
4	PC	CSE365	Computer Programming using Python Laboratory	0:0:2	0:0:1	2	1
5	EMC	EMC311	Entrepreneurship Mindset & Curriculum-V (Mandatory course by Punjab Government)	0:0:4	0:0:2	4	2
6	SEC- II	CSE367	Four weeks industrial training Evaluation (undertaken after 4thsem)	-	0:0:3	-	3

III. Professional Elective-I

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PE	CSE369	Mobile Application Development	3:0:0	3:0:0	3	3
2	PE	CSE371	Introduction to Internet of Things	3:0:0	3:0:0	3	3
3	PE	CSE373	Cloud computing	3:0:0	3:0:0	3	3
5	PE	CSR305	Cyber Law and Intellectual Property Rights	3:0:0	3:0:0	3	3

1V. Professional Elective-II

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PE	CSE366	Digital Image Processing	3:0:0	3:0:0	3	3
2	PE	CSE314	Computer Vision	3:0:0	3:0:0	3	3
3	PE	CSE362	Compiler Construction	3:0:0	3:0:0	3	3
4	PE	CSE348	Digital Marketing	3:0:0	3:0:0	3	3
5	PE	CSR378	Advanced Parallel Computing	3:0:0	3:0:0	3	3

Total Contact Hours= 33
Total Credits Hours= 30

PROGRAMME CODE- UG059

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I. Theory Subjects

S. No.	Type	Subject Code	Subject Name	Contact hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PC	CSE352	Internet web Programming	4:0:0	4:0:0	4	4
2	PC	CSE354	Software Engineering	4:0:0	4:0:0	4	4
3	PC	CSE356	Programming in Java	4:0:0	4:0:0	4	4
4	PE		Professional Elective-III	3:0:0	3:0:0	3	3
5	MDC/ HS	MDC018	**Gender, Culture &Development**	3:0:0	3:0:0	3	3
6	PC	CSR302	Open Source Technologies	4:0:0	4:0:0	4	4

II. Practical Subjects

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PC	CSR304	Open Source Technologies Laboratory	0:0:2	0:0:1	2	1
2	PC	CSE382	Internet web Programming Laboratory	0:0:2	0:0:1	2	1
3	PC	CSE384	Programming in Java Laboratory	0:0:2	0:0:1	2	1
4	EMC	EMC312	Entrepreneurship Mindset & Curriculum-VI (Mandatory course by Punjab Government)	0:0:4	0:0:2	4	2

III. Professional Elective-III

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PE	CSR306	Digital Forensics and Cyber Crime Investigation	3:0:0	3:0:0	3	3
2	PE	CSE322	Distributed Systems	3:0:0	3:0:0	3	3
3	PE	CSE324	Wireless Communications	3:0:0	3:0:0	3	3
4	PE	CSE326	Blockchain	3:0:0	3:0:0	3	3
5	PE	CSE376	Advanced Data Base Management System	3:0:0	3:0:0	3	3

Note:4 weeks industrial training after3rd year/ 6thsem

Total Credits Hours = 27
Total Contact Hours=32

PROGRAMME CODE- UG059

SEMESTERVII

I. Theory Subjects

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PE		Professional Elective-IV	3:0:0	3:0:0	3	3
2	PC	CSR110	Network Security and Cyber Crime Analysis	4:0:0	4:0:0	4	4
3	PC	CSE403	Cybersecurity	4:0:0	4:0:0	4	4
4	PC	CSR111	DevOps Engineering	4:0:0	4:0:0	4	4
5	OE		Open Elective-III	3:0:0	3:0:0	3	3
6	PC	CSE405	Theory of Computation	4:0:0	4:0:0	4	4

II. Practical Subjects

S. No.	Type	Subject Code	Subject Name	Contact Hours(L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	SEC	*CSE481	Major Project	0:0:4	0:0:4	4	2
2	PC	CSR112	DevOps Engineering Laboratory	0:0:2	0:0:1	2	1
3	PC	CSE361	Computer Graphics Laboratory	0:0:2	0:0:1	2	1
4	SEC-III	CSE485	Four weeks industrial training evaluation (undertaken after 6th sem)	Four Weeks			3

III. Professional Elective-IV

S. No.	Type	Subject Code	Subject Name	Contact Hours(L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PE	CSE451	Cryptography	3:0:0	3:0:0	3	3
2	PE	CSR113	Malware Analysis and Reverse Engineering	3:0:0	3:0:0	3	3
3	PE	CSE455	Natural Language Processing	3:0:0	3:0:0	3	3
4	PE	CSE477	Data Mining in Business Intelligence	3:0:0	3:0:0	3	3
5	PE	CSE459	Computer Graphics	3:0:0	3:0:0	3	3

Total Contact Hours= 30
Total Credits Hours=29

SEMESTER-VIII

I. Practical Subjects

S. No.	Type	Subject Code	Subject Name	Total Credit Hours
1	SEC-IV	CSE466	Six Months Industrial Training	20

Total Credits Hours= 20

List of Open Electives offered by the department

Open-Elective-I

1. Basics of Artificial Intelligence
2. Introduction to Cloud Computing

Open Elective-II

1. Introduction to Operating System
2. Basics of Networking

Open Elective-III

1. Introduction to Digital Marketing
2. Basic Concepts of IOT

Open Elective-IV

1. E-commerce
2. Introduction to Cyber security

1st Semester

PROGRAMME CODE- UG059

Course Code	**CSE111**
Course Title	Introduction to programming in C
Type of Course	ES
L T P	3:0:0
Credits	3
Course Prerequisites	Basic Knowledge about Computers
Course Objective(s)	• Understand the fundamentals of programming and the structure of the C programming language including syntax, variables, and data types. • Develop problem-solving skills using algorithms and flowcharts before implementing programs in C. • Learn control structures such as decision making (if, switch) and looping (for, while, do-while) to create logical programs. • Understand functions, arrays, pointers, and basic file handling concepts to develop structured and modular programs. .
Course Outcome (CO)	The students will be able to: **CO1** Illustrate algorithms and flowcharts and develop basic C programs using variables, operators, and input/output statements. **CO2** Develop C programs using conditional and iterative statements and apply user-defined functions to solve real-time problems. **CO3** Construct C programs using pointers to access and manipulate arrays, strings, and functions efficiently. **CO4** Apply user-defined data types including structures, unions, and enumerations to solve programming problems.

SYLLABUS

UNIT–I

Program Development & Basics: Introduction to Programming, Steps in Program Development (Problem Analysis, Algorithm Design, Coding, Testing & Debugging, Documentation), Algorithms and Flowcharts, Symbol Conventions, Constructing Flowcharts for Problem Solving, Program Debugging Techniques, Common Programming Errors and Debugging Strategies.

UNIT–II

Program Structure and Operators: Structure of a C Program, Input/Output Statements (printf, scanf), Variables and Constants, Data Types (int, float, char), Type Conversion (Implicit and Explicit), Operators (Arithmetic, Relational, Logical, Bitwise, Conditional), Operator Precedence and Associativity, Standard

Libraries (stdio.h, stdlib.h), Basic User-defined Data Types (struct, union).

UNIT–III

Control Structures, Pointers and Functions: Decision Making (if, if–else, nested if, switch), Looping (while, do-while, for), Jump Statements (break, continue, goto), Functions (Declaration, Definition, Prototypes), Introduction to Pointers, Pointer Arithmetic, Parameter Passing (Call by Value, Call by Reference), Recursion, Scope of Variables (Local and Global).

UNIT–IV

Arrays and Structures: Arrays (Single and Multidimensional), Array Initialization and Manipulation, Passing Arrays to Functions, Searching and Sorting Basics, Dynamic Memory Allocation, Pointers with Arrays and Functions, Structures and Unions (Declaration, Initialization, Arrays of Structures, Pointer to Structures), Difference between Structure and Union.

RECOMMENDED BOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1.	Programming in C	Byron Gottfried, Jitender Chhabra	Schuam outline series
2.	Let us C	Yaswant Kanetkar	BPB Publication
3.	A structured programming approach using C	Behrouz Forouzan	Thomas learning

PROGRAMME CODE- UG059

Semester	**I**
Course Code	**MAT171**
Course Title	**Engineering Mathematics-I**
Type of course	BS
L: T: P	4:0:0
Credits	4
Course prerequisite	Students must have knowledge of Basic Mathematics
Course Objective (s)	• Understand the fundamental concepts of differential calculus including limits, continuity, and differentiation of functions. • Apply techniques of differentiation to solve problems related to maxima and minima, curvature, and real-life engineering applications.
Course Outcomes (CO)	At the end of the course, the students will be able to: **CO1**: Understand the concepts of curvature, evolutes, and involutes, and apply definite and improper integrals, including Beta and Gamma functions, to compute areas and volumes of revolutions. **CO2:** Analyze and apply theorems like Rolle's and Mean Value Theorem to functions, evaluate extreme values, and resolve indeterminate forms using L'Hôpital's rule. **CO3**: Understand and apply vector calculus concepts such as scalar and vector fields, Del operator, gradient, divergence, and curl, along with their physical interpretations in mechanics. **CO4:** Evaluate limits of sequences, determine convergence of infinite series using standard tests, and construct Taylor and Maclaurin series with error estimates.

UNIT-I:

Basic Calculus Curvature, evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

UNIT-II:

Single-variable Calculus Rolle's Theorem, Mean value theorems and applications; Extreme values of functions; Linear approximation; Indeterminate forms and Hospital rule. Scalar and vector fields, Differentiation of vectors, Velocity and acceleration, Del, Gradient, Divergence, Curl and their physical interpretation.

UNIT -III:

Sequences and series Limits of sequence of numbers, Calculation of limits, Infinite series; Tests for convergence; Power series, Taylor and Maclaurin series; Taylor theorem, convergence of Taylor series, error estimates.

UNIT-IV:

Multivariable Calculus (Differentiation) Limit, continuity and partial derivatives, directional derivatives, gradient, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers.

RECOMMENDED BOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1.	Advanced Engineering Mathematics	Erwin Kreyszig	John Wiley & Sons
2.	Higher Engineering Mathematics	B. V. Ramana	Tata McGraw Hill
3.	A Textbook of Engineering Mathematics	N. P. Bali and Manish Goyal	Laxmi Publications

PROGRAMME CODE- UG059

Course Code	**AEC0010**
Course Title	**Communication Skills-I**
Type of course	AEC-1
LTP	2:0:0
Credits	2
Course prerequisite	+2 in any stream
Course Objectives (s)	Objectives of the course is to: • Develop **basic communication skills in English** to improve listening, speaking, reading, and writing abilities. • Enhance **vocabulary and grammatical knowledge** to communicate effectively in academic and professional environments.
Course Outcomes	At the conclusion of the course the learner will be able to: CO1 Have fairly good proficiency in reading comprehension. CO2 Have enhanced writing skills and command in official/corporate communication. CO3 Develop confidence in making presentation: oral or documentary. CO4 Develop speaking skills.

SYLLABS

UNIT-I

Basics of Communication Skills: Communication, Process of Communication, Types of Communication-Verbal and Nonverbal communication, Channels of Communication-Upward, Downward, Horizontal, Barriers to Communication, Role of Communication in society.

UNIT-II

Listening Skills: Listening Process, Hearing and Listening, Types of Listening, Effective Listening, Barriers of Effective Listening, Note Taking

Reading Skills: Purpose of reading, Process of reading, reading skills Models and strategies, scanning, skimming, SQ3R, Approaches of Reading, Comprehension passages for practice.

UNIT III

Writing Skills: Purpose of writing, Effective writing, Types of writing, Business Correspondence, Precise writing, Memo writing, minutes of meeting.

UNIT-IV

Speaking Skills: Speech process, Skills of effective speaking, Role of audience, Feedback Skill, Oral Presentation.

RECOMMENDED BOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1.	Effectual Communication Skills	Bhupender Kour	S. K. Kataria & Sons
2.	Communication Skills	R. Datta Roy and K. K. Dheer	Vishal Publishing Company
3.	The Essence of Effective Communication	Ron Ludlow and Fergus Panton	Prentice Hall of India

PROGRAMME CODE- UG059

Course Code	**PHY115**
Course Title	**Engineering Physics**
Type of course	BS
LTP	4:0:0
Credits	4
Course prerequisite	10+2 with physics as core subject.
Course Objective (s)	• Understand the basic concepts of smart materials, their classification, properties, and applications in engineering systems. • Study the principles and characteristics of piezoelectric, electrostrictive, magnetostrictive, and magnetoelectric materials used in smart devices. • Learn the properties and applications of shape memory alloys and smart fluids such as electrorheological (ER) and magnetorheological (MR) fluids. • Understand the working principles of sensors, actuators, and measuring techniques used in smart material based systems.
Course Outcome (CO)	**Students will be able to:** CO1: Gain the knowledge to explain the concept of electronics materials. CO2: Understand the physics of semiconductors and light semiconductor interaction. CO3: illustrate the measurements of carrier density, resistivity and hall mobility using different techniques. CO4: Analyze engineered semiconductor materials and its applications.

Syllabus

UNIT-I

Semiconductors and engineered semi-conductor materials: Intrinsic and extrinsic semiconductors, p-type, and n-type semiconductors; Fermi level in semiconductors; Current conduction in semiconductors, I-V characteristics of p-n junction diode, some special p-n diodes: Zener diode, Tunnel diode, Photo diode, and Light emitting diode. Practical examples of low-dimensional systems such as quantum wells, wires, and dots: design, fabrication, and characterization techniques.

UNIT-II

Magnetic Materials, Nano Materials & Superconductivity: Basic ideas of Dia, Para, Ferro & Ferrimagnetic materials, Ferrites, Hysteresis loop, Magnetic Anisotropy, Superconductivity, Meissner Effect, Type I & Type II superconductors, London Equations, Nano scale, Classifications of nanomaterials (3D, 2D, 1D and 0D), electron confinement, Nanocomposites, Carbon nanotubes (CNTs), Properties of nanomaterials, synthesis of nanomaterials, Applications of nanomaterials.

UNIT-III

EM waves, Dielectrics & Quantum Theory: Physical significance of Gradient, Divergence & Curl, Relationship between Electric Field & Potential, Dielectric polarization, Displacement current, Maxwell's Equations, Need and origin of quantum concept, Wave - particle duality, Matter waves, Group & Phase velocities; Wave function, Uncertainty Principle; Schrodinger wave equations (time independent & dependent); Application to particle in a box.

UNIT-IV

Lasers & Fiber Optics: Concepts of laser, Spontaneous & Stimulated emissions, Einstein's Coefficients, Population Inversion, Pumping Mechanisms, Components of a laser System, Three & four level laser systems;

Ruby, He -Ne, and semiconductor Lasers, Introduction to Holography, Introduction of fiber optics, Acceptance Angle, Numerical Aperture, Modes of propagation in fiber optics, material dispersion & pulse broadening in optical fibers, fiber connectors, splices and couplers, Applications of optical fibers.

RECOMMENDED BOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1.	Engineering Physics	H. K. Malik and A. K. Singh	Tata McGraw Hill
2.	Materials Science and Engineering	V. Raghavan	Prentice Hall of India
3.	Concepts of Modern Physics	Arthur Beiser, S. Mahajan and S. R. Choudhary	Tata McGraw Hill

PROGRAMME CODE- UG059

Course Code	**EVS002**
Course Title	Environmental Education
Type of course	MC
L T P	3:0:0
Credits	NC
Course prerequisite	Nil
Course Objective (s)	• Understand the fundamental concepts of environment and ecosystem, including biodiversity, ecological balance, and the importance of environmental awareness. • Study the causes, effects, and control measures of environmental pollution and understand the importance of sustainable use of natural resources. • Analyze social and environmental issues such as climate change, global warming, environmental ethics, and environmental protection laws. • Develop awareness about human population growth, environmental health, and disaster management, and encourage participation in environmental protection activities.
Course Outcomes (CO)	**CO1** Illustrate the structure and functioning of ecosystems and explain the importance of biodiversity and ecological balance. **CO2** Analyze different types of environmental pollution and natural resource management and identify methods for pollution control. **CO3** Evaluate social issues related to environment, including sustainable development, climate change, environmental legislation, and conservation strategies. **CO4** Apply environmental knowledge in real-life situations through field studies, environmental assessment, and awareness of human health and population issues.

SYLLABUS

UNIT-I

Introduction to Environment and Ecosystem: Definition and scope and importance of multidisciplinary nature of environment. Need for public awareness, Concept of Ecosystem, Structure, interrelationship, producers, Consumers and decomposers, ecological pyramids-biodiversity and importance. Hot spots of biodiversity.

UNIT-II

Environmental Pollution & Natural Resources: Definition, Causes, effects and control measures of air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, nuclear hazards. Solid waste Management: Causes, effects and control measures of urban and industrial waste. Role of an individual in prevention of pollution. Pollution case studies. Disaster Management: Floods, earthquake, cyclone and landslides, Natural Resources and associated problems, use and over exploitation, case studies of forest resources and water resources.

UNIT-III

Social Issues and the Environment: From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rainwater harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns. Case studies. Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies. Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of pollution) Act. Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation.

UNIT-IV

Human Population and the Environment & Field Work: Population growth, variation among nations. Population explosion –Family Welfare Program. Environment and human health, Human Rights, Value Education, HIV/AIDS. Women and child Welfare. Role of Information Technology in Environment and human health. Case studies

Visit to a local area to document environmental assets river/forest/grassland/hill/mountain; Visit to a local polluted site-Urban/Rural/Industrial/Agricultural; Study of common plants, insects, birds; Study of simple ecosystems-pond, river, hill slopes, etc.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**Author(S)**	**Publisher**
1	A Textbook for Environmental Studies	Erach Bharucha	Orient Black Swan
2	Environmental Biology	Agarwal, K.C. 2001	Nidi Publ. Ltd. Bikaner.
3	Environmental Science	Miller T.G. Jr.	Wadsworth

Course Code	**CSE113**
Course Title	**Programming in C practical**
Type of Course	ES
L T P	0:0:2
Credits	1
Course Prerequisites	Basic Knowledge about Computers
Course Objective(s)	• Understand the basic concepts of C programming including input/output operations, variables, data types, and operators through practical implementation. • Develop logical and problem-solving skills using conditional statements, loops, and switch cases in C programs. • Learn modular programming concepts using functions, parameter passing, arrays, pointers, and dynamic memory allocation. • Implement structured programming techniques using structures, unions, and sorting algorithms to solve real-world programming problems.
Course Outcome (CO)	The students will be able to: **CO1** Illustrate the flowchart and to develop C programs. **CO2** Develop conditional and iterative statements to write C programs and exercise user defined functions to solve real time problems **CO3** Inscribe C programs that use Pointers to access arrays, strings and functions. **CO4** Exercise user defined datatypes including structures and unions to solve problems.

SYLLABUS

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Programming using C

- **Input and Output:** Write a program that takes user input for their name and age, then outputs a greeting message with their age.
- **Assignment Operators:** Create a program to calculate the area of a rectangle using assignment operators (+=, -=, *=).
- **Variable Declaration and Initialization:** Write a program to calculate the simple interest, prompting the user for principal amount, rate, and time.
- **Conditional Statements:** Implement a program that determines whether a given number is even or odd using if-else statements.
- **Looping Constructs:** Create a program to find the factorial of a number using for loop.
- **Termination and Iteration Control:** Write a program that reads integers from the user until they enter a negative number using a do-while loop.
- **Switch Statement:** Implement a program that calculates the result of a basic arithmetic operation (+, -, *, /) based on user input using a switch statement.

- **Functions and Global/Local Variables:** Develop a program to find the sum of elements in an array using a function with global and local variables.
- **Function Prototypes and Definitions:** Create a program with function prototypes and definitions to find the maximum of two numbers.
- **Parameter Passing:** Write a program that swaps two numbers using call-by-reference parameter passing.
- **Array Manipulation:** Implement a program to sort an array of integers in ascending order using the bubble sort algorithm.
- **Pointers and Dynamic Memory Allocation:** Develop a program to dynamically allocate memory for an array of integers, input values from the user, and then display the array.
- **Structures**: Create a program to store and display information about a student using a structure.
- **Unions:** Write a program to create a union of different data types and display its values.

BOOKS RECOMMENDED

Sr No	Name	Authors	Publisher
1	Programming in ANSI C	E. Balagurusamy	McGraw-Hill Education
2	The C Programming Language	Brian W. Kernighan & Dennis Ritchie	Pearson
3	C: The Complete Reference	Herbert Schildt	McGraw-Hill

Course Code	ME105
Course Title	**Workshop/Manufacturing Practices**
Type of course	ES
L: T: P	0:0:6
Credits	3
Course Prerequisites	+2 Physics and Mathematics
Course Objectives(s)	• Understand the basic manufacturing processes such as casting, forming, machining, and joining used in engineering industries. • Learn the use of different workshop tools and power tools used in fitting, carpentry, welding, and machine shop operations. • Develop practical skills in various workshop practices including machine shop, welding, casting, smithy, and carpentry. • Understand basic electrical and electronics components and operations used in workshop practice.
Course Outcome (CO)	**CO1:** Understanding different manufacturing techniques and their relative advantages/ disadvantages with respect to different applications with selection of a suitable technique for meeting a specific fabrication need. **CO2:** Acquire a minimum practical skill with respect to the different manufacturing methods and develop the confidence to design and fabricate small components for their project work. **CO3:** Introduction to different manufacturing methods in different fields of engineering. **CO4:** Practical exposure to different fabrication techniques and Creation of simple components using different materials.

LECTURES

1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods
2. Fitting operations and power tools
3. Electrical and Electronics
4. Carpentry
5. Metal casting
6. Welding (arcwelding and gas welding), brazing

WORKSHOP PRACTICE

1. Machine shop
2. Fitting shop
3. Carpentry
4. Electrical and Electronics
5. Welding shop
6. Casting
7. Smithy

Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above.

BOOKS RECOMMENDED

Sr.no.	Name	AUTHOR(S)	PUBLISHER
1.	Workshop Technology	H.S. Bawa	McGraw-Hill Publishing Company Limited
2.	Workshop Technology I, II, III	S.K. Hajra, Choudhary and AK Choudhary	Media Promoters and Publishers Pvt. Ltd., Bombay
3.	Manual on Workshop Practice	K.Venkata Reddy	New Delhi
4.	Basic Workshop Practice Manual	T. Jeyapoovan	Vikas Publishing House (P)Ltd., New Delhi

PROGRAMME CODE- UG059

Course Code	**PHY107**
Course Title	**Engineering Physics Practical**
Type of course	BS
L: T: P	0:0:2
Credits	1
Course prerequisite	10+2 with physics as core subject.
Course Objectives(s)	• Understand the fundamental principles of physics such as magnetism, optics, laser, semiconductors, and crystal structures through laboratory experiments. • Develop practical skills in using scientific instruments such as spectrometer, interferometer, CRO, optical fiber setup, and four probe apparatus. • Study the optical and magnetic properties of materials including diffraction, interference, refractive index, and magnetic field measurements. • Analyse experimental data and verify physical laws related to optics, semiconductor physics, and electromagnetic phenomena.
Course Outcome (CO)	**Students will be able to:** CO1: Measure the Magnetic effects along axis of circular coil, magnetic dipole moment of a bar magnet. CO2: Infer the characteristics, wavelength & diffraction of laser beam using Michels on interferometer, grating elements. CO3: determine numerical aperture, attenuation and propagation losses in optical fiber, various crystal structures, polarizability of a dielectric substance. CO4: Determine the resistivity, band gap of semiconductor materials. .

*__Note:__ Perform at least 12-14 experiments from list of experiments given below.

1. To study the variation of magnetic field with distance along the axis of a circular coil carrying current.
2. To determine the magnetic dipole moment of a bar magnet and horizontal intensity of earth's magnetic field using a deflection galvanometer.
3. To study B-H curve using CRO.
4. To study laser beam characteristics like divergence using diffraction grating aperture.
5. To determine the wavelength of a laser using Michels on interferometer.
6. To study diffraction using laser beam and thus to determine the grating element.

7. To find the refractive index of a material using spectrometer.
8. To find the refractive index of a liquid using a hollow prism and spectrometer.
9. To determine numerical aperture of an optical fiber.
10. To determine attenuation and propagation losses in optical fibers.
11. To study various crystal structures.
12. To find out polarizability of a dielectric substance.
13. To set up and observe Newton's rings.
14. To determine Energy Band Gap of Semiconductor.
15. To determine the number of lines per millimeter of the grating using the green line of the mercury spectrum.
16. To calculate the wavelength of the other prominent lines of mercury by normal incidence method.
17. To find the acceleration of the cart in the simulator (Newton 2nd law)
18. To determine the resistivity of semiconductors by four probe Method.

Text and Reference Books

S. No	Name	Author(S)	Publisher
1	Advanced Practical Physics for students	B.L. Flint & H.T.Worsnop	Asia Publishing House.
2	Advanced level Physics Practical's	Michael Nelson and Jon M.O. gborn	Heinemann Educational Publishers
3	A Textbook of Practical Physics	Indu Prakash and Ramakrishna	Kitab Mahal, New Delhi

PROGRAMME CODE- UG059

2ND SEMESTER

PROGRAMME CODE- UG059

Course Code	**CHM105**
Course Title	Engineering Chemistry
Type of course	BS
L T P	4:0:0
Credits	4
Course prerequisite	NA
Course Objective (CO)	The objectives of engineering chemistry are to relate the students with basic concepts of chemistry. Some new topics have been introduced to the syllabus For the development of the right attitudes by the engineering students to cope with new technology
Course Outcomes	**The course will enable the students to:** CO1: Analyze microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces. Rationalize bulk properties and processes using thermodynamic considerations. CO2: Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques CO3: Rationalize periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity. CO4: List of major chemical reactions that are used in the synthesis of molecules.

SYLLABUS

UNIT-I

Atomic and molecular structure Schrodinger equation. Particle in a box solution and their applications for conjugated molecules and nanoparticles. Forms of the hydrogen atom wavefunctions and the plots of these functions to explore their spatial variations. Molecular orbitals of diatomic molecules and plots of the multi center orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomic. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

UNIT-II

Spectroscopic techniques and applications: Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterization techniques. Diffraction and scattering.

Intermolecular forces and potential energy surfaces: Ionic, dipolar and van der Waals interactions. Equations of state of real gases and critical phenomena. Potential energy surfaces of H_3, H_2F and HCN and trajectories on these surfaces.

UNIT-III

Use of free energy in chemical equilibria: Thermodynamic functions: energy, entropy and free energy

Estimations of entropy and free energy. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Water chemistry. Corrosion. Use offer energy considerations in metallurgy through Ell in Gham diagrams.

Periodic properties: Effective nuclear charge, penetration of orbitals, variations of s, p, d and forbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries.

UNIT-IV

Stereochemistry Representations of 3-dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds. Organic reactions and yn thesis of a drug molecule**:** Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings.

Synthesis of a commonly used drug molecule.

Recommended books:

S. No.	Book Title	Author(s)	Publisher
1	Engineering Chemistry	P. C. Jain & Monica Jain	Dhanpat Rai Publishing Company
2	Engineering Chemistry	S. S. Dara	S. Chand Publishing
3	Engineering Chemistry	B. Sivasankar	Tata McGraw-Hill Education

PROGRAMME CODE- UG059

Semester	II
Course Code	**MAT172**
Course Title	**Engineering Mathematics**
Type of course	BS
LTP	4:0:0
Credits	4
Course prerequisite	+2 with Non-Medical, B. Tech Ist semester
Course Objective	The objective of this course is to familiarize the students with statistical techniques. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.
Course Outcome (CO)	By the end of the course, students will be able to: CO1 understands the notion of probability and random variables and various discrete and continuous probability distributions and their properties. CO2 applies the basics of statistics including measures of central tendency, correlation and regression in the problems related to the discipline. CO3 uses statistical methods of studying data samples. CO4**:** Apply vector calculus concepts such as gradient, divergence, and curl in physical and engineering problems.

SYLLABUS

UNIT-I

Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Correlation coefficient, Chebyshev's Inequality.

UNIT-II

Continuous random variables and their properties, distribution functions and densities, normal, exponential and gamma densities. Bivariate distributions and their properties, distribution of sums and quotients, conditional densities, Bayes' rule.

UNIT-III

Measures of Central tendency: Moments, skewness and Kurtosis–Probability distributions: Binomial, Poisson and Normal – evaluation of statistical parameters for these three distributions, Correlation and regression–Rank correlation.

UNIT-IV

Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: large sample test for single proportion, difference of mean, difference of means and correlation coefficients, test for ratio of variances–Chi-square test for goodness of fit and independence of attributes.

Recommended books:

S.No	Book Title	Author	Publisher
1	Higher Engineering Mathematics	B. S. Grewal	Khanna Publishers
2	Advanced Engineering Mathematics	Erwin Kreyszig	Wiley

PROGRAMME CODE- UG059

Course Code	**ME101**
Course Title	**Engineering Graphics and Design**
Type Of Course	ES
L T P	2:0:2
Credits	4
Course Prerequisites	Basic Mathematics
Course objectives	To familiarize with various AC, DC circuits, Transformer, Electrical Machine and Measuring Instruments.
Course Outcome (CO)	By the end of the course, students will be able to: CO1: Get exposure to common electrical components and their ratings. CO2: Make electrical connections with wires of appropriate ratings. CO3: Understand the usage of common electrical measuring instruments. CO4: Understand the basic characteristics of transformers and electrical machines.

SYLLABUS

UNIT-I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales.

Orthographic Projections: Principles of Orthographic Projections-Conventions – Projections of Points and lines inclined to both planes; Projections of planes inclined Planes – Auxiliary Planes.

UNIT-II

Projections of Regular Solids: Inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include windows, doors, and fixtures such as WC, bath, sink, shower, etc.

Sections and Sectional Views of Right Angular Solids Covering:

Prism, Cylinder, Pyramid, **Cone – Auxiliary Views; Development of surfaces of Right Regular Solids**

- Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only).

UNIT-III

Isometric Projections: Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions.

Overview of Computer Graphics: listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids].

UNIT-IV

Customization & CAD Drawing: consisting of set up of the drawing page and the printer, including scale settings, setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles.

Annotations, layering & other Functions: applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies. Parametric and non-parametric solid, surface, and wireframe models. Part editing and two-dimensional documentation of models. Planar projection theory, including sketching of perspective, isometric, Multiview, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerancing techniques; dimensioning and scale multi views of dwelling.

Demonstration of a Simple Team Design Project that Illustrates: Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; meshed topologies for engineering analysis and tool-path generation for component manufacture; geometric dimensioning and tolerancing; Use of solid-modeling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying color coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM).

Recommended books:

S.No	**Name**	**Author(s)**	**Publisher**
1.	Engineering Drawing	Bhatt N.D., Panchal V.M. & Ingle P.R., (2014)	Charotar Publishing House
2.	Engineering Drawing and Computer Graphics	Shah, M.B. & Rana B.C. (2008)	Pearson Education
3.	Engineering Graphics	Agrawal B. & Agrawal C. M. (2012)	TMH Publication

4.	Textbook on Engineering Drawing	Narayana, K.L. & P Kannaiah (2008)	Scitech Publishers

Course Code	**EE102**
Course Title	**Basic Electrical Engineering**
Type Of Course	ES
L T P	3:0:0
Credits	3
Course Prerequisites	Physics & Mathematics
Course objectives	To familiarize with AC, DC circuits & their fundamentals, Magnetic circuits & Transformer, Electrical Machines and Measuring Instruments
Course Outcome (CO)	By the end of the course, students will be able to: CO1: Understand basic electrical concepts and circuit laws. CO2: Learn analysis of DC and AC electrical circuits. CO3: Study working principles of electrical machines and transformers. CO4: Understand electrical measuring instruments and power systems basics.

SYLLABUS

UNIT-I

DC Circuits: Electrical circuit elements (R, Land C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

UNIT-II

AC Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-III

Transformers: Magnetic materials, BH characteristics, ideal and practical transformers, equivalent circuit, losses in transformers, regulation and efficiency. Auto transformer and three-phase transformer connections.

UNIT-IV

Electrical Machines: Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motors. Construction and working of synchronous generators.

Power Converters: DC-DC buck and boost converters, duty ratio control. Single-phase and three-phase voltage source inverters; sinusoidal modulation.

Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Recommended books:

S.No	Name	Author(s)	Publisher
1.	Basic Electrical Engineering	D.P.KothariandI.J. Nagrath	Tata Mc Graw Hill,2010
2.	Basic Electrical Engineering	D.C. Kulshreshtha	McGrawHill,2009
3.	Fundamentals of Electrical Engineering	L S. Bobrow	OxfordUniversityPress,2011
4.	Electrical and Electronics Technology	E Hughes	Pearson,2010
5.	PrenticeHallIndia,1989	Electrical Engineering Fundamentals	V.D. Toro

PROGRAMME CODE- UG059

PROGRAMME CODE- UG059

Course Code	**MDC023**
Course Title	**Indian Knowledge System**
Type of Course	MC
L T P	3:0:0
Credits	3
Course Prerequisites	NA
Course Objective(s)	1. Comprehend the core principles of the Indian knowledge system, including health, spirituality, and cultural preservation. 2. Explore the contributions of ancient Indian mathematicians to number systems, geometry, and astronomy.
Course Outcome (CO)	The students will be able to: CO1: Understand the philosophy, principles, and historical development of Indian Knowledge Systems. CO2: Recognize the contributions of ancient Indian sciences, mathematics, medicine, and technology. CO3: Appreciate the integration of traditional knowledge with modern scientific concepts. CO4: Analyze the role of ethics, values, and sustainability in Indian Knowledge Systems.

SYLLABUS

UNIT 1:

Overview of Indian Knowledge System: Introduction to Indian knowledge system, its uniqueness; Vedic literature: Rigveda, Samaveda, Yajurveda, Atharvaveda; Ayurveda: holistic health principles, natural remedies; Yoga, meditation: physical, mental well-being; Art, architecture: monuments, preservation of cultural heritage.

UNIT 2:

Scientific and Mathematical Contributions: Introduction to science and math; Ancient Indian mathematicians: Aryabhata, Brahmagupta, Bhaskara; Number systems, invention of zero, basic arithmetic; Geometry, trigonometry: shapes, angles, trigonometric ratios; Astronomy, calendar systems, ancient Indian discoveries.

UNIT 3:

Simple Philosophical Ideas: Importance of Kindness, Power of Imagination, Respect for Nature, Golden Rule, Mindfulness and Self-awareness, Curiosity and Asking Questions, Journey of Learning, Gratitude and Appreciation, Value of Friendship, Power of Positive Thinking, Existence of Truth, Ethics and Morality, Importance of Justice, and Nature of Reality

UNIT 4:

Art, Culture, and Society Made Simple: Traditional Indian Festivals, Indian Folk Dances, Indian Classical Music, Indian Clothing Styles, Indian Cuisine, Indian Mythology, Traditional Indian Art Forms, and Historical Monuments, Languages of India, and Indian Wildlife and Nature, Family Structure in India, Caste System, Education System, Indian Weddings, Role of Women in Indian Society, Religious Diversity, Rural vs. Urban Life, Social Issues, Traditional Occupations, and

Community Celebrations.

Recommended Books:

S.No	Books	Authors	Publisher
1	Introduction to Indian Knowledge Systems: Concepts and Applications	B. Mahadevan, Vinayak Rajat Bhat, Nagendra Pavana	PHI Learning Pvt. Ltd.
2	Indian Knowledge System (Bhartiya Gyan Parampara)	N. M. Khandelwal, Pratapsinh Chauhan	Himalaya Publishing House

PROGRAMME CODE- UG059

Course Code	**CHM107**
Course Title	**Engineering Chemistry Practical**
Type of course	BS
LTP	0:0:2
Credits	1
Course Objectives	The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering.
Course Outcome (CO)	The students will learn to: 1. Estimate rate constant of reactions from concentration of reactants/products as a function of time 2. Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc. 3. Synthesize a small drug molecule and analyze a salt sample.

SYLLABUS

List of Experiment (Choice of 10-12 experiments from the following)

Determination of surface tension and viscosity of liquids. Determination of viscosity of oil by means of Red Wood Viscometer.

Thin layer chromatography: Determination of Rf value of a mixture by TLC. Separation of methyl orange and phenolphthalein from given mixture by paper chromatography.

Ion exchange column for removal of hardness of water/Determination of total hardness of water by EDTA method.

Determination of Total Residual Chlorine in water sample. Colligative properties using freezing point depression Determination of the rate constant of a reaction Determination of cell constant and conductance of solutions. Potentiometry-determination of redox potential sand emfs:

Determine the strength of a solution pH metrically.

Synthesis of a polymer/drug: Preparation of Urea Formaldehyde Resin.

Synthesis of paracetamol

To bring catalyzed condensation or to prepare a pure sample of dibenzl propane Saponification/acid value of an oil

. Chemical analysis of salt

. Lattice structures and packing of spheres

. Models of potential energy surfaces

. Chemical oscillations-Iodine clock reaction

. Determination of the partition coefficient to of a substance between two immiscible liquids

PROGRAMME CODE- UG059

Course Code	**EE104**
Course Title	**Basic Electrical Engineering Laboratory**
Type Of Course	ES
L T P	0 0 2
Credits	1
Course Pre-requisites	Basics of Electrical Engineering
Course objectives	To familiarize with various AC, DC circuits, Transformer, Electrical Machine and Measuring Instruments
Course outcome (CO)	**By the end of the course, students will be able to:** CO1: Get exposure to common electrical components and their ratings. CO2: Make electrical connections with wires of appropriate ratings. CO3: Understand the usage of common electrical measuring instruments. CO4: Understand the basic characteristics of transformers and electrical machines. CO5: Get exposure to the working of power electronic converters.

Adsorption of acetic acid by charcoal

Recommended Books:

S. No.	Book Title	Author(s)	Publisher
1	Engineering Chemistry Practical	Dr. R. K. Bansal	Firewall Media

SYLLABUS

LIST OF EXPERIMENTS/DEMONSTRATIONS:

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi meter, oscilloscope. Real-life resistors, capacitors, and inductors.
2. Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to a step change in voltage (transient may be observed on a storage oscilloscope). Sinusoidal steady-state response of R-L and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Resonance in R-L-C circuits.
3. Transformers: Observation of the no-load current waveform on an oscilloscope (non-sinusoidal wave-shape due

to B-H curve nonlinearity should be shown along with a discussion about harmonics). Loading of a transformer: measurement of primary and secondary voltages and currents, and power.

4. Three-phase transformers: Star and Delta connections. Voltage and current relationships (line-to-line voltage, phase-to-neutral voltage, line and phase currents). Phase-shifts between the primary and secondary side. Cumulative three-phase power in balanced three-phase circuits.
5. Demonstration of cut-out sections of machines: DC machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winding – slip ring arrangement), and single-phase induction machine.
6. Torque-speed characteristic of separately excited DC motor.
7. Synchronous speed of two- and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connections. Torque-slip characteristic of an induction motor. Generator operation of an induction machine driven at super-synchronous speed.
8. Synchronous machine operating as a generator: stand-alone operation with a load. Control of voltage through field excitation.
9. Demonstration of: (a) DC-DC converters, (b) DC-AC converters – PWM waveform, (c) use of DC-AC converter for speed control of an induction motor, and (d) components of LT switchgear.

Recommended Books:

S. No.	Book Title	Author(s)	Publisher
1	Basic Electrical Engineering Laboratory Manual	V. K. Mehta & Rohit Mehta	S. Chand Publishing
2	Electrical Engineering Laboratory Manual	P. K. Sen	McGraw-Hill Education

PROGRAMME CODE- UG059

3rd Semester

PROGRAMME CODE- UG059

PROGRAMME CODE- UG059

Course Code	CSE247
Course Title	Digital Communication and Networks
Type of Course	PC
L:T:P	4 0 0
Credits	4
Course Prerequisites	Basic knowledge of computers and their components.
Course Objectives	This subject gives basic knowledge to analyze architecture and Computational designs and synthesize new and better architectures.
Course Outcome (CO)	The learner will be able to- 1. Understand basics of computer network 2. Describe ISO-OSI reference model 3. Explain various layers of OSI model 4. Implement and demonstrate networking

SYLLABUS

UNIT-I

Data Communication System and its components, Data Flow, Computer network and its goals, Types of computer networks: LAN, MAN, WAN, Wireless and wired networks, broadcast and point to point networks, Network topologies, Network software: concept of layers, protocols, interfaces and services, ISO-OSI reference model, TCP/IP reference model.

UNIT-II

Data signals, analog vs. digital signals, and basic signal impairments like noise and bandwidth and data rate. Limits: Nyquist formula, Shannon Formula, Multiplexing, Introduction to Transmission Media, Switching.

Data Link Layer: Design issues, Framing, Error detection and correction codes: checksum, CRC, hamming code, Data link protocols for noisy and noiseless channels, Sliding Window Protocols: Stop & Wait ARQ, Go back-N ARQ, Selective repeat ARQ, Data link protocols: HDLC and PPP. Medium Access Sub-Layer: Static and dynamic channel allocation, Random Access: ALOHA, CSMA protocols, Controlled Access: Polling, Token Passing, IEEE802.3 frame format, Ethernet cabling, Manchester encoding, collision detection in 802.3, Binary exponential back off algorithm.

UNIT-III

Network Layer: Design issues, IPv4 classful and classless addressing, subnetting, Routing algorithms: distance vector and link state routing, Congestion control: Principles of Congestion Control, Congestion prevention policies, Leaky bucket and token bucket algorithms. Transport Layer: Elements of transport protocols: addressing, connection establishment and release, flow control and buffering, multiplexing and de-multiplexing, crash recovery, introduction to TCP/UDP protocols and their comparison.

UNIT-IV

Application Layer: World Wide Web (WWW), Domain Name System (DNS), E-mail, File Transfer Protocol (FTP), Introduction to Network security

RECOMMENDED BOOKS			
Sr. No.	**Name**	**Author**	**Publisher**
1.	Communication Networks: Fundamentals and Concepts and Key Architectures	Leon Garrcia and IndraWidjaja	TMH
2.	Computer Networks.	A.S. Tanenbaum	PHI

PROGRAMME CODE- UG059

Course Code	CSE253
Course Title	Data structure and Algorithms
Type of Course	PC
L:T:P	4:0:0
Credits	4
Course Prerequisites	Basic knowledge of C language and C++ language
Course Objectives	This course provides a thorough understanding of the Linear and Non-Linear Data Structures in solving problems and to give the idea of the efficiency of various algorithms.
Course Outcome (CO)	The learner will be able to– 1. For a given algorithm student will be able to analyze the algorithms to determine the time and computation complexity and justify the correctness. 2. For a given Search problem (Linear Search and Binary Search) student will be able to implement it. 3. For a given problem of Stacks, Queues and linked list student will be able to implement it and analyze the same to determine the time and computation complexity. 4. Student will be able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity. 5. Student will be able to implement Graph search and traversal algorithms and determine the time and computation complexity.

SYLLABUS

UNIT-I

Introduction: Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time Space trade off. Searching: Linear Search and Binary Search Techniques and their complexity analysis.

UNIT-II

Stacks and Queues: ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation– corresponding algorithms and complexity analysis. ADT queue, Types of Queues: Simple Queue, Circular Queue, Priority Queue; Operations on each type of Queues: Algorithms and their analysis.

UNIT-III

Linked Lists: Singly linked lists: Representation in memory, algorithms of several operations: traversing, searching, insertion into, deletion from linked list; linked representation of Stack and Queue, header nodes, doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations, their algorithms and the complexity analysis.

Trees: Basic tree terminologies, different types of trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; tree operations on each of the trees and their algorithms with complexity analysis. Applications for Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.

UNIT-IV

Sorting and Hashing: Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; performance and comparison among all the methods, Hashing.

Graph: Basic terminologies and representations, graph search and traversal algorithms, and complexity analysis.

RECOMMENDED BOOKS

Sr. No.	Name	Author	Publisher
1.	Fundamentals of Data Structures	Illustrated Edition by Ell is Horowitz,Sartaj Sahni	Computer Science Press
2.	Algorithms,Data Structures, and ProblemSolvingwithC++	Illustrated Edition by M arkAllenWeiss	Addison- Wesley Publishing Company
3.	How to Solve it by Computer	2ndImpression by R.G.Dr omey	Pearson Education

PROGRAMME CODE- UG059

Course Code	CSE255
Course Title	Operating Systems
Type of Course	PC
L:T:P	4:0:0
Credits	4
Course Prerequisites	Overview of Computer Architecture
Course Objectives	To learn the fundamentals of Operating Systems. 1. To learn the mechanisms of OS to handle processes and threads and their communication. 2. To learn the mechanisms involved in memory management in contemporary OS. 3. To gain knowledge on distributed operating system concepts that include architecture, mutual exclusion algorithms, deadlock detection algorithms, and agreement protocols. 4. To know the components and management aspects of concurrency management. 5. To learn to implement simple OS mechanisms.
Course Outcome (CO)	The learner will be able to- 1. Create processes and threads. 2. Develop algorithms for process scheduling for a given specification of CPU utilization, throughput, turnaround time, waiting time, and response time. 3. For a given specification of memory organization, develop techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time. 4. Design and implement file management system. 5. For a given I/O devices and OS (specify), develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers.

SYLLABUS

UNIT-I

Introduction: Operating Systems functions, Types of operating systems, Multi programming systems, Batch systems, Time-sharing systems, Operating system operations, Special purpose operating systems, distributed systems, Different computing environments.

UNIT-II

Operating System Organization: Processor and user modes, user operating system interface, Kernels, System calls and its types, System programs, Operating system structures, Virtual machines.

Process Management: Process states, Process Scheduling, Process hierarchy, Threads, Threading issues, Multi-threading models, Non-pre-emptive and pre-emptive scheduling algorithms, Concurrent processes, Critical section, Semaphores, methods for inter-process communication, Deadlocks.

UNIT-III

Memory Management: Physical and virtual address space, Memory allocation strategies, Paging, Segmentation, Virtual memory and Demand paging, Page replacement algorithms.

File and I/O Management: Directory structure, File operations, Files system mounting, File allocation methods, Device management, Disk scheduling algorithms.

UNIT-IV

OS and Security: Security breaches, types of attacks, attack prevention methods, security policy and access control, OS design considerations for security, access control lists and OS support, internet and general network security, Policy mechanism, Program, network and system threats, Authentication.

Case Study: UNIX and LINUX operating systems

RECOMMENDED BOOKS			
Sr. No.	**Name**	**Author**	**Publisher**
1.	Fundamentals of Data Structures	Illustrated Edition by Ell is Horowitz,Sartaj Sahni	Computer Science Press
2.	Algorithms,Data Structures, and ProblemSolvingwithC++	Illustrated Edition by M arkAllenWeiss	Addison- Wesley Publishing Company
3.	How to Solve it by Computer	2ndImpression by R.G.Dr omey	Pearson Education

PROGRAMME CODE- UG059

Course Code	CSR201
Course Title	Blockchain and Modern Cryptography
Type of Course	PC
L:T:P	4:0:0
Credits	4
Course Prerequisites	NA
Course Objectives	1. To understand the concepts of block chain technology 2. To understand the consensus and hyper ledger fabric in block chain technology.
Course Outcome (CO)	1. State the basic concepts of block chain 2. Paraphrase the list of consensus and Demonstrate and Interpret working of Hyper ledger Fabric 3. Implement SDK composer tool and explain the Digital identity for government

Syllabus

UNIT - I

History: Digital Money to Distributed Ledgers -Design Primitives: Protocols, Security, Consensus, Permissions, Privacy- : Block chain Architecture and Design-Basic crypto primitives: Hash, Signature Hash chain to Block chain-Basic consensus mechanisms.

UNIT – II

Requirements for the consensus protocols-Proof of Work (PoW)-Scalability aspects of Block chain consensus protocols: Permissioned Block chains-Design goals-Consensus protocols for Permissioned Block chains.

UNIT – III

Decomposing the consensus process-Hyper ledger fabric components-Chain code Design and Implementation: Hyper ledger Fabric II:-Beyond Chain code: fabric SDK and Front End-Hyper ledger composer tool.

UNIT – IV

Block chain in Financial Software and Systems (FSS): -Settlements, -KYC, -Capital Markets-Insurance- Block chain in trade/supply chain: Provenance of goods, visibility, trade/supply chain finance, invoice management/discounting. Block chain for Government: Digital identity, land records and other kinds of record keeping between government entities, public distribution system / social welfare systems: Block chain Cryptography: Privacy and Security on Block chain.

RECOMMENDED BOOKS			
Sr. No.	**Name**	**Author**	**Publisher**
1.	Block chain: Ultimate guide to understanding block chain, bit coin, crypto currencies, smart contracts and the future of money	Mark Gates	Wise Fox Publishing and Mark Gates 2017
2.	Hands-On Block chain with Hyper ledger: Building decentralized applications with Hyperledger Fabric and Composer	Salman Baset, Luc Desrosiers, Nitin Gaur, Petr Novotny, Anthony O'Dowd, Venkatraman Ramakrishna	Packt Publishing
3.	Mastering Bitcoin: Unlocking Digital Crypto currencies	Andreas Antonopoulos	O'Reilly Media

PROGRAMME CODE- UG059

Course Code	CSE259
Course Title	Object Oriented Programming with C++
Type of Course	PC
L:T:P	4:0:0
Credits	4
Course Prerequisites	Basic Knowledge about Computers
Course Objectives	To gain experience about structured programming. To help students to understand the implementation of Programming language. To understand various features in Programming Language
Course Outcome (CO)	**The students will be able to:** 1. Understand how C++ improves C with object-oriented features. 2. Learn how to write inline functions for efficiency and performance. 3. Learn the syntax and semantics of the C++ programming language. 4. Learn how to design C++ classes for code reuse.

SYLLABUS

UNIT-I : Basics: Introduction to C++, Tokens, Identifiers, data types, control statements, functions, array, structure, union, pointers. Classes and Objects: Classes, Structures and Classes, Unions and Classes are Related, Friend Functions, Friend Classes, Inline Functions, Constructors and its types, Static Class Members, When Constructors and Destructors are Executed, Scope Resolution Operator, Nested Classes, Local Classes, Passing and Returning Objects, Object Assignment Arrays, Pointers, References and the Dynamic Allocation: Arrays of Objects, Pointers, References, Dynamic Allocation Operators, The Placement Forms of new and delete.

UNIT-II : Function Overloading and Default Arguments: Function Overloading, Overloading Constructor Functions, Finding the Address of an Overloaded Function, Overload Anachronism, Default Arguments, Function Overloading and Ambiguity. Operator Overloading: Creating Member Operator Function, Overloading Using a Friend Function, Overloading new delete, Overloading Special Operators & Comma Operator.

UNIT-III: Inheritance: Base-Class Access Control, Inheritance and protected members, Inheriting Multiple Base Classes, Constructors, Destructors and Inheritance, Granting Access, Virtual Base Classes. Virtual Functions & Polymorphism: Virtual Functions, The Virtual Attribute is inherited, Virtual Functions are Hierarchical, Pure Virtual Functions, Using Virtual Functions, Early VsLate Binding. Templates: Generic Functions, Applying Generic Functions, Generic Classes, Typename and Export Keywords, Power of Templates.

UNIT – IV: Exception Handling: Fundamentals, Derived-Class Exceptions, Options, Terminate () and Unexpected (), uncaught_exception(), exception and bad_exception Classes, Applying ExceptionHandling. The C++ I/O System

Basics: Old Vs. Modern C++ I/O, Streams, Stream Classes, Formatted I/O,Overloading << and >>, Creating Manipulators

RECOMMENDED BOOKS

Sr. No.	Name	Author	Publisher
1	Object Oriented Programming with C++	E. Balaguruswamy	Tata Mc. Graw Hil
2	Object Oriented Programming with C++	R.Lafore	Galgotia Publications

Course Code	CSE263
Course Title	Data Structure and Algorithms Laboratory
Type of Course	PC
L:T:P	0 0 2
Credits	1
Course Prerequisites	Knowledge of C++ Programming Language
Course Objectives	Allows the students to understand the implementation of data structures.
Course Outcome (CO)	The learner will be able to – 1. Design and analyze the time and space efficiency of the data structure. 2. Identify the appropriate data structure for given problem. 3. Gain practical knowledge on the applications of data structures.

Laboratory Experiments-

1: Sequential Arrays

1.1: Insert a new element at end as well as at a given position.

1.2: Delete an element from a given array whose value is given or whose position is given.

1.3: To find the location of a given element.

1.4: To display the elements of the linear array.

2: Linear Linked Lists

2.1: Insert a new element.

2.2: Delete an existing element.

2.3: Search an element.

2.4: Display all the elements.

3: Stacks and Queues

3.1: Program to demonstrate the use of stack.

3.2: Program to demonstrate the implementation of various operations on a linear queue represented using a linear array.

3.3: Program to demonstrate the implementation of various operations on a circular queue represented using a linear array.

3.4: Program to demonstrate the implementation of various operations on a queue represented using a linear linked list (linked queue).

4: Sorting and Searching

4.1: Program to sort an array of integers in ascending order using bubble sort.

4.2: Program to sort an array of integers in ascending order using selection sort.

4.3: Program to sort an array of integers in ascending order using insertion sort.

4.4: Program to demonstrate the use of linear search to search a given element in an array.

4.5: Program to demonstrate the use of binary search to search for a given element in a sorted array in ascending order.

RECOMMENDED BOOKS			
Sr. No.	**Name**	**Author**	**Publisher**
1.	Practical Data Structures Using C ::Beginner's Easy	Harry H. Chaudhary	Createspace LLC USA
2.	Object Oriented Programming with C++	Balaguruswamy	Tata Mc Graw-Hill Education
3.	Data Structures through C++	Yashavant P. Kanetkar	BPB Publications

PROGRAMME CODE- UG059

Course Code	CSE267
Course Title	Operating System Laboratory
Type of Course	PC
L:T:P	0:0:2
Credits	1
Course Prerequisites	Knowledge of Operating System, DOS Commands
Course Objectives	To provide understanding of the operating system operation and inter-process communication.
Course Outcome (CO)	The learner will be able to: 1. Understand and execute basic commands of shell script. 2. Apply basic operations in shell scripts which are required for different applications. 3. Identify and understand the concept of file systems in shell script. 4. Apply the concept of creating a new process from a parent process.

LIST OF PRACTICALS

1. Simulation of the CPU scheduling algorithms:

   a) Round Robin
   b) SJF
   c) FCFS
   d) Priority

2. Simulation of continuous memory management allocation techniques:

   a) First Fit
   b) Bes tFit
   c) Wors tFit

3. Simulation of page Replacement Algorithms:

   a) FIFO
   b) LRU
   c) OPT

4. Simulation of file allocation Strategies:

   a) Sequential
   b) Indexed
   c) Linked

5. Simulation of file organization techniques:

   a) Single Level Directory

RECOMMENDED BOOKS			
Sr. No.	**Name**	**Author**	**Publisher**
1.	Practicing Handbook for Operating System Laboratory	Sathish Kumar Ravichandran, Archana Sasi	BP International
2.	Operating Systems Lab	Luna Cole	Venus Publications
3.	Operating Systems: Design and Implementation	Andrew S. Tanenbaum	Prentice Hall / Pearson

PROGRAMME CODE- UG059

Course Code	CSE269
Course Title	Digital Communication and Networks Laboratory
Type of Course	PC
L:T:P	0 0 2
Credits	1
Course Prerequisites	Basic Knowledge of infrastructure components, design infrastructure including devices, topologies and protocols.
Course Objectives	This practical coursework allows the students to efficiently design a working software model.
Course Outcome (CO)	To make students proficient in understanding Network components, Topologies and implementing Network protocols.

SYLLABUS

1: Specification, Familiarization of Networking Components & devices.

1.1: Specification of laptop & computers.

1.2: Familiarization of Networking Components & devices: LAN adapter, Hub, Switches, Routers.

2: Familiarization with transmission media & tools, Preparing cables.

2.1: Coaxial cable, UTP Cable, Coaxial cable, UTP Cable.

2.2: Preparing straight cable & cross cable.

3: Study of topology, Study of TCP/IP Protocol.

3.1: Study of LAN topology & their creation using N/W devices, cables & computers.

3.2: Configuration of TCP/IP protocol in windows & LINUX.

4: Addressing, File & Printer sharing.

4.1: Implementation of file & printer sharing.

4.2: Designing & implementing class A, B, C network.

5: Subnet planning, FTP Server, TCP/UDP

5.1: Subnet planning & implementation.

5.2: Installation of FTP server & client.

5.3: Study of TCP/UDP performance.

RECOMMENDED BOOKS			
Sr. No.	**Name**	**Author**	**Publisher**
1.	A+ Guide to PC Hardware Maintenance and Repair, Volume 1	Michael W. Graves	Cengage Learning
2.	Practical TCP/IP and Ethernet Networking.	Deon Reynders, Edwin Wright	Newnes

Course Code	CSE265
Course Title	Object Oriented Programming using C++ Laboratory
Type of Course	PC
L:T:P	0:0:2
Credits	1
Course Prerequisites	Knowledge of C++ Programming Language Concepts
Course Objectives	This course is to help the students to give the practical implementation of the C++ programs
Course Outcome (CO)	**The learner will be able to –** 1. Design a program using member functions in and out of the class. 2. Write a program to demonstrate use of Constructors and Destructors. 3. Implement operator overloading through C++ programming. 4. Demonstrate Inheritance and polymorphism in real-world problems using C++.

List of Experiments

1: Classes and Objects

1.1: Write a program that uses a class where the member functions are defined inside a class.

1.2: Write a program that uses a class where the member functions are defined outside a class.

1.3: Write a program to demonstrate the use of static data members.

1.4: Write a program to demonstrate the use of const data members.

2: Constructors and Destructors

2.1: Write a program to demonstrate the use of zero-argument and parameterized constructors.

2.2: Write a program to demonstrate the use of dynamic constructors.

2.3: Write a program to demonstrate the use of explicit constructors.

3: Operator Overloading

3.1: Write a program to demonstrate the overloading of increment and decrement operators.

3.2: Write a program to demonstrate the overloading of binary arithmetic operators.

3.3: Write a program to demonstrate the overloading of memory management operators.

4: Typecasting

4.1: Write a program to demonstrate the typecasting of basic type to class type.

4.2: Write a program to demonstrate the typecasting of class type to basic type.

4.3: Write a program to demonstrate the typecasting of class type to class type.

5: Inheritance

5.1: Write a program to demonstrate multilevel inheritance.

5.2: Write a program to demonstrate multiple inheritances.

5.3: Write a program to demonstrate the virtual derivation of a class.

6: Polymorphism

6.1: Write a program to demonstrate the runtime polymorphism.

7: Exception Handling

7.1: Write a program to demonstrate exception handling.

8: File Handling

8.1: Write a program to demonstrate the reading and writing of mixed types of data.

8.2: Write a program to demonstrate the reading and writing of objects.

PROGRAMME CODE- UG059

Sr. No.	Name	Author	Publisher
1	Object Oriented Programming in C++	LaforeR.	Waite Group
2	Object Oriented Programming with C++	E.Balagurus wamy	Tata McGrawHill

Course Code	CSE271
Course Title	Four Weeks Industrial Training Evaluation (Undertaken after 2nd semester)
Type of Course	SEC
L:T:P	
Credits	3
Course Prerequisites	Basics of programming and software development
Course Objectives	To enhance programming skills of a learner, so that the learner finds solutions to problems. He also gets industrial experience of software development
Course Outcome (CO)	The learner will be able to 1. implement software using proper software life cycle models 2. works with the latest IT tools 3. Develop team leadership

The four weeks industrial training will give exposure to the practical aspects of the discipline, in the real-time working scenario. In addition, the student may also workon a specified task or project which may be assigned to him/her, by the industry person. The student will maintain the daily diary which will have the signature of an industry expert, assigned to him/ her. This daily diary will be produced by the student during practical examinations, as and when scheduled by the institute. The department will evaluate student performance based on his/her project report, running software code, CD containing code and daily diary.

PROGRAMME CODE- UG059

PROGRAMME CODE- UG059

4th Semester

PROGRAMME CODE- UG059

Course Code	**MAT272**
Course Title	**Discrete Mathematics**
Type of Course	BS
L T P	4:0:0
Credits	4
Course Prerequisites	+2 in any stream
Course objective(s)	
Course Outcome (CO)	The students will be able to: 1. Use logical notation. 2. Perform logical proofs. 3. Apply recursive functions and solver Currence relations. 4. Determine equivalent logic expressions

SYLLABUS

UNIT-I

Set, Relations, Functions: Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and Uncountable Sets, Cantor diagonal argument and The Power Set theorem. Proof Methods and Strategies: Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency, Case analysis, Induction.

UNIT-II

Modular Arithmetic and Combinatorics: Extended Euclid's Greatest Common Divisor algorithm, The Fundamental Theorem of Arithmetic, Modular arithmetic, Coprimality (or Euler's totient function), Chinese Remainder Theorem. Permutation & Combination, Inclusion- Exclusion, pigeon-hole principle, Generating functions, Recurrence.

UNIT-III

Graphs and Logics: Connected components, Paths, Cycles, Trees, Hamiltonian/ Eulerian Walks, Colouring, Planarity, Matching .Languages of Propositional logic and First-order logic, expressing natural language sentences in languages of propositional and first-order logic, expressing natural language predicates in the language of first-order logic. Semantics of First- order logic: interpretation and its use in evaluating a formula.

UNIT-IV

Algebra & Discrete Probability: Group, Permutation Groups, Cosets, Normal Subgroups, Ring, Field, Finite fields, Fermat's little theorem Discrete Sample Space, Probability Distribution, Random variables, Expectation, Variance, Bernoulli trials, Conditional probability & independence (Bayes' Theorem).

RECOMMENDED BOOKS

Sr. No.	Name	Author	Publisher
1	Singh, S.B., Discrete Mathematics, Khanna Book Publishing Company, New Delhi.	Singh, S.B	Khanna Publishing House Publication Year: 2019
2	Liu, C. L., & Mohapatra, D. P. (2008). Elements of Discrete Mathematics. Tata McGraw- Hill.	Liu, C. L., & Mohapatra, D. P.	Tata McGraw- Hill. Publication Year: 2008

PROGRAMME CODE- UG059

Course Code	**CSR202**
Course Title	**Ethical Hacking in Cloud**
Type of Course	PC
L T P	**4:0:0**
Credits	**4**
Course Prerequisites	**NA**
Course objective(s)	The objective of this course is to enable students to be part of such a team that can conduct the security assessment of an organization through the process of ethical hacking. This course will introduce the students, the idea of security assessment of systems and networks under investigation and how to perform them under the legal and ethical framework. Further, this course will outline the importance of various stages of ethical hacking, including but not limited to tasks such as penetration testing, and usage of various tools at each stage.
Course Outcome (CO)	On successful completion of the course, students will be able to: • Understand and acknowledge the relevance of legal, ethical, and professional challenges faced by an ethical hacker. • Apply fundamental principles of system, application, and network security to ethically attack / penetrate the system to uncover the security flaws. • Perform evaluation of security systems through a systematic ethical hacking process and recommend countermeasures to improve security. • Understand and use various tools and techniques used in various stages of the ethical hacking process.

Syllabus

UNIT -I

Introduction: Overview of information security threats and attack vectors, vulnerability assessment and penetration testing concepts, information security controls, security laws and standards. OWASP top 10 vulnerabilities.

Footprinting and Reconnaissance: Introduction to network reconnaissance tools such ipconfig, ifconfig, domain tools, nmap, Wireshark, etc.

UNIT 2

Scanning and Enumeration: Network penetration testing, Password cracking techniques and countermeasures, NetBIOS tools.

Gaining and Maintaining Access: Network level attacks and countermeasures, Metasploit framework, Burp Suite.

UNIT 3

Exploitation and Covering Tracks: Privilege escalation, social Engineering, identity theft, countermeasures, Covering tracks using attrib command and creating Alternate Data Stream (ADS) in Windows, Erasing evidence from Windows logs, Strategies for maintaining access.

Advanced stages: Denial of service, Session hijacking, hacking web servers, hacking web applications, sql injection etc.

UNIT 4

NIST Cybersecurity framework and ISO standards: NIST cybersecurity framework, Cyber Kill chain, ISO/IEC 27001 and related standards.

Cyber Defense and Reporting: Preparing vulnerability assessment reports, presenting post testing findings, preparing recommendations

Recommended Books			
Sr. No.	**Name**	**Author**	**Publisher**
1	The Basics of Hacking and Penetration Testing, 2nd Edition	Patrick Engebretson	Syngress (an imprint of Elsevier)
2	Penetration Testing: A Hands-On Introduction to Hacking	Georgia Weidman	No Starch Press

Course Code	CSE254
Course Title	Database Management Systems
Type of Course	PC
L T P	**4:0:0**
Credits	**4**
Course Prerequisites	Elementary knowledge about computers including some experience using Windows. Basic knowledge about programming in some common programming language.
Course objective(s)	1. To understand the different issues involved in the design and implementation of a database system. 2. To study the physical and logical database designs, database modeling, relational, hierarchical, and network models. 3. To understand and use data manipulation language to query, update, and manage a database. 4. To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency, distributed database, and intelligent database, Client/Server (Database Server), Data Warehousing.
Course Outcome (CO)	The learner will be able to – 1. For a given query, write relational algebra expressions for that query and optimize the developed expressions. 2. For a given specification of the requirement, design the databases using ER method and normalization. 3. For a given specification, construct the SQL queries for Open Source and Commercial DBMS – MYSQL, ORACLE, and DB2. 4. For a given query, optimize its execution using query optimization algorithms.

Syllabus

UNIT-I

Introduction

Database Systems; Database and its purpose, Characteristics of the database approach, Advantages and disadvantages of database systems. Classification of DBMS Users; Actors on The scene, Database Administrators, Database Designers, End Users, System Analysts and Application Programmers, Workers behind the scenes (DBMS system designers and implementers, tool developers, operator and maintenance personnel)

UNIT-II

Database System Concepts and Architecture

Data models, schemas, instances, data base state. DBMS Architecture; The External level, The conceptual level, The internal level, Mappings. Data Independence, and its types, DBMS Language, DBMS Interfaces, Classification of Database Management Systems

Data Modeling using E.R. Model (Entity Relationship Model)

Data Models Classification; Entities and Attributes, Entity types and Entity sets, Key attribute and domain of attributes, Relationship among entities

UNIT-III

Relational Algebra and Relational Model

Introduction to Relational algebra, Selection and projection, set operations, renaming, Joins, Division Relational Model Concepts: Domain, Attributes, Tuples and Relations. Relational constraints and relational database schemes; Domain constraints, Key constraints and constraints on Null. Entity integrity, referential integrity and foreign key

Normalization
Non-loss decomposition and functional dependencies, First, Second and Third normal forms, Boyce/Codd normal form, denormalization

UNIT-IV
Database Access and Security
Database security, process controls, database protection, grant and revoke

SQL (Structured Query Language)
Creating Tables, creating a table with data from another table, Inserting values into a table, updating columns of a Table, Deleting Rows, Dropping a Table. Database Security and Privileges, Grant and Revoke Command, Commit and Rollback, various types of select commands, various types of joins, sub query, aggregate functions.

Recommended Books			
Sr. No.	**Name**	**Author**	**Publisher**
1	Database System Concepts	6th Edition by Abraham Silberschatz, Henry F. Korth, S.Sudarshan,	McGraw-Hill.
2	Principles of Database and Knowledge – Base Systems	Vol 1, J.D. Ullman	Computer Science Press
3	Foundations of Databases	Reprint by Serge Abiteboul, Richard Hull, Victor Vianu	Addison-Wesley

PROGRAMME CODE- UG059

Course Code	**CSE272**
Course Title	Computer Architecture
Type of Course	PC
L T P	**4:0:0**
Credits	**4**
Course Prerequisites	Basic knowledge of computers and its components
Course objective(s)	To expose the students to the following: 6. Understand the internal structure and operation of digital computers. 7. Learn instruction set architecture and its impact on processor design. 8. Explore memory hierarchy, I/O systems, and performance optimization. 9. Develop skills to design and analyze CPU components and control units.
Course Outcome (CO)	The learner will be able to d) Explain the basic structure and functional units of a computer system. e) Design and analyze instruction formats, addressing modes, and control units. f) Evaluate performance trade-offs in memory and I/O systems. g) Apply pipelining and parallel processing techniques in processor design.

Syllabus

Unit I: Basic Computer Organization

- Introduction to digital computers and Von Neumann architecture
- Functional units: ALU, control unit, memory, I/O
- Instruction cycle, timing and control
- Memory reference instructions, interrupts
- Register Transfer Language (RTL) and micro-operations

Unit II: CPU Design & Microprogramming

- General register organization
- Instruction formats and addressing modes
- Stack organization and program control
- Microprogrammed control: control memory, address sequencing
- Hardwired vs microprogrammed control units

Unit III: Memory Organization

1. Memory hierarchy: cache, main, virtual, and secondary memory
2. Associative memory and mapping techniques
3. Cache performance and replacement policies
4. Virtual memory: paging and segmentation
5. RAID and memory management hardware

Unit IV: I/O Systems & Parallel Processing

d) I/O interface and data transfer modes
e) DMA, interrupt-driven I/O, and programmed I/O
f) Pipelining: instruction and arithmetic pipelines

g) RISC vs CISC architectures
h) Vector processing and multiprocessor systems

Recommended Books			
Sr. No.	**Name**	**Author**	**Publisher**
1	Computer System Architecture	M.Morris Mano	Pearson Education
2	Computer Organization and Design: The Hardware/ Software Interface	David A. Pattersonand John L. Hennessy	Elsevier
3	Computer Organization and Embedded Systems	Carl Hamacher	Mc Graw Hil lHigher Education
4	Computer Architecture and Organization, 3rd Edition	John P.Hayes	WCB/McGraw-Hill

PROGRAMME CODE- UG059

Course Type	**MDC/ HS**
Course Code	**MDC019**
Course Title	**Universal Human Values : Understanding Harmony**
Type of Course	**Theory**
L T P	**3:0:0**
Credits	**3**
Course objective(s)	**The main objective of this course is to:** 1. Develop a universal perspective based on self- exploration about themselves (human being), family, society and nature. 2. Understand the harmony in human relations. 3. Strengthen the Self-Reflection. 4. Develop commitment and courage
Course Outcome (CO)	**After the completion of the course, students will be able:** CO1: To become more aware of themselves, and their surroundings (family, society, nature). CO2: To become more responsible in life and in handling problems with sustainable solutions. CO3: To develop a sense of commitment and courage to act. CO4: Apply the concept of coexistence and sustainability to promote harmony between human beings and the natural environment.

Syllabus

UNIT-I

Need, Basic Guidelines, Content and Process for Value Education

1. Concept of Value Education including its needs, basic guidelines, content & process.
2. Concept of Self-Exploration, Natural Acceptance & Experiential Validation as the process for Self-Exploration.
3. Happiness & Prosperity.

UNIT-II

Understanding Harmony in Human Beings

1. Understanding Human Being as a Co-existence of Self (I) & Body.
2. Understanding the needs of self (I) & Body.
3. Understanding harmony of self (I) with Body: Sanyam &Swasthya.

UNIT-III

Understanding Harmony in Human Relationships

1. Need for and Importance of Values in Human Relationships.
2. Human Values to be practiced in a family.
3. Visualizing a Universal Human Order in Society

UNIT-IV

Understanding Harmony in Nature & Existence

1. Need & Importance of Harmony in Nature.
2. Understanding the Interconnectedness among Four Orders of Nature.
3. Holistic Perception of Harmony at all levels of Existence.

Sessional work:

Organize a group discussion regarding the ways and measures to inculcate values among individuals.

Recommended Books			
Sr. No.	**Name**	**Author**	**Publisher**
1	Human Values and Professional Ethics	Varinder Kumar	Kalyani Publishers
2	A Foundation Course in Value Education	R.R. Gaur & R. Sangal	Excel Books Publishers
3	Human Values and Professional Ethics	Rishabh Anand	Satya Prakashan, New Delhi

PROGRAMME CODE- UG059

Course Code	**AEC0015**
Course Title	**Effective Technical Communication Skills**
Type of Course	AEC/ HS
L T P	2:0:0
Credits	2
Course Prerequisites	General English
Course objective(s)	Aims to teach oral and written skills in English with illustrations and examples drawn from project reports, paper presentations and published papers in scientific journals. The grammar exercises are not taught in a rule-based manner but through observation and use in specific contexts. Newspaper and popular scientific reports are also included as course material. Presentation skills will be taught through practice sessions. During the course, all participants make presentations and sympathize with the presentations. Emphasizes placed on teaching how to present the same findings orally and in writing.
Course Outcome (CO)	The learner will be able to: 1. Understand language skills. 2. Use their technical writing and presentation skills effectively to draft business letters, email messages, faxes, and acceptance and rejection letters. 3. Analyze the importance of LSRW (Listening, Speaking, Reading, and Writing) skills in communication. 4. Enhance self-esteem and support personality development.

Syllabus

UNIT-I

Information Design and Development – Different kinds of technical documents, information development life cycle, organizational structures, factors affecting information and document design, strategies for organization, information design and writing for print and for online media

UNIT-II

Technical Writing, Grammar, and Editing – Technical writing process, forms of discourse, writing drafts and revising, collaborative writing, creating indexes, technical writing style and language. Basics of grammar, study of advanced grammar, editing strategies to achieve appropriate technical style. Introduction to advanced technical communication, usability, human factors, managing technical communication projects, time estimation, single sourcing, and localization.

UNIT-III

Self-development and assessment – self-assessment, awareness, perception and attitudes, values and beliefs, personal goalsetting, career planning, self-esteem. Managing time; personal memory, rapid reading, taking notes; complex problem solving; creativity.

Communication and Technical Writing- Public speaking, Group discussion, Oral; presentation, Interviews, Graphic presentation, Presentation aids, Personality Development. Writing reports, project proposals, brochures, newsletters, technical articles, manuals, official notes, business letters, memos, progress reports, minutes of meetings, event report.

UNIT-IV

Ethics- Business ethics, Etiquettes in social and office settings, Email etiquettes, Telephone Etiquettes, engineering ethics, Managing time, Role and responsibility of engineering, Work culturing, Personal memory ,Rapid reading, Taking notes, Complex problem solving, Creativity

Recommended Books			
Sr. No.	**Name**	**Author**	**Publisher**
1	David F. Beer and David Mc Murray	Guide to writing as An Engineer	John Willey. New York
2	Diane Hacker	Pocket Style Manual	Bed ford Publication, New York
3	Shiv Khera	You Can Win	Macmillan Books

PROGRAMME CODE- UG059

Course Code	CSE260
Course Title	Database Management System Laboratory
Type of Course	PC
L T P	0 0 2
Credits	1
Course Prerequisites	Knowledge of Program Development Constructs
Course objective(s)	This practical course work allows the students to efficiently design a working of water model.
Course Outcome (CO)	The learner will be able to – 1. Understand, appreciate, and effectively explain the underlying concepts of database technologies. 2. Design and implement a database schema for a given problem domain. 3. Normalize a database. 4. Populate and query a database using SQL DML/DDL commands.

List of Practicals

1: Introduction To DBMS And Its Applications

1.1: Introduction to DBMS and its applications.

2: Study of SQL Statements

2.1: Data types, creating tables, retrieval of rows using SELECT statement, conditional retrieval of rows, ALTER and DROP statements.

2.2: Working with NULL values, matching a pattern from a table, ordering the result of a query, aggregate functions, grouping the result of a query, UPDATE and DELETE statements.

3: Operators

3.1: Arithmetic operators – ADD, SUBTRACT, MULTIPLY, DIVIDE.

3.2: Rename field.

3.3: Logical operations – AND, OR, NOT.

4: Other Operations

4.1: Aggregate functions – AVERAGE, MINIMUM, MAXIMUM, SUM, COUNT, COUNT (*).

4.2: Numeric functions – ABSOLUTE, POWER, SQRT, ROUND.

4.3: String functions – LOWER, UPPER, INITCAP, LENGTH, LTRIM, RTRIM, SUBSTRING, LPAD, RPAD.

5: T-SQL: Transact Structured Query Language

5.1: Implement GRANT and REVOKE commands, COMMIT and ROLLBACK commands

6: Joins And Views

6.1: Program to illustrate use of JOIN.

6.2: Create a VIEW.

7: Introduction To PL/SQL

7.1: Introduction to PL/SQL, basic code structure, difference between SQL and PL/SQL.

7.2: Study PL/SQL control structures.

7.2.1: Conditional control – IF and CASE statements.

7.2.2: Iterative control – LOOP and EXIT statements.

7.2.3: Sequential control – GOTO and NULL statements.

7.3: Program to find greatest of two numbers.

7.4: Program to find greatest of three numbers.

7.5: Program to perform addition, subtraction, multiplication, division according to user's choice.

7.6: Program to print first n natural numbers.

Recommended Books			
Sr. No.	**Name**	**Author**	**Publisher**
1	The Algorithm Design Manual	Steven S Skiena	Springer Science & Bu siness Media
2	Object Oriented Programming with C++	Balaguru samy	Tata McGraw-Hill Education
3	Object Oriented Programming Using C++	Jaspreet Singh ,Mrs. Pinki Parampreet Kaur	Technical Publications

PROGRAMME CODE- UG059

Course Code	CSE274
Course Title	Computer Architecture Laboratory
Type of Course	**PC**
L T P	**0:0:2**
Credits	**1**
Course Prerequisites	**Basic knowledge of computer and its components**
Course objective(s)	6. Understand the architecture and instruction set of microprocessors (especially 8085/8086). 7. Develop assembly language programs for arithmetic, logical, and control operations. 8. Explore memory interfacing, I/O operations, and interrupt handling. 9. Strengthen low-level programming and debugging skills.
Course Outcome (CO)	The learner will be able to- 1. Write and execute assembly language programs for basic arithmetic and logical operations. 2. Interface peripheral devices and demonstrate control over serial communication. 3. Analyze and debug low-level programs using simulators and hardware kits. 4. Apply interrupt handling and memory operations in real-time scenarios.

Syllabus

List of Experiments

1. Multiplication and division of 8-bit numbers
2. Finding largest/smallest number in an array
3. Sorting array in ascending/descending order
4. Interrupt service routine implementation
5. Interfacing 8251 USART and initializing serial communication
6. Factorial computation using loops
7. Counting number of 1's in a byte
8. Reversing an array stored in memory
9. Logical operations using AND, OR, XOR
10. 16-bit operations using LXI and DAD instructions

Course Code	**CSR204**
Course Title	**Ethical Hacking in Cloud Laboratory**
Type of Course	**PC**
L T P	**0:0:2**
Credits	**1**
Course Prerequisites	**NA**
Course objective(s)	1. Develop a deep understanding of network protocols, structures, and vulnerabilities. 2. Navigate and manipulate various operating systems with ease. 3. Develop scripting skills for automation and manipulation.
Course Outcome (CO)	The learner will be able to: - 5. strong Understanding of Cybersecurity Fundamentals 6. Ability to Identify System Vulnerabilities 7. Knowledge of Different Cyber Attacks 8. Legal and Ethical Awareness

LIST OF EXPERIMENTS: -

Networking Basics: Unveiling the Digital Web
-Set up a home lab with virtual machines using tools like Virtual Box or VMware.
-Master the art of packet sniffing using Wireshark.
-Conduct network scans with Nmap to identify open ports and services.

Operating System Mastery: Conquer the Command Line
-Familiarize yourself with Linux distributions (Ubuntu, Kali Linux).
-Practice command-line tasks for file manipulation, process management, and system administration.
-Explore Windows environments, understand file structures and system configurations.

Programming Power: The Language of Hackers
-Learn Python for its versatility and widespread use in cybersecurity.
-Automate simple tasks such as network scanning or file manipulation.
-Understand the basics of Bash scripting for Linux.

Web Application Hacking: Taming the Online Beasts
- Explore the OWASP Web Goat and DVWA (Damn Vulnerable Web App) to practice web vulnerabilities.
- Execute SQL injection attacks on intentionally vulnerable websites.
- Learn Cross-Site Scripting (XSS) and Cross-Site Request Forgery (CSRF) techniques.
- Experiment with tools like Air crack-ng for Wi-Fi password cracking.
- Set up a rogue access point to capture and analyze wireless traffic.
- Explore the security implications of WEP, WPA, and WPA2 protocols.

Ethical Hacking Tools: Building Your Arsenal
- Work with Metasploit for penetration testing and exploitation.
- Use Burp Suite for web application security testing.

- Employ Wireshark for deep packet inspection.

Capture The Flag (CTF) Challenges: Real-World Simulations
- Engage in CTF challenges on platforms like Hack the Box and Try Hack Me.
- Collaborate with the cybersecurity community to solve complex problems.
- Analyze and exploit vulnerabilities in various simulated environments.

Bug Bounty Hunting: Real Rewards for Real Skills
- Sign up for platforms like Hacker One and Bug crowd.
- Hunt for and responsibly disclose vulnerabilities in real-world applications.
- Understand the bug bounty submission process and communicate findings effectively.

Specialization: Niche Exploration
- Explore penetration testing by simulating real-world scenarios.
- Dive into malware analysis to understand and dissect malicious code.
- Specialize in IoT security by exploring vulnerabilities in smart devices.

Continuous Learning: The Ethical Hacker's Pledge
- Follow cybersecurity blogs, podcasts, and forums.
- Attend webinars, conferences, and meetups to stay updated on industry trends.
- Engage in personal projects to explore new tools and techniques.

Recommended Books			
Sr. No.	**Name**	**Author**	**Publisher**
1	Certified Ethical Hacker (CEH) Foundation Guide	Sagar Ajay Rahalkar	Apress
2	Penetration Testing: A Hands-On Introduction to Hacking	Georgia Weidman	No Starch Press
3	Gray Hat Hacking: The Ethical Hacker's Handbook	Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle	McGraw-Hill Osborne Media

PROGRAMME CODE- UG059

5th Semester

PROGRAMME CODE- UG059

Course Code	CSE351
Course Title	Advanced Computer Networks
Type of Course	PC
L:T:P	3:0:0
Credits	3
Course Prerequisites	Basic knowledge of computer and its components
Course Objectives	IV. This subject dives into next-generation networking concepts, focusing on architecture, protocols, and technologies like SDN and NFV. V. It builds on foundational networking knowledge and prepares students for cutting-edge developments in the field.
Course Outcome (CO)	The learner will be able to- 1. Understand functionality of various network components, its architecture and services 2. Implement Congestion and Wireless Networks 3.Compare Software defined networks and traditional networks 4.Discuss Network Function Virtualization, its architectures, applications and use cases

SYLLABUS

Unit I: Network Architecture & Services

Overview of data communication models, Internet multicasting, NAT (Network Address Translation), VPN (Virtual Private Network). Routing algorithms: BGP, RIP, OSPF. Differentiated and Integrated Services, SONET, ATM, MPLS, Next-generation Internet architectures. Green communication networks and data center networking.

Unit II: Congestion & Wireless Networks

Network congestion mechanisms. ARQ protocols & TCP/IP variants. Multimedia networking. Sliding window protocol implementation. Cellular & ad hoc wireless networks. Medium access schemes, routing, transport layer protocols. Security & energy management in wireless networks.

Unit III: Software Defined Networking (SDN)

SDN vs traditional networks. SDN controller & switch design. OpenFlow protocol.

Unit IV: Network Function Virtualization (NFV)

NFV architecture & use cases. NFV orchestration. NFV applications in the 5G network.

RECOMMENDED BOOKS

Sr. No.	Name	Author	Publisher
1	Communication Networks: Fundamentals and Concepts and Key Architectures	Leon Garcia and Indra Widjaja	TMH
2	Advanced Computer Networks	Rahul Sharma, Manmohan Singh Kassahun Gashu Melesse	Lambert Academic Publishers

PROGRAMME CODE- UG059

Course Code	CSE353
Course Title	Design and Analysis of Algorithms
Type of Course	PC
L:T:P	4:0:0
Credits	4
Course Prerequisites	Data Structures, C, C++ Programming language
Course Objectives	1. Analyze the asymptotic performance of algorithms. 2. Write rigorous correctness proofs for algorithms. 3. Demonstrate a familiarity with major algorithms and data structures. 4. Apply important algorithmic design paradigms and methods of analysis. 5. Synthesize efficient algorithms in common engineering design situations.
Course Outcome (CO)	**The learner will be able to** 1. For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms . 2. Describe the greedy paradigm and explain when an algorithmic The design situation calls for it. For a given problem develop the greedy algorithms. 3. Describe the divide-and-conquer paradigm and explain when an The algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation.

	4 Understand computational complexity and identify tractable and intractable problems.

SYLLABUS

UNIT-I Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.

UNIT-II Fundamental Algorithmic Strategies: Brute-Force, Greedy, Dynamic Programming, Branch- and-Bound and Backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving , Bin Packing, Knap Sack TSP. Heuristics – characteristics and their application domains.

UNIT-III Graph and Tree Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.

UNIT-IV Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP complete and NP-hard. Cook's theorem, Standard NP-complete problems and Reduction techniques. Advanced Topics: Approximation algorithms, Randomized algorithms, Class of problems beyond NP–PSPACE

RECOMMENDED BOOKS

Sr. No.	Name	Author	Publisher
1	Introduction to Algorithms	4TH Edition, Thomas H Cormen, Charles E Lieserson,Ronald L Rivest and Clifford Stein	MIT Press/ Mc Graw Hill
2	Fundamentals of Algorithms	E. Horowitz et al.	Pearson Education

PROGRAMME CODE- UG059

Course Code	CSR301
Course Title	Mobile and Wireless Communication Networks
Type of Course	PC
L:T:P	4:0:0
Credits	4
Course Prerequisites	Nil
Course Objectives	To gain an understanding of the principles behind the design of wireless communication systems and technologies.
Course Outcome (CO)	**The learner will be able to –** 1. Understand and explain the classification of mobile communication systems. 2. Examine state-of-the-art distributed systems, such as the Google File System. 3. Learn the principles, architecture, algorithms, and programming models used in distributed systems. 4. Evaluate the performance and challenges of wireless and mobile networks.

SYLLABUS

UNIT – I Introduction: A basic cellular system, performance criteria, operation of cellular systems, planning a cellular system, analog and digital cellular systems. Examples of Wireless Communication Systems: Paging systems, cordless telephone systems, cellular telephone systems. GSM System: Architecture and features; GSM services; authentication; incoming and outgoing call flow; handover in GSM.

UNIT – II Digital Communication through Fading Multipath Channels: Fading types and their characteristics; concept of diversity branches and signal paths; combining methods – selective diversity combining, predetection and post-detection combining, switched combining, maximal ratio combining, equal gain combining. Different Types of Channels: Control channels and traffic channels. BTS Hardware: Introduction to BTS 3900 series; Baseband Unit (BBU); Radio Frequency Unit (RFU); description of cards; login to BTS 3900.

UNIT – III Multiple Access Techniques for Wireless Communications: Introduction; Frequency Division Multiple Access (FDMA); Time Division Multiple Access (TDMA); Spread Spectrum Multiple Access; Code Division Multiple Access (CDMA); Space Division Multiple Access; WCDMA (Wideband CDMA) features and architecture; handoff and its types.

UNIT – IV Wireless Systems and Standards: GPRS/EDGE specification, features and architecture; 3G systems; applications of 3G, UMTS, and CDMA 2000 standards; specifications and architecture of UMTS; forward CDMA

channel; reverse CDMA channel. BSC Hardware: Introduction to 6900 series; MPR and EPR; description of cards; login to BSC 6900. Future Trends: Bluetooth technology; 4G mobile techniques; Wi-Fi technology advanced system; ZigBee.

RECOMMENDED BOOKS

Sr. No.	Name	Author	Publisher
1	Wireless Communications	T.S.Rappaport,	Principles Edition, and Practice, 2nd Pearson Education Asia,20 10.
2	Mobile Cellular Telecommunications	William CYLee	2nd Edition ,MGH.
3	Mobile and Personal Communication systems and services	Raj Pandya	Prentice HallofIndia

PROGRAMME CODE- UG059

Course Code	**CSE369**
Course Title	**Mobile Application Development**
Type of Course	PE
L T P	3:0:0
Credits	3
Course Prerequisites	Students are expected to have basic knowledge of JAVA, HTML, JavaScript and CSS
Course Objectives	Students will learn the basic so f the programming language, designing mobile interfaces, using libraries to build applications, user input and other aspects.
Course Outcome (CO)	The learner will be able to- 1. Define multimedia to potential clients. 2.Identify and describe the function of the general skill sets in the multimedia industry. 3. Identify the basic components of a multimedia project. 4. Identify the basic hardware and software requirements for multimedia development and playback.

SYLLABUS

UNIT-I

Introduction to Mobile Devices

Mobile devices vs. desktop devices, ARM and Intel architectures, Power Management, Screen resolution, Touch interfaces, Application deployment, AppStore, Google Play, Windows Store, Development environments, Xcode, Eclipse, VS2012, Phone GAP, Native vs. web applications.

Mobile Applications

Introduction to mobile computing, mobile applications, Embedded systems, Market and business drivers for mobile applications, Publishing and delivery of mobile applications, Requirements gathering and validation for mobile applications.

UNIT-II

Mobile OS Architectures

Comparing and contrasting architectures of all three–Android, iOS, and Windows, Underlying OS (Darwin vs. Linux vs. Win 8), Kernel structure and native level programming, Runtime (Objective-C vs. Dalvik vs. WinRT), Approaches to power management, Security.

Basic Design

Introduction, Basics of embedded systems design, Embedded OS design constraints for mobile applications, both hardware and software related, Architecting mobile applications, user interfaces for mobile applications

Touch events and gestures, Achieving quality constraints, performance, usability, security, availability, and modifiability.

UNIT-III

Advanced Design

Designing applications with multimedia and web access capabilities, Integration with GPS and social media networking applications, accessing applications hosted in a cloud computing environment, Design patterns for mobile applications.

Technology I - Android

Introduction, Establishing the development environment, Android architecture, Activities and views, Interacting with UI, persisting data using SQLite, Packaging and deployment, Interaction with server-side applications, Using Google Maps, GPS, and Wi Fi, Integration with social media applications.

UNIT-IV

Technology II - iOS

Introduction to Objective C, iOS features, UI implementation, Touch frameworks, Data persistence using Core Data and SQLite, Location-aware applications using Core Location and Map Kit, integrating calendar and address book with social media applications, Using Wi-Fi, iPhone marketplace.

Mobile Device Security

Mobile malware, Device protections, iOS ―Jailbreaking‖, Android ―rooting‖ and Windows' ―defenestration.

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(s)**	**Publisher**
1	Professional Mobile Application Development	Jeff Mc Wherter and Scott Gowell	Wrox
2	Android in Practice	Charlie Collins, Michael Galpin and Matthias Kappler	Dream Tech
3	Beginning iOS6 Development: Exploring the iOS SDK	David Mark, Jack Nutting, Jeffl a Marche and Frederic Olsson	Apress

PROGRAMME CODE- UG059

Course Code	**CSE371**
Course Title	**Introduction to Internet of Things**
Type of Course	PE
L T P	3:0:0
Credits	3
Course Prerequisites	NIL
Course Objectives	The Internet is evolving to connect people to physical things and also physical things to other physical things all in real time. It's becoming the Internet of Things (IoT). The course enables student to understand, The basics of Internet of things and protocols. It introduces some of the applications are easy where Internet of Things can be applied.
Course Outcome (CO)	At the end of the course the learner will be able to- 1. Understand and describe Functional blocks of IOT 2. Explain MAC protocol and various routing protocols 3. Describe data aggregation and data dissemination 4. Evaluate and explain challenges in IoT design 5. Demonstrate the ability to develop applications through IoT tools

UNIT-I

Introduction to IoT Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models and APIs

UNIT-II

IoT & M2M Machine to Machine, Difference between IoT and M2M, Software define Network, Network and Communication aspects Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment and Node discovery, Data aggregation and dissemination

UNIT-III

Challenges in IoT Design challenges, Development challenges, Security challenges, Other challenges Domain specific applications of IoT Home automation, Industry applications, Surveillance applications, Other IoT applications

UNIT-IV

Developing IoTs Introduction to Python, Introduction to different IoT tools, developing applications through IoT tools, developing sensor-based application through embedded system platform, Implementing IoT concepts with python

RECOMMENDED BOOKS

Sr.no.	Name	AUTHOR(S)	PUBLISHER
1	The Internet of Things in the Cloud: A Middleware	Honbo Zhou	CRCPress,2012

Course Code	**CSE373**
Course Title	**Cloud Computing**
Type of Course	PE
L T P	3:0:0
Credits	3
Course Prerequisites	Distributed System, Operating Systems and Networking
Course Outcome	This Course work provides the complete understanding of Cloud system, its implementation techniques and its various applications in The field of computer Science.
Course Objectives (CO)	The learner will be able to- 1. Understand characteristics and types of cloud computing 2. Describe architecture of cloud computing 3. Explain applications of cloud 4. Demonstrate their knowledge of cloud computing to real world examples

SYLLABUS

UNIT-I

Cloud Computing Basics, History of Cloud Computing, Importance, Characteristics of Cloud Computing, Benefits and Challenges to Cloud Architecture

UNIT-II

Types of Cloud: Public Cloud, Private Cloud, Hybrid Cloud, and Community Cloud. Differences between public and private cloud, the status of Cloud Computing in India, Cloud Service Models, and the role of virtualization in enabling the cloud. Differences between Grid computing and cloud computing, differences between grid computing and utility computing, Cloud Computing security concerns, and proposed security model for future cloud computing.

UNIT-III

Cloud Computing - Logical architecture, developing holistic Cloud Computing reference models, and the seven- step model of migrating to the cloud.

Virtualization

Types of virtualizations, Virtual Machine Life Cycle, Virtualization applications, Pitfalls of Virtualization, and CPU Virtualization

UNIT-IV

Case study of Cloud Computing, Cloud Computing risks, Cloud tools, Cloud applications, future trends, mobile cloud, jungle computing, and Big Data – features and applications.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**Author(s)**	**Publisher**
1	Cloud Computing – A Practical Approach	Anthony T.Velte, Toby J.Velte and Robert E	TMH
2	Cloud Computing–Web based Applications	Michael Miller	Pearson Publishing

Course Code	**CSR305**
Course Title	**Cyber Law and Intellectual Property Rights (IPR)**
Type of Course	PE
L T P	3:0:0
Credits	3
Course Objectives	1. To introduce students to the legal and regulatory framework governing cyberspace and digital communication. 2. To develop an understanding of cyber crimes and legal remedies available for cyber security issues. 3. To familiarize students with provisions of the Information Technology Act, 2000 and related cyber regulations.
Course Outcome (CO)	**CO1:** Explain the concept and importance of cyber law in the digital environment. **CO2:** Identify and analyze different types of cyber crimes and their legal implications. **CO3:** Understand provisions of the Information Technology Act and cyber law enforcement procedures. **CO4:** Describe the different types of Intellectual Property Rights and their relevance in information technology.

SYLLABUS

Unit I: Introduction to Cyber Law

Introduction to cyberspace and cyber law; need and scope of cyber law; evolution of cyber regulations; internet governance and legal issues; jurisdiction in cyberspace; legal aspects of online communication and digital transactions; overview of global cyber laws and policies.

Unit II: Cyber Crimes and Cyber Security Issues

Concept and classification of cyber crimes; cyber crimes against individuals, organizations, and government; hacking, phishing, identity theft, cyber stalking, cyber bullying, cyber fraud, and cyber terrorism; online privacy and data protection; ethical and legal issues in cyberspace.

Unit III: Information Technology Act and Cyber Regulations

Overview and objectives of the Information Technology Act, 2000; electronic governance; electronic records and digital signatures; role of certifying authorities; cyber offences and penalties; investigation and adjudication process; cyber law enforcement and challenges in regulating cyber space.

Unit IV: Intellectual Property Rights (IPR)

Introduction to Intellectual Property Rights; importance of IPR in technology and innovation; types of IPR – patents, copyrights, trademarks, industrial designs, and geographical indications; protection of computer software and digital content; IPR laws in India; role of IPR in research and technological development.

RECOMMENDEDBOOKS			
Sr.no.	**Name**		**Publisher**
1	Cyber Law in India	Pavan Duggal	Lexis Nexis India
2	Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives	Nina Godbole, Sunit Belapure	Wiley India Pvt. Ltd

Course Code	**CSE366**
Course Title	**Digital Image Processing**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	This course has no prerequisite other than knowledge of probability and statistics, and Computer graphics.
Course Objectives	The objective of this course is to teach students the architecture of image processing. By taking this course, the students are expected to understand the basic algorithms, and be able to apply these techniques.
Course Outcome (CO)	The learner will be able to- 1. Understand the digital image processing 2. Understand the image enhancement.

SYLLABUS

Unit-I

Introduction to the DIP areas and applications; Components of Digital Image Processing; Elements of Visual Perception; Image Sensing and Acquisition; Image Sampling and Quantization; Relationships between pixels; color models.

Unit-II

Image Enhancement Spatial Domain: Gray level transformations; Histogram processing; Basics of Spatial Filtering; Smoothing and Sharpening Spatial Filtering Frequency Domain: Introduction to Fourier Transform; Smoothing and Sharpening frequency domain filters; Ideal, Butterworth and Gaussian filters.

Unit-III

Image Restoration Course Code: Noise models; Mean Filters; Order Statistics; Adaptive filters; Band reject Filters; Band pass Filters; Notch Filters; Optimum Notch Filtering; Inverse Filtering; Wiener filtering.

Unit-IV

Feature Extraction and Image Segmentation Feature Extraction: Contour and shape dependent feature extraction, Extraction of textural features

Segmentation: Detection of Discontinuities; Edge Linking and Boundary detection; Region based segmentation; Morphological processing- erosion and dilation.

Image Compression and Encoding Entropy-based schemes, Transform-based encoding, Predictive encoding and DPCM, Vector quantization, Huffman coding.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**Author(s)**	**Publisher**
1	Digital Image Processing	A. Baskar, Muthaiah Rajappa	Chapman & Hall / CRC Press

Course Code	**CSE314**
Course Title	**Computer Vision**
Type of Course	PE
LTP	3:0:0
Credits	3
Course Prerequisites	Computer Graphics
Course Objectives	To familiarize the student with specific, well-known computer vision methods, algorithms, and results. To understand the roles of image Transformations and their invariances in pattern recognition and classification.
Course Outcomes (CO)	**The learner will be able to –** 1. Identify basic concepts, terminology, theories, models, and methods in the field of computer vision. 2. Describe basic methods of computer vision related to multi-scale representation, edge detection, and detection of other primitives, stereo, motion, and object recognition. 3. Assess which methods to use for solving a given problem. 4. Analyze the accuracy of the methods.

SYLLABUS

UNIT I: Digital Image Formation and Low-Level Processing

Fourier Transform, convolution, filtering, image enhancement, restoration, and histogram processing are discussed. The unit also delves into depth estimation and multi- camera views, addressing concepts such as perspective, binocular stereopsis, camera and epipolar geometry, homo graph, rectification, DLT, RANSAC, and 3D reconstruction frameworks including auto-calibration.

UNIT II: Feature Extraction, Image Segmentation, and Pattern Analysis

Various feature extraction methods such as edge detection (Canny, LOG, DOG), line detectors using Hough Transform, and corner detection using Harris and Hessian Affine methods. Advanced descriptors like SIFT, SURF, HOG, GLOH, and scale-space analysis techniques using Gaussian derivative filters, Gabor filters, and DWT are covered. In image segmentation, methods like region growing, edge-based segmentation, graph cuts, mean-shift, MRFs, texture segmentation, and object detection are explored. Pattern analysis includes clustering techniques (K-Means, K-Medoids, Mixture of Gaussians), classification (discriminant functions, supervised, unsupervised, semi-supervised), and classifiers like Bayes, KNN, and ANN. Dimensionality reduction methods like PCA, LDA, ICA, and non-parametric techniques are also Introduced

UNIT III: Motion Analysis and Shape Reconstruction

Motion analysis techniques including background subtraction and modeling, optical flow, KLT tracking, spatio-temporal analysis, dynamic stereo, and motion parameter estimation. It also explores shape-from-X techniques, such as shape from shading, texture, color, motion, and edges. Concepts like the Phong model, reflectance maps, albedo estimation, photometric stereo, and the use of surface smoothness constraints are discussed. The unit concludes with perceptual organization and cognition, modeling vision as a graphic

process in the brain, insights from neurological trauma and visual deficits, and phenomena like visual agnosia's and illusions.

UNIT IV: Model Estimation and Applications

Model estimation using machine learning and statistical methods in computer vision. It discusses both discriminative and generative models and their applications in areas like content-based image retrieval (CBIR). Additional applications include content-based video retrieval (CBVR), activity recognition, computational photography, biometrics, image stitching, and document processing. The unit also highlights modern trends such as super-resolution, GPU-based acceleration, augmented reality, cognitive models, fusion techniques, and sparse representation and compressed sensing (SR & CS).

RECOMMENDED BOOKS			
Sr. no.	**Name**	**Author(s)**	**Publisher**
1	Computer Vision: Algorithms and Applications	Richard Szeliski	Springer
2	Computer Vision: A Modern Approach	D.A. Forsyth, J.P once	Prentice Hall
3	Introductory Techniques for 3D Computer Vision	Trucco and Verri	Prentice Hall
4	Three-dimensional Computer Vision: Ageometric approach	Olivier Faugeras	Olivier Faugeras

PROGRAMME CODE- UG059

Course Code	**CSE362**
Course Title	**Compiler Construction**
Type of Course	PE
L T P	3:0:0
Credits	3
Course Prerequisites	Basic understanding of programming languages, data structures, and machine architecture.
Course Objectives	The course introduces the fundamental concepts of compiler design, including lexical analysis, parsing, semantic analysis, and code generation.
Course Outcome (CO)	The learner will be able to: 1. For a given grammar specification, develop the lexical analyzer. 2. For a given parser specification, design top-down and bottom-up parsers. 3. Develop syntax-directed translation schemes. 4. Develop algorithms to generate code for a target machine.

SYLLABUS

UNIT I

Introduction: Phases of compilation and overview. Lexical Analysis (Scanner): Regular languages, finite automata, regular expressions, converting regular expressions to finite automata, scanner generators (lex,flex). Syntax Analysis (Parser): Context-free languages and grammars, push-down automata, LL(1) grammars and top-down parsing, operator grammars, LR(0), SLR(1), LR(1), LALR(1) grammars and bottom-up parsing, ambiguity and LR parsing, LALR(1) parser generators (yacc, bison).

UNIT II

Semantic Analysis: Attribute grammars, syntax-directed definitions, evaluation and flow of attributes in a syntax tree. Symbol Table: Structure, symbol attributes, and management. Run-Time Environment: Procedure activation, parameter passing, value return, memory allocation, and scope.

UNIT III

Intermediate Code Generation: Translation of different language features, types of intermediate representations.

Code Improvement (Optimization): Control-flow analysis, data-flow analysis, dependence analysis; Local optimization, global optimization, loop optimization, peephole optimization.

UNIT IV

Architecture Dependent Code Improvement: Instruction scheduling (for pipelines), loop optimization (for cache memory), etc. Register Allocation and Target Code Generation

Advanced Topics: Type systems, data abstraction, compilation of object-oriented features, and non-imperative programming languages.

RECOMMENDEDBOOKS			
Sr.no.	**Name**		**Publisher**

1	Compilers Principles, Techniques, &Tools	A.V.Aho, R. Sethi &J.D. Ullman	Pearson Education

PROGRAMME CODE- UG059

Course Code	**CSE348**
Course Title	**Digital Marketing**
Type of Course	PE
L T P	3:0:0
Credits	3
Course Prerequisites	Nil
Course Objective	The main objective of this course is to provide learners with the knowledge of business advantages of digital marketing and its importance for marketing success; to develop a digital marketing plan; to make SWOT analysis; to define a target group; to get introduced to various digital channels, their advantages and ways of integration;
Course Outcomes	The learner will be able to- 1. Identify the importance of digital marketing for marketing success, 1. Manage customer relationships across all digital channels and build better customer relationships, 2. Create a digital marketing plan, starting from the SWOT analysis and defining a target group, then identifying digital channels, their advantages and limitations. 3. Perceiving ways of integration taking into consideration the available budget.

SYLLABUS

UNIT I

Introduction: Marketing and its definition, Digital Marketing, how we do Marketing, Benefits of Digital marketing, Digital marketing platforms and Strategies, Defining Marketing Goals, Latest Digital marketing trends, introduction to traditional and new methods of marketing Requirement: Requirements for digital marketing, its uses.

UNIT II

Search Engine Optimization: Introduction to Search Engines, How the search engine works, Components of Search Engines. Keyword Research and Competition: Introduction to Keyword Research, Types of Keywords, Keyword Research Methodology, Business Analysis & Categorization, Google Keyword Planner, Market Research and Analysis, New Keyword Ideas, Competition Analysis, Finalizing the Keywords List.

UNIT III

On page Optimization: Introduction to on page, what is Webmaster Tools, Selecting Target Location, On page Analysis Methodology, Fundamental On-page Factors, Website Speed, Domain name in SEO, URL Optimization, Title Tag Optimization, Meta Tags Optimization, Content Optimization, Sitemaps Generation , Using Robot.txt in Site URL, Redirecting Techniques, Canonical Links, Rich Snippets.

UNIT IV

Off page Optimization : What is Link Building , Types of Linking Methods , Do Follow Vs. No Follow Link building Guidelines, Linking Building Methodology, Links Analysis Tools, Directory Submissions, Local Business Directories, Social Bookmarking, Using Classifieds for Inbound traffic, Question and Answers, Blogging & Commenting, Guest Blogging Local SEO: What is Local SEO, Importance of Local SEO,

Submission to Google My Business, Completing the Profile, Local SEO Ranking Signals, Local SEO Negative Signals, Citations and Local Submissions

	RECOMMENDED BOOKS		
S.No	**Name**	**Author(s)**	**Publisher**
1	Digital Marketing For Dummies	Ryan Deiss & Russ Henneberry	John Wiley & Sons, Inc.,
2	Social Media Marketing All-in-one Dummies	Jan Zimmerman, Deborah Ng	John Wiley & Sons Inc, 4th edition

PROGRAMME CODE- UG059

Course Code	**CSE378**
Course Title	**Advanced Parallel Computing**
Type of Course	PE
L T P	3:0:0
Credits	3
Course Prerequisites	Basic knowledge of Computer System Architecture
Course Outcome	Students become familiar with parallel computer architecture and algorithms.
Course Objectives (CO)	The learner will be able to- 1. Understand basic terms used in parallel computing 2. Classify parallel computers 3. Describe parallel computer architecture 4. Analyze parallel algorithms

Syllabus

UNIT-I

Introduction to Parallel Computing: Basic concepts about program/process/ thread, Concurrent Execution, Parallel Execution, granularity, Potential of Parallelism; Need of Parallel Computation; Levels of parallel processing; Parallel processing Vs. Parallel computing; Dataflow Computing concept, Applications of parallel processing-Scientific Applications / Image processing, Engineering Application, Database query / Answering applications, AI Applications, Mathematical simulations and modeling

Classification of Parallel Computers: Types of Classification, Flynn's/ Handler classification; UMA /NUMA /COMA, loosely coupled / tightly coupled; Classification based grain size and Instruction level parallelism.

UNIT-II

Interconnection Network: Need of Interconnection Network; Concept Bandwidth Nod degree diameter bisection bandwidth, In degree and Out degree; Static and Dynamic Interconnection network Omega, Parallel Shifter, Bens, permutation, hypercube, butterfly; Shuffle exchange Network

Parallel Computer Architecture: Introduction to various computer architecture; Pipeline processing, Vector / Array processing; VLIW and Super scalar architecture; Associative architecture -Multithreaded architecture.

UNIT-III

Parallel Algorithm: Introduction to Parallel Algorithms; Analysis of Parallel Algorithms; Different models of computation- Combinational circuit, Permutation Circuit, Sorting circuit, Matrix computation.

PRAM Algorithms: Message passage programming -Shared memory, Message passing libraries, Data Parallel programming; Data Structures for parallel algorithms-Link list, Arrays pointers, Hypercube network.

Parallel Programming: Introduction to Parallel Programming; Types of parallel programming - Programming based on message passing, data parallelism, Programming for shared memory systems, Example programs for parallel systems.

UNIT- IV

Advanced Topics Operating System for Parallel Computers: Basic issues of Operating Systems for Parallel Computers, Process Management; Resource Management; Memory management; I/O Management, Inter- Processor Communication, Vectorization Compiler Performance Evaluation:

Introduction to performance evaluation, Metric of Parallel overhead, Law Speedup, Measurement Tools Recent Trends: Multi-component CPU; Apex architecture IA 64; Hyper threading.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**Author(s)**	**Publisher**
1	Advanced Computer Architecture: Parallelism, Scalability, Programmability	Hwang, K	Tata McGraw Hills
2	Introduction to Parallel Processing	Sasi kumar M., Shikhare, D.,Ravi Prakash	Prentice Hall of India pvt. ltd. New Delhi

PROGRAMME CODE- UG059

Course Code	CSE359
Course Title	Computer Programming using python
Type of Course	PC
L:T:P	4:0:0
Credits	4
Course Prerequisites	NA
Course Objectives	1. To understand syntax and data types used in python. 2. To write and perform programs using control structures in python 3. To implement programs using functions and to handle exceptions in python. Creating and using classes in python programming
Course Outcome (CO)	The learner will be able to: 1. Understand basic syntax and data types used in python. 2. Write and perform programs using control structures 3. Implement programs with functions and handle Exceptions. Create and use classes in python

SYLLABUS

UNIT-I

Introduction: Introduction, History and Versions, Installation and Execution (IDLE, Script Mode), Basic Syntax and Indentation, variable, Reserved Words and Naming Conventions, Dynamic Typing, id (), typeof (), Comments, Data Types, Type Casting, Strings and String Methods, String Formatting (f-string, % method, format method), Input and Output, print () Function.

UNIT-II

Control Structures and Collections: if, if–else, Nested if, Ternary Operator, Loops (for, while), break and continue, Range Function, Operator Precedence, Truthy and Falsy Values, Lists, Tuples, Sets, Dictionary – Accessing Elements and Common Methods.

UNIT-III

Functions, Modules and Exception Handling: Defining Functions, Parameters (Default and Keyword), Variable-Length Arguments, Scope, Lambda Functions, map () and filter (), Modules and Importing, Creating Modules, Standard Library Modules, Exception Handling (try, except, finally), raise, assert.

UNIT-IV

Classes in Python: Principles of Object Orientation, Creating Classes, Constructor, Instance and Static Methods, Class Variables, Special Methods, Inheritance, Polymorphism.

PROGRAMME CODE- UG059

RECOMMENDED BOOKS

Sr. No.	Name	Author	Publisher
1.	Python Crash Course: A Hands-On, Project-Based Introduction to Programming	Eric Matthes	No Starch Press
2.	Python Programming: An Introduction to Computer Science	John M. Zelle	Franklin, Beedle & Associates

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PROGRAMME CODE- UG059

PROGRAMME CODE- UG059

Course Code	CSE357
Course Title	Advanced Computer Networks Laboratory
Type of Course	PC
L:T:P	0:0:2
Credits	1
Course Prerequisites	Basic knowledge of Computer, Digital Circuits and Network Arrangement
Course Objectives	1. Gain hands-on experience with advanced networking protocols and configurations. 2. Understand the implementation and debugging of routing, DNS, FTP, and mail services. Use open-source tools for diagnostics and performance analysis
Course Outcome (CO)	**The learner will be able to** 1. Understand and configure networking protocols. 2. Implement and debug routing, DNS, FTP and mail services 3. Configure and use open source tools for diagnostics and performance analysis

List of Experiments

1. Basic router configuration and user interface setup
2. IP addressing for various topologies
3. DHCP server integration with BOOTP daemon
4. Debugging ARP/RARP protocols using open-source tools
5. Implementation of RIP, BGP, OSPF routing protocols
6. Static route configuration and verification using netstat
7. DNS setup: caching client, proxy, reverse and forward DNS
8. FTP server configuration and performance analysis
9. TFTP client setup and comparison with FTP
10. Mail server setup for IMAP/POP and SMTP client development
11. SNMPD with OpenNMS for device status monitoring
12. NAS setup using NIS/NFS and SMB for Windows clients

PROGRAMME CODE- UG059

RECOMMENDED BOOKS			
Sr. No.	**Name**	**Author**	**Publisher**
1	A+ Guide to PC Hardware Maintenance and Repair, Volume 1	Michael W. Graves	Cengage Learning
2	Practical TCP/IP and Ethernet Networking	Deon Reynders, Edwin Wright	Newnes

Course Code	CSE377
Course Title	Design and analysis of algorithm laboratory
Type of Course	PC
L:T:P	0:0:2
Credits	1
Course Prerequisites	Knowledge of C++ Programming Language Concepts
Course Objectives	Makes the students proficient in implementing algorithms using the algorithm design techniques.
Course Outcome (CO)	**The learner will be able to** 1.. Analyze the complexities of various problems in different domains. 2. Understand methods for analyzing the efficiency and correctness of algorithms (such as exchange arguments, recurrence, induction, and average case analysis). 3. Compare, contrast, and choose appropriate algorithmic design techniques to present an algorithm that solves a given problem. 4. Develop efficient algorithms for the new problem with suitable designing techniques

List of Experiments

1. **Array**

1.1: WAP to code and analyze to compute the greatest common divisor of two numbers.
1.2: WAP to code and analyze to find the mid element in an array.
1.3: WAP to code and analyze to find maximum and minimum elements (without MAXMIN algorithm) in an array.
1.4: WAP to code and analyze to find the largest element in an array.
1.5: WAP to code and analyze to enter elements in an array.

2. Searching

2.1: WAP to find maximum and minimum element choosing MAXMIN algorithm.
2.2: WAP to code and analyze to find an element using binary search and find its time complexity.

3. Sorting

3.1: WAP to code and analyze to sort an array of integers using Heap Sort.
3.2: WAP to code and analyze to sort an array of integers using Merge Sort

4. **Pattern Matching**

4.1: WAP to code and analyze to find all occurrences of a pattern in each string.

5. Shortest Path Algorithm

5.1: WAP to code and analyze to find the minimum path using Kruskal's Algorithm.

6. Dynamic Programming

6.1: WAP to code and analyze to find the distance between two character strings using Dynamic Programming.

7. Divide and Conquer

7.1: WAP to code and analyze to find an element using linear search by applying divide and conquer technique and find its time complexity

RECOMMENDED BOOKS

Sr. No.	Name	Author	Publisher
1	The Algorithm Design Manual	Steven Skiena Springer Science& Business Media	Springer Science& Business Media
2	Object Oriented Programming with C++	Balagurusamy	TataMc Graw-Hill Education
3	Object Oriented Programming Using C++	Jaspreet Singh, Mrs. Pinki Parampreet Kaur	Technical Publications

Course Code	CSR303
Course Title	Mobile and Wireless Communication Networks Laboratory
Type of Course	PC
L:T:P	0:0:2
Credits	1
Course Prerequisites	Basic knowledge of Mobile and Wireless Communication Networks
Course Objectives	Understand **wireless communication fundamentals** and channel characteristics. Learn **cellular network design** and concepts like frequency reuse and handoff. Analyze **multiple access techniques** (FDMA, TDMA, CDMA). Study **wireless protocols and standards** (GSM, IEEE 802.11). Explore **mobile ad hoc and sensor networks** and their applications.
Course Outcome (CO)	**The learner will be able to** Explain the fundamentals of wireless communication and propagation characteristics. Understand and implement wireless network protocols and standards

List of Experiments

1. Study of Wireless Communication Tools
- Introduction to wireless communication simulation tools (e.g., NS-2, NS-3, MATLAB).
- Basic commands and environment setup.

2. Simulation of Wireless Network Models
- Creating simple wireless network topology.
- Configuring nodes, links, and traffic.

3. Performance Analysis of Routing Protocols
- Simulation and comparison of protocols like:
- AODV
- DSR
- DSDV

4. TCP/UDP Performance in Wireless Networks
- Throughput analysis
- Packet delivery ratio
- Delay measurement

5. Simulation of Mobile Ad Hoc Networks (MANET)

- Node mobility models
- Impact of mobility on routing performance.

6. Study of Wireless LAN (WLAN)

- IEEE 802.11

7. Case Study

- Simulation of real wireless network scenarios such as sensor networks or cellular networks**.**

Sr. No.	**Name**	**Author**	**Publisher**
1	Wireless and Mobile Communication	Rishabh Anand	S Chand Publishing
2	Wireless Communications & Networking	Vijay Garg	Morgan Kaufmann (Elsevier)

PROGRAMME CODE- UG059

PROGRAMME CODE- UG059

Course Code	CSE365
Course Title	Computer Programming using python laboratory
Type of Course	PC
L:T:P	0:0:2
Credits	1
Course Prerequisites	NA
Course Objectives	1. To understand and perform python installation. 2. To create python scripts using variables, data types and operators. 3. To write programs on string manipulation, control structures and data structures. 4. To implement programs in python using functions, modules and object-oriented programming concepts 5. To handle programs using file and exceptions
Course Outcome (CO)	The learner will be able to: 1. Understand and perform python installation. 2. Create python scripts using variables, data types and operators. 3. Write programs on string manipulation, control structures and data structures. 4. Implement programs in python using functions, modules and object-oriented programming concepts 5. Handle programs using file and exceptions

LIST OF EXPERIMENTS

- **Installation and Environment Setup:**

Install Python and execute a simple program using IDLE and command line.

- **Basic Syntax and Data Types:**

Write programs demonstrating variables, data types (int, float, string), and basic operators.

- **String Manipulation:**

Develop programs using string methods and formatting techniques (f-string, format).

- **Control Structures:**

Implement programs using if–else, nested if, for and while loops, break and continue statements.

- **Data Structures (Collections):**

Write programs using lists, tuples, sets, and dictionaries, including common operations and methods.

- **Functions and Parameters:**

Create user-defined functions with different types of parameters (default, keyword, variable-length).

- **Lambda and Functional Programming:**

Use lambda functions with map () and filter ().

- **Modules and Exception Handling:**

Create and import modules; write programs using try–except, raise, and assert.

- **Object-Oriented Programming:**

Implement classes demonstrating constructors, instance methods, inheritance, and polymorphism.

- **File Handling:**Write programs to read from and write files.

RECOMMENDED BOOKS			
Sr. No.	**Name**	**Author**	**Publisher**
1.	Python Programming: A Practical Approach	Vijay Kumar Sharma, Vimal Kumar, Swati Sharma, Shashwat Pathak	Chapman & Hall / CRC Press (Taylor & Francis Group)
2.	Problem Solving Using Python Programming	Dr. K. Purushotam Naidu, Dr. V. Laksmana Rao, S. Sumahasan	Jack Sparrow Publishers
3.	Programming with Python	T. R. Padmanabhan	Springer

PROGRAMME CODE- UG059

Course Code	CSE367
Course Title	Four weeks industrial training evaluation (undertaken after 4thsem)
Type of Course	SEC
L:T:P	
Credits	3
Course Prerequisites	Basic knowledge related to the training field (for example): **Programming basics** (C, C++, Java, Python) for software training. **Networking basics** for networking training. **Electronics fundamentals** for electronics training
Course Objectives	To give students practical exposure to real industrial environments and improve their technical and professional skills. **The learner will be able to** 1. Understand the working environment and organizational structure of an industry or company. 2. Apply **theoretical knowledge gained in the classroom** to real-world industrial applications.

The four-week industrial training syllabus is designed to provide students with practical exposure to real industrial environments. During the training period, students learn about the organization's structure, working procedures, safety practices, and technologies used in the industry. They observe and participate in various technical activities related to their field of study and gain hands-on experience with tools, equipment, or software. The training also helps students develop professional skills such as teamwork, communication, and problem-solving. At the end of the training, students are required to prepare and submit a detailed training report based on their learning and experience.

6th Semester

PROGRAMME CODE- UG059

Course Code	**CSE352**
Course Title	**Internet Web Programming**
Type of Course	PC
L T P	4:0:0
Credits	4
Course Prerequisites	Basic knowledge of Program Development and Programming Language Constructs
Course Objectives	This course introduces advanced programming skills for website design. Dynamic content development will be explored through state-of-the-art programming languages for the creation of interactive websites. Students will Create web pages that utilize the most current advances in web development.
Course Outcomes (CO)	The students will be able to: CO1: Understand concepts of Internet, WWW, Email, and HTML. CO2: Perform programs related to forms, table, and CSS using HTML tags. CO3: Implement the concepts of JavaScript, and DOM. CO4: Implement PHP programs and perform MySQL database operations using PHP My Admin**.**

SYLLABUS

UNIT–I: Internet and World Wide Web

Introduction to Internet, Applications of Internet (Email), Internet Service Providers (ISP), Domain Name System (DNS), Domain Name, World Wide Web (WWW), W3C, URL (Uniform Resource Locator), Web Browsers, Search Engines, Web Servers such as Apache and IIS, Proxy Server, HTTP Protocol.

UNIT–II: HTML and CSS

Basic structure of an HTML document, HTML tags and elements, Headings, Paragraphs, Line breaks, Comments, Attributes, Links and Anchor tags, Images, Lists (Ordered and Unordered), Tables, Forms, Input fields, Buttons, Basic CSS integration (inline and internal CSS), Linking external CSS files.

UNIT–III: JavaScript

Introduction to JavaScript, Variables, Data types, Operators, Expressions, Control statements (if–else, switch), Loops (for, while, do–while), Functions, Arrays, Objects, DOM Manipulation, Form Validation, Built-in methods, Linking external JavaScript files.

UNIT–IV: PHP and MySQL

Introduction to PHP, PHP syntax, Variables and Data types, Operators, Control statements (if–else, switch), Loops (for, while, do–while), PHP Functions, Arrays, Strings and String functions, Form handling, GET and

POST methods, Sessions and Cookies, File handling, Connecting PHP with MySQL, Creating databases and tables in MySQL, CRUD operations (Insert, Select, Update, Delete), MySQL queries, Prepared statements, Displaying database results on web pages.

RECOMMENDED BOOKS

Sr. no.	Name	Author(s)	Publisher
1	HTML 5 in simple steps Kogent Learning	Dreamtech press Solutions Inc.	Dreamtech Press
2	HTML: Beginner's guide Wendy Willard Mc Graw Hill	Wendy Willard	Osborne/McGraw-Hill
3	Managing software process	Watts Humphrey	Pearson education
4	Software Engineering – An Engineering Approach	James F. Peters and WitoldPedrycz	Wiley

Course Code	**CSE354**
Course Title	**Software Engineering**
Type of Course	PC
L T P	4:0:0
Credits	4
Course Prerequisites	Overview of Structure and Software Analysis and Design
Course Objectives	This Course Work provides the thorough understanding of the software engineering concepts, and it also gives the ideas of handling the projects in the organizations and in institutes
Course Outcome (CO)	The learner will be able to- 1. Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics Communicate effectively with a range of audiences 3. Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors 4. Analyze, design, verify, validate, implement, apply, and maintain software systems

SYLLABUS

UNIT-I

Introduction: Software Engineering definition, history, evolution of software, software components, applications, software myths, software crisis.

Software Development Lifecycle: Requirements analysis, software design, coding, testing, maintenance

Software Process Models: Waterfall model, prototyping, interactive enhancement, spiral model. Role of Management in software development. Role of metrics and measurement.

UNIT-II

Software Requirement Specification: Problem analysis, requirement specification, validation, metrics, monitoring and control, SRS

UNIT-III

Coding: Top-down and bottom-up, structured programming, information hiding, programming style, and internal documentation. Verification, Metrics, monitoring and control.

Testing: Levels of testing functional testing, structural testing, test plan, test cases specification, and reliability assessment.

UNIT-IV

Software Project Management: Cost estimation, Project scheduling, Staffing, Software configuration

management, Quality assurance, SIX SIGMA, Project Monitoring, Risk management, reverse Engineering CASE Tools.

RECOMMENDED BOOKS

Sr. no.	Name	Author(s)	Publisher
1	Engineering: A Practitioners Approach	Roger Pressman	McGraw Hill
2	Software Engineering	Sommerville	Adison Wesley
3	Managing software process	Watts Humphrey	Pearson education
4	Software Engineering – An Engineering Approach	James F. Peters and Witold Pedrycz	Wiley

Course Code	**CSE356 PROGRAMME CODE- UG059**
Course Title	Programming in Java
Type of Course	PC
L T P	4:0:0
Credits	4
Course Prerequisites	Knowledge of OOPs
Course Objectives (CO)	1. Understand fundamentals of object-oriented programming (OOP) in Java, including defining classes, invoking methods, and using class libraries. 2. Be aware of the important topics and principles of software development. 3. Be able to use the Java SDK environment to create, debug, and run simple Java programs. 4. Understand the principles of inheritance, packages, and interfaces.
Course Outcome	The learner will be able to – 1. Use an Integrated Development Environment (IDE) to write, compile, run, and test simple object-oriented Java programs. 2. Read and make elementary modifications to Java programs that solve real-world problems. 3. Validate input in a Java program. 4. Identify and fix defects and common security issues in code.

SYLLABUS

UNIT-I

Introduction and Features: Fundamentals of object-oriented programming – procedure-oriented programming Vs. object-oriented programming (OOP), Object oriented programming concepts – Classes, object, object reference, abstraction, encapsulation, inheritance, polymorphism, Introduction of eclipse (IDE) for developing programs in Java, Javac, JRE, JDK, JVM, JIT, Bytecode

Review of constructs of C used in JAVA: variables, types and type declarations (Static, Instance, Local) , data types, Operator; conditional expressions, input using scanner class and output statement, loops, switch case, arrays, methods declaration & definition, Static method.

UNIT-II

Classes and Objects: Creation, accessing class members, new keyword, Constructors and its types, Constructor Overloading, Constructor Overriding, Object & Object Reference, this keyword, Access Modifiers .

UNIT-III

Inheritance: Definition of inheritance, types of inheritance, Method Overriding in Inheritance Super Keyword.

Polymorphism: Runtime Polymorphism, Compile-Time Polymorphism, Method Overriding & overloading

UNIT-IV

Abstract class & Interface: Key points of Abstract class & interface, difference between an abstract class & interface, implementation of multiple inheritance through interface.

Exception Handling: Error, Definition of exception handling, Types of error and exception, implementation of keywords like try, catch, finally, throw & throws. importance of exception handling in practical implementation of live projects.

RECOMMENDED BOOKS

Sr. No.	Name	Author	Publisher
1	Java: The Complete Reference	Herbert Schildt	McGraw-Hill Education
2	Programming with Java	E. Bala Guruswamy	McGraw-Hill Education

Course Code	CSR306
Course Title	Digital Forensics and Cyber Crime Investigation
Type of Course	PE
L T P	3:0:0
Credits	3
Course Prerequisites	Students should have basic knowledge of computer networks, operating system fundamentals, and an introduction to cyber security.
Course Objective	To provide students with fundamental knowledge and practical skills to identify, collect, preserve, analyze, and present digital evidence for the investigation **of** cyber-crimes using digital forensic tools and techniques.
Course Outcomes	CO1: Understand the types, scope, and nature of cybercrime. CO2: Apply digital forensic methodologies to identify, preserve, and collect evidence. CO3: Analyze operating system, network, and storage artifacts for investigation purposes. CO4: Use digital forensic tools effectively for cybercrime analysis.

SYLLABUS

UNIT–I: Introduction to Cybercrime & Digital Forensics

1. Cyber Crime: Definition, Nature, Scope, and Classification
2. Emergence of Cybercrime, Conventional crime vs Cybercrime
3. Cyber Law Basics: Indian IT Act, International Perspectives on Cybercrime
4. Cybercrime Scenarios: Social Engineering, Hacking, Malware, Phishing, Stalking, Obscenity Online

UNIT–II: Cybercrime Issues and Investigative Framework

1. Issues in Cybercrime: Unauthorized Access, Intrusions, Viruses & Malicious Code
2. Cybercrime against Individuals and Property
3. Law Enforcement Challenges and Responses
4. Cyber Ethics and Cyber Terrorism
5. Components of Cyber Law and Jurisprudence

UNIT–III: Digital Forensics Concepts & Process Models

1. Introduction to Digital Forensics, Forensic Science Fundamentals
2. Digital Forensics Process: Identification, Preservation, Collection
3. Chain of Custody, Forensic Cloning, Evidence Integrity (Hashing)
4. Forensic Analysis of File Systems and Memory
5. Operating System Artifacts: Registry, Recycle Bin, Shadow Copies

UNIT–IV: Forensics Tools & Techniques

1. Digital Forensic Tools: Software and Hardware Solutions
2. Disk Imaging and Forensic Cloning Tools
3. Email Header Analysis, Internet Artifacts, Browser Forensics
4. Case Studies: Social Networking Sites Forensics
5. Network and Mobile Device Forensics (introductory concepts)

RECOMMENDED BOOKS

Sr. No.	Name	Author	Publisher
1	Guide to Computer Forensics and Investigations	Bill Nelson, Amelia Phillips, Christopher Steuart	Cengage Learning
2	*Computer Forensics: Cybercriminals, Laws, and Evidence*	Marie-Helen Maras	Jones & Bartlett Learning

Course Code	**CSE322**
Course Title	**Distributed System**
Type of Course	PE
L T P	3:0:0
Credits	3
Course Prerequisites	Basic knowledge of object-Oriented programming, data structures, threads, operating system concepts.
Course Objectives	This course provides a complete understanding of distributed systems and their various applications in the field of Computer Science.
Course Outcome (CO)	The learner will be able to – 1. Identify the characteristics of distributed systems. 2. Explain the system models of distributed processing and communication. 3. Explain distributed deadlock detection. **4.** Explain distributed transactions and their types.

SYLLABUS

UNIT–I

Characterization of Distributed Systems: Introduction, Examples of Distributed Systems, Issues in Distributed Operating Systems, Resource Sharing and the Web Challenges.

System Models: Architectural Models, Fundamental Models.

Theoretical Foundation for Distributed System: Limitation of Distributed Systems, Absence of Global Clock, Shared Memory, Logical Clocks, Lamppost's & Vector Logical Clocks, Causal Ordering of Messages, Global State, and Termination Detection.

UNIT–II

Distributed Mutual Exclusion: Classification of Distributed Mutual Exclusion, Requirement of Mutual Exclusion Theorem, Token-based and non-token-based Algorithms, and Performance Metric for Distributed Mutual Exclusion Algorithms.

Distributed Deadlock Detection: System Model, Resource vs Communication Deadlocks, Deadlock Prevention, Avoidance, Detection and Resolution, Centralized Deadlock Detection, Distributed Deadlock Detection, Path Pushing Algorithms, Edge Chasing Algorithms.

UNIT–III

Agreement Protocols: Introduction, System Models, Classification of Agreement Problems – Interactive Consistency Problem, Applications of Agreement Algorithms.

Distributed Objects and Remote Invocation: Communication between Distributed Objects, Remote Procedure Call (RPC), Events and Notifications, Java RMI Case Study.

Transactions and Concurrency Control: Transactions, Nested Transactions, Locks, Optimistic Concurrency Control, Timestamp Ordering, Comparison of Methods for Concurrency Control.

UNIT–IV

Distributed Transactions: Introduction, Flat and Nested Distributed Transactions, Atomic Commit

Protocols, Concurrency Control in Distributed Transactions, Distributed Deadlocks, Transaction Recovery.
Distributed Shared Memory: Design and Implementation Issues, Consistency Models.
CORBA Case Study: CORBA RMI, CORBA Services.
File System: File Service Components, Design Issues, Interfaces, Implementation Techniques, Sun Network File System – Architecture and Implementation, Other Distributed File Systems – AFS, CODA.
Name Services: SNS Name Service Model.

RECOMMENDED BOOKS

Sr. No.	Name	Author	Publisher
1	Advanced Concepts in Operating Systems	Mukesh Singhal & Niranjan G. Shivaratri	Tata McGraw Hill
2	Distributed Operating Systems	Tanenbaum	Pearson Education

PROGRAMME CODE- UG059

Course Code	CSE324
Course Title	Wireless Communications
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Nil
Course Objectives	To gain an understanding of the principles behind the design of wireless communication systems and technologies.
Course Outcome (CO)	The learner will be able to- 1. Understand and explain the Classification of mobile communication systems. 2.Examine state-of-the-art distributed systems, such as Google File System. 3. Learn the principles, architecture, algorithms and programming models used in distributed systems

Syllabus

UNIT-I

Introduction: A basic cellular system, performance criteria, operation of cellular systems, planning a cellular system, analog & digital cellular systems. Examples of Wireless Communication Systems: Paging Systems, Cordless Telephone Systems, Cellular Telephone Systems.
GSM system : Architecture and features; GSM Services; Authentication; Incoming & outgoing call flow ; Hand over in GSM.

UNIT-II
Digital Communication through fading multipath channels: Fading types and their characteristics. Concept of diversity branches and signal paths- Combining methods- Selective diversity combining-pre-detection and post- detection combining- Switched combining- maximal ratio combining- Equal gain combining. Different types of channels: Control & Traffic channels.
BTS hardware: Introduction of BTS 3900 series; Baseband unit (BBU); Radio Frequency unit (RFU); Description of Cards; Login to BTS 3900
UNIT-III
Multiple Access Techniques for Wireless Communications: Introduction, Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Spread Spectrum Multiple Access, CDMA (code division multiple access), Space Division Multiple Access. WCDMA (wideband CDMA) features and architecture, handoff and its types.
UNIT-IV
Wireless Systems & Standards: GPRS/EDGE specification features and architecture, 3G systems: Application of 3G & UMTS & CDMA 2000 standards, specifications and architecture of UMTS, Forward CDMA Channel, Reverse CDMA Channel. BSC Hardware: Introduction to 6900 series; MPR & EPR; Description of Cards; Login to BSC 6900. Future trends: Blue Tooth technology, 4G mobile techniques, Wi-Fi Technology advance system, Zigbee.

RECOMMENDED BOOKS

Sr. No.	Name	Author	Publisher
1	Wireless Communications	T.S. Rappaport,	Principles Edition, and Practice, 2nd Pearson Education Asia, 2010.

PROGRAMME CODE- UG059

Course Code	**CSE326**
Course Title	**Block Chain**
Type of Course	PE
L T P	3:0:0
Credits	3
Course Prerequisites	This course has no prerequisite other than knowledge of probability and statistics, and programming skills.
Course Objectives	The objective of this course is to teach students the architecture of blockchain. By taking this course, the students are expected to Understand the basic algorithms, and be able to apply these techniques to financial service, supply chain.
Course Outcome (CO)	The learner will be able to- 1. Understand the basic architecture of blockchain. 2. Understand theory of bitcoin. 3. Describe components of blockchain. 4. Explain applications of blockchain in financial service, supply chain.

SYLLABUS

Unit-I

Introduction to Blockchain – I : Basics, History, Architecture, Conceptualization, Bitcoin basics.

Unit-II

Consensus in Bitcoin – I (The Basics, Pow and Beyond, The Miners), Permissioned Blockchain (Basics, Consensus)

Unit-III

Blockchain for Enterprise – Overview, Blockchain Components and Concepts, Hyperledger Fabric Transaction Flow, Hyperledger Fabric Details. Fabric – Membership and Identity Management **Unit-IV**

Blockchain Use Cases. Blockchain in Financial Service (Payments and Secure Trading, Compliance and Mortgage, Financial Trade). Blockchain in Supply Chain Blockchain in Other Industries. Blockchain in Government (Advantages, Use Cases, Digital Identity)

RECOMMENDED BOOKS		
Name	**AUTHOR(S)**	**PUBLISHER**
Blockchain	Melanie Swa, O'Reilly	O'Reilly
Zero to Blockchain, An IBM Redbooks course	Bob Dill, David Smits	https://www.redbooks.ibm.com/Redbooks.nsf/RedbookAbstracts/crse0401.html

PROGRAMME CODE- UG059

Course Code	**CSE376**
Course Title	**ADVANCE DATA BASE MANAGEMENT SYSTEM**
Type of Course	PE
L T P	3:0:0
Credits	3
Course Prerequisites	Basic knowledge of database and relational database management systems.
Course Objectives	This course is intended to provide an understanding of the current theory and practice of database management systems, and a solid technical overview of database management systems.
Course Outcome (CO)	The learner will be able to – **CO1:** Explain the features of database management systems and relational databases. **CO2:** Analyze the existing design of a database schema using ER diagrams and apply concepts of normalization to design an optimal database. **CO3:** Identify the need for concurrent transactions and locking, and explain their types, advantages, and disadvantages. **CO4:** Formulate query solutions using SQL for a broad range of queries and data update problems.

Syllabus

Unit-I

Introduction: Introduction to DBMS, RDBMS, Types of DBMS and their advantages and disadvantages, E-R Diagram, Keys, Normalization, Query optimization

Transaction management and Concurrency control: Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Two-phase locking, Multiple Granularity, Timestamp based Protocol. Time stamping methods, optimistic methods, database recovery management

Unit-2

Distributed Databases: Basic concepts, structure, trade-offs Methods of data distribution – fragmentation, replication, design & advance concepts of DDBMS like Two-phase commit protocol, distributed transaction, distributed concurrency control, distributed deadlock handling.

Introduction to object-oriented databases: Object Oriented Data model, Object Oriented Database Management System, Object Query Language, Object Oriented Relational Database Management System and its concepts.

Unit-3

Data warehousing Concepts: Architecture, Data-flows, Tools & Technologies, Data Marts, Data Mining and Online Analytical Processing.

Unit-4

Emerging Database Technologies: Spatial & Multimedia databases, Mobile Computing & Mobile Databases, OLAP, data mining, data warehouse, multimedia database, geographical database, spatial database.

RECOMMENDED BOOKS

Sr.no.	Name	AUTHOR(S)	PUBLISHER
1	Advanced database management system	Rini Chakrabarti, Shilbhadra Das Gupta	Wiley India Pvt. Ltd.
2	Distributed Databases	Ozsuand Valduriez	Pearson Education
3	Advanced Database Management System	VaishaliP. Yadav	Pearson Education India

PROGRAMME CODE- UG059

Course Code	**MDC018**
Course Title	**Gender, Culture and Development**
Type of Course	MDC/HS
LTP	3:0:0
Credits	3
Course Prerequisite	None
Course Objectives (CO)	The objective of this course is to build an understanding and initiate and strengthen programs combating gender-based violence and discrimination
Course Outcomes	Upon completion of this course, students will be able to – 1. Understand basic gender concepts. 2. Explain gender roles and relationship matrix. 3. Identify gender-based violence from a human rights perspective. 4. Develop relationship between gender, development, and violence.

SYLLABUS

UNIT–I Introduction to Gender

1. Definition of Gender
2. Basic Gender Concepts and Terminology
3. Exploring Attitudes towards Gender
4. Social Construction of Gender

UNIT–II Gender Roles and Relations

1. Types of Gender Roles
2. Gender Roles and Relationships Matrix
3. Gender-based Division and Valuation of Labour

UNIT–III Gender Development Issues

1. Identifying Gender Issues
2. Gender Sensitive Language
3. Gender, Governance and Sustainable Development
4. Gender and Human Rights

- Gender-based Violence

1. The Concept of Violence
2. Types of Gender-based Violence
3. The Relationship between Gender, Development and Violence
4. Gender-based Violence from a Human Rights Perspective

UNIT–IV Gender and Culture

1. Gender and Film
2. Gender and Electronic Media
3. Gender and Advertisement
4. Gender and Popular Literature

RECOMMENDED BOOKS

Sr. No.	**Name**	**Author**	**Publisher**
1	Gender and Development	Janet Henshall Momsen	Routledge
2	Gender and Culture	Chris Weedon	Blackwell Publishing

Course Code	**CSR302**
Course Title	**Open-Source Technologies**
Type of Course	**PC**
L: T:P	**4:0:0**
Credits	**4**
Course Prerequisites	Basic knowledge of Computer Fundamentals and Programming Concepts.
Course Objectives	1. To introduce the concepts and philosophy of Open-Source Software (OSS). 2. To understand open-source licensing models and development processes. 3. To study major open-source projects and their applications. 4. To familiarize students with open-source tools and technologies used in software development.
Course Outcome (CO)	CO1: Understand the basic concepts, history, and importance of Open-Source Software**.** CO2**:** Explain different open-source licenses, copyright, and legal issues**.** CO3: Analyze popular open-source projects and development models**.** CO4: Use open-source tools and technologies for software development and deployment**.**

SYLLABUS

Unit-1: Introduction to Open Source

- Definition of Open-Source Software (OSS)
- History and evolution of Open Source
- Free Software vs Open-Source Software
- Public Domain Software
- Open-Source Principles and Philosophy
- Open Standards and Open Formats
- Advantages and disadvantages of Open Source
- Open-Source Development Model
- Role of Open Source in software industry

Unit-2: Open-Source Licensing and Methodology

- Introduction to Software Licensing
- Types of Open-Source Licenses
  - GPL (General Public License)

- LGPL
- BSD License
- Apache License
- Copyright, Copyleft and Patents
- Open-Source Initiative (OSI)
- Open-Source Development Process
- Software Freedom and Community Development
- Economic aspects of FOSS (Free and Open-Source Software)
- Revenue and business models in Open Source

Unit-3: Case Studies of Open-Source Projects

- Linux Operating System
- Apache Web Server
- Mozilla Firefox
- Wikipedia
- Joomla CMS
- GCC Compiler
- OpenOffice / LibreOffice
- Contribution and collaboration in Open-Source projects
- Community-driven development models

Unit-4: Open-Source Tools and Technologies

- Open-Source Development Tools
- IDEs
- Debuggers
- Version Control Systems (Git)
- Open-Source Programming Languages
- LAMP Stack (Linux, Apache, MySQL, PHP)
- Open-Source Databases (MySQL, PostgreSQL)
- Virtualization Technologies
- Containerization (Docker)
- Starting and maintaining Open-Source projects
- Impact and future of Open-Source Technologies

RECOMMENDED BOOKS

PROGRAMME CODE- UG059

Sr. No.	Name	Author	Publisher
1	***Open-Source Technology***	Kailash Vadera, Bhavyesh Gandhi	Laxmi Publications Pvt. Ltd

Course Code	**CSR304**
Course Title	**Open-Source Technologies Laboratory**
Type of Course	PC
L T P	0:0:2
Credits	1
Course Prerequisites	Basic knowledge of computer fundamentals, operating systems, and basic programming concepts. Familiarity with basic networking and database concepts is desirable.
Course Objective	1. To introduce students to the concepts and importance of open-source technologies. 2. To provide practical knowledge of Linux operating system and shell scripting. 3. To develop skills in installing, configuring, and using open-source software tools. 4. To enable students to develop simple applications using open-source platforms such as LAMP stack.
Course Outcomes	CO1: Understand and use various open-source operating systems and tools. CO2: Perform basic Linux operations and write shell scripts. CO3: Install, configure, and manage open-source software such as Apache, MySQL, and PHP. CO4: Develop simple web applications using open-source technologies.

List of Practical Experiments

1. **Installation of Linux Operating System** (Ubuntu/Fedora/CentOS) and basic configuration.
2. Study and execute **basic Linux commands** such as ls, pwd, mkdir, rmdir, cp, mv, rm, cat, grep.
3. Explore the **Linux directory structure** and identify directories like /home, /etc, /var, /usr.
4. Create, edit, and manage files using **vi/vim editor**.
5. Demonstrate **file permissions and ownership** using chmod, chown, and umask.
6. Create and manage **users and groups** using commands like useradd, passwd, and groupadd.
7. Write **simple shell scripts** to perform arithmetic operations and display system information.
8. Write shell scripts for **file manipulation and text processing**.
9. Demonstrate **input and output redirection and piping** in Linux.
10. Install and configure **Apache Web Server**.
11. Install and configure **MySQL database server** and perform basic SQL operations.
12. Install **PHP** and create a simple PHP program to display output on a web page.
13. Develop a **simple HTML form and process it using PHP (GET and POST methods)**.
14. Create a **database-driven web application using PHP and MySQL** (CRUD operations).

15. Install and configure the **LAMP Stack (Linux, Apache, MySQL, PHP)**.
16. Demonstrate **Git installation and configuration** on Linux.
17. Create a **Git repository**, add files, commit changes, and track version history.
18. Demonstrate **Git branching, merging, and cloning repositories** from GitHub.
19. Install and use an **open-source IDE** such as Eclipse or NetBeans for programming.
20. Mini Project: Develop a **simple open-source web application using Linux, PHP, and MySQL**.

RECOMMENDED BOOKS

Sr. No.	Name	Author	Publisher
1	Linux Labs and Open-Source Technologies	Prof. Dayanand Ambawade, Deven Shah	Dreamtech Press
2	Understanding Open-Source Software Development	Joseph Feller, Brian Fitzgerald	Pearson Education

PROGRAMME CODE- UG059

Subject Code	**CSE382**
Course Title	**Internet Web Programming-Laboratory**
Type of Course	PC
LTP	0:0 :2
Credits	1
Course Prerequisite	Basic knowledge of Program Development and Programming Language Constructs
Course Objectives	This course introduces advanced programming skills for website design. Dynamic content development will be explored through state-of-the-art programming languages for the creation of interactive web sites. Students will create web pages that utilize the most current advances in web development.
Course Outcomes (CO)	The learner will be able to- 1. Implement interactive web page(s) using HTML, CSS and JavaScript. Design a responsive web site using HTML5 and CSS3. 3. Describe and differentiate different Web Extensions and Web Services. 4. Build Dynamic web site using server-side PHP Programming and Database connectivity.

SYLLABUS

List of Practical's

1. Create a Basic Web Page using HTML
   Design a simple webpage containing headings, paragraphs, images, and links.

2. Design a Student Registration Form using HTML
   Create a form including text fields, radio buttons, checkboxes, dropdown lists, and submit/reset buttons.

3. Apply Basic CSS Styling to a Web Page
   Use inline and internal CSS to style text, backgrounds, borders, and layouts.

4. JavaScript Form Validation Practical
   Validate fields such as name, email, phone, and password (required fields, length, pattern, etc.).

5. JavaScript DOM Manipulation Practical
   Modify content, styles, and elements using functions and events (onclick, on change, etc.).

6. PHP Script for Form Handling using POST Method
   Collect form data and display it back to the user using PHP.

7. PHP + MySQL: Insert and Display Records
   Create a database and table (e.g., students), insert form data, and fetch results to display on a webpage.

8. CRUD Operations using PHP and MySQL
   Implement Create, Read, Update, and Delete operations for a small module (e.g., student records or products.

9. Demonstrate the use of website designing tools such as Joomla and WordPress.

RECOMMENDED BOOKS

Sr. No.	**Name**	**Author**	**Publisher**
1	Internet & World Wide Web: How to Program	Paul Deitel, Harvey Deitel	Routledge
2	Web Programming: Building Internet Applications	Chris Bates	Wiley India

PROGRAMME CODE- UG059

Subject Code	**CSE384**
Course Title	**Programming in Java Laboratory**
Type of Course	PC
LTP	0:0:2
Credits	1
Course Prerequisite	Basic knowledge of programming concepts and familiarity with computers.
Course Objectives	1. To provide practical knowledge of Java programming. 2. To understand the use of classes, objects, and methods in Java. 3. To develop programs using concepts such as inheritance, interfaces, and packages. 4. To practice compiling, debugging, and running Java programs using the Java SDK environment.
Course Outcomes (CO)	CO1: Write, compile, and execute simple Java programs. CO2: Apply object-oriented programming concepts using Java. CO3: Develop Java programs using inheritance, interfaces, and packages. CO4: Debug and test Java programs effectively.

LIST OF PRACTICALS

1. **Java Installation and Setup** – Install JDK, set environment variables, and run a simple "Hello World" program.
2. **Classes and Objects** – Demonstrate classes, objects, and object references.
3. **Procedure-Oriented vs Object-Oriented Programming** – Show the difference between the two paradigms.
4. **Abstraction and Encapsulation** – Implement abstract classes/interfaces and use private variables with getters/setters.
5. **Inheritance** – Demonstrate single, multilevel, and hierarchical inheritance.
6. **Polymorphism** – Show method overriding (runtime) and method overloading (compile-time).
7. **Constructors and this Keyword** – Demonstrate constructors, constructor overloading, and usage of this.
8. **Access Modifiers** – Implement private, public, protected, and default access.
9. **Super Keyword** – Use super to invoke superclass constructors and methods.

10. **Exception Handling** – Demonstrate try, catch, finally, throw, throws, and checked/unchecked exceptions.
11. **Interfaces and Abstract Classes** – Demonstrate multiple inheritance using interfaces and compare with abstract classes.
12. Develop a Java application to showcase error and exception types, such as checked exceptions, unchecked exceptions, and errors.
13. Implement a Java program demonstrating runtime polymorphism through overriding methods.
14. Write a Java application illustrating compile-time polymorphism through method overloading.
15. Create a Java program demonstrating the implementation of multiple inheritance using interfaces.
16. Design a Java application showcasing the usage of abstract classes and interfaces, highlighting their differences and similarities.

RECOMMENDED BOOKS

Sr. No.	Name	Author	Publisher
1	Java: The Complete Reference	Herbert Schildt	McGraw-Hill Education
2	Programming with Java	E.Balagurusamy	McGraw-Hill Education

7th Semester

PROGRAMME CODE- UG059

Course Code	**CSE451**
Course Title	**Cryptography**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Basic Knowledge of complexity theory, algorithms, game theory, machine learning
Course Objectives	This course work provides the thorough understanding of thenetwork security and various cryptography techniques to obtain security on network and a computer.
Course outcome(CO)	The learner will be able to- 1. Understand concepts related to security attacks, encryption, decryption techniques, and substitution and transposition techniques. 2. Describe principles of public key cryptography, RSA algorithm. 3. Explain authentication requirements and use of hash function

SYLLABUS

UNIT-I

Introduction: Attacks, Services and Mechanisms, Security attacks, security services, model for internetwork security. Conventional Encryption: Conventional Encryption Model, steganography, Classical Encryption Techniques: Substitution Techniques, Transposition Techniques.

UNIT-II

Modern Encryption Techniques: Simplified Data Encryption Standard, Block Cipher Principles. ***The Data Encryption Standard, Strength of DES.***

Encryption Algorithms: Triple DES, International Data Encryption Algorithm, Blowfish.

UNIT-III

Confidentiality using Conventional Encryption: Placement of Encryption Function, Traffic Confidentiality, Key distribution, Random Number Generation.

Public- Key Cryptography: Principles of Public- Key Cryptosystems, RSA algorithm, Key Management, Diffie-Hellman Key.

UNIT-IV

Message Authentication and Hash Functions: Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Security of hash Functions and MACs, Digital Signatures, Authentication Protocols, SHA-1, RC-4,RC-5.

Course Code	**CSR113**
Course Title	**Malware Analysis and reverse engineering**
Type of Course	PE
L T P	3:0:0
Credits	3
Course Prerequisites	Basic knowledge on Networks and security.
Course Objective	To introduce the malware taxonomy and malware analysis tools. Also to identify and analyse malware samples using static, dynamic analysis, and reverse engineering techniques, and to detect and analyse malicious documents and mobile malware.
Course Outcomes	The learner will be able to – CO1: Possess the skills to carry out static and dynamic malware analysis on various malware samples. CO2: Understand the executable formats, Windows internals, and APIs. CO3: Apply techniques and concepts to unpack, extract, and decrypt malware. CO4: Comprehend reverse-engineering of malware and anti-malware analysis. CO5: Achieve proficiency with industry-standard malware analysis tools.

Syllabus

UNIT:I

Fundamentals of Malware Analysis: Malware taxonomy – Malware analysis techniques – Packed and Obfuscated Malware – Portable Executable File Format: Headers and Sections – Malware Analysis in Virtual Machines – Malware Analysis Tools: ProcMon / ProcExplore, BinText, FileAlyzer, OllyDbg, etc.

UNIT:II

Static Analysis: File signature analysis and identifying file dependencies – Database of file hashes – String analysis – Local and online malware sandboxing – Levels of abstraction – x86 Architecture – x86 / x86_64 Assembly – Static Analysis Tools: PeiD, Dependency Walker, and Resource Hacker.

UNIT:III

Dynamic Analysis: Source level vs. Assembly level Debuggers – Kernel vs. User-Mode Debugging Exceptions – Modifying Execution with a Debugger – Modifying Program Execution in Practice – DLL analysis – Dynamic Analysis Tools: Virus total, Malware Sandbox, Windows Sysinternals.

Reverse Engineering: Reverse engineering malicious code – Identifying malware passwords – Bypassing authentication – Advanced malware analysis: Virus, Trojan and APK Analysis – Reverse Engineering Tools: IDA Pro and OLLYDBG.

UNIT:IV

Malicious Document Analysis: PDF and Microsoft Office document structures – Identify PDF and Office document vulnerabilities – Analysis of suspicious websites – Examining malicious documents: Word, XL, PDF, and RTF files – Malware extraction and analysis tools.

Anti-Reverse-Engineering: Anti-Disassembly – Anti-Debugging – Anti-Forensic Malware – Packers and Unpacking – Shellcode Analysis – 64-Bit Malware.

UNIT:V

Mobile Malware Analysis: Mobile application penetration testing – Android and iOS vulnerabilities – Exploit prevention – Handheld exploitation – Android root – Spreading and distribution – Android debugging.

Machine learning techniques for malware analysis: Support Vector Machine (SVM), K-Nearest Neighbour (KNN), Random Forest (RF), Decision Trees (DT), Naïve Bayes (NB), and Neural Networks (NN).

RECOMMENDED BOOKS

Sr. no.	Name	Author(s)	Publisher
1	The Malware Analyst's Cookbook and DVD	Michael Ligh, Steven Adair, Blake Hartstein, Matthew Richard	Wiley
2	Practical Malware Analysis	Michael Sikorski and Andrew Honig	No Starch Press

Course Code	**CSE455**
Course Title	**Natural Language Processing**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Objectives	The objective of this course is to provide knowledge of the fundamentals of speech and text processing
Course Outcomes(CO)	The learner will be able to- 1. Understand basic concepts of Natural language processing 2. Explain Machine translation and speech recognition

SYLLABUS

UNIT-I

Introduction: Natural Language Processing (NLP), Challenges of NLP, NLP applications, Processing of Indian Languages.

UNIT-II

Structures: Theories of Parsing, Parsing Algorithms; Robust and Scalable Parsing on Noisy Textas in Web documents; Hybrid of Rule Based and Probabilistic Parsing; Scope Ambiguity and Attachment Ambiguity resolution.

UNIT-III

Understanding Part of Speech or Text Processing: Tokenization, Sentence segmentation or Splitting, Normalization

UNIT-IV

Words and Word Forms: Morphology fundamentals; Morphological Diversity of Indian Languages; Morphology Paradigms; Finite State Machine Based Morphology; Automatic Morphology Learning; Shallow Parsing; Named Entities; Maximum Entropy Models; Random Fields, Scope Ambiguity and Attachment Ambiguity resolution

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Natural Language Understanding	Allen, James	Second Edition, Benjamin/Cumming
2	Statistical Language Learning	Charniack, Eugene	MIT Press
3	Speech and Language Processing	Jurafsky, Dan and Martin, James	Second Edition, Prentice Hall
4	Foundations of Statistical Natural Language Processing	Manning, Christopher and Heinrich, Schutze	MIT Press.

Course Code	**CSE477**
Course Title	**Data mining in Business Intelligence**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Basic knowledge of Computer Graphics & Image Processing.
Course Objectives	Students will be enabled to understand and implement classical models and algorithms in data mining.
Course Outcomes (CO)	The learner will be able to- 1. Understand Data mining and its scope. 2. Understand various data mining techniques 3. Describe supervised and unsupervised clustering techniques 4. Illustrate applications of data mining using real life examples

SYLLABUS

UNIT-I

Introduction to Data Mining: Introduction: Scope of Data Mining: What is Data Mining; How does Data Mining Works, Predictive Modeling: Data Mining and Data Warehousing: Architecture for Data Mining: Profitable Applications: Data Mining Tools: Data Preprocessing: Introduction, Data Preprocessing Overview, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

UNIT-II

Data Mining Techniques- An Overview: Introduction, Data Mining, Data Mining Versus Database Management System, Data Mining Techniques- Association rules, Classification, Regression, Clustering, Neural networks.

UNIT-III

Clustering: Introduction, Clustering, Cluster Analysis, Clustering Methods- K means, Hierarchical clustering, Agglomerative clustering, Divisive clustering, clustering and segmentation software, evaluating clusters.

UNIT-IV

Applications of data mining: Introduction, Business applications using data mining- Risk Management and targeted marketing, Customer profiles and feature construction, Medical applications, Scientific applications using data mining

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Introduction to Data Mining	Pang-Ning Tan, Michael Steinbach, Vipin Kumar	Pearson Education India
2	Data Mining	Pieter Adrians, Dolf zantinge	Pearson Education India
3	Database Management Systems	R. Ramakrishnan, J.	McGraw Hill

Course Code	**CSE459**
Course Title	**Computer Graphics**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Computer graphics (basics), linear algebra, programming
Course Objectives	The main objective of this course is to give the student a comprehensive understanding of computer graphics and visualization and their applications. In particular participants will have the ability to understand the process of generating virtual images from virtual scenes, typically identified as a pipeline of generate, computer and store/display
Course Outcomes (CO)	The learner will be able to- 1. Understand the fundamental graphical operations and the implementation on computer. 2. Get a glimpse of recent advances in computer graphics. 3. Describe user interface issues that make the computer easy for then ovice to use. 4. Discuss interface issues that make the computer easy for the novice to use.

SYLLABUS

UNIT-I

Introduction - History of computer graphics, applications, graphics pipeline, physical and synthetic images, synthetic camera, modeling, animation, rendering, relation to computer vision and image processing, review of basic mathematical objects (points, vectors, matrix methods)

Introduction to OpenGL - OpenGL architecture, primitives and attributes, simple modeling and rendering of two- and three-dimensional geometric objects, indexed and RGB color models, frame buffer, double buffering, GLUT, interaction, and callbacks, picking.

UNIT-II

Geometric transformations- Homogeneous coordinates, affine transformations (translation, rotation, scaling, shear), concatenation, matrix stacks and use of model view matrix in OpenGL for these operations. **Viewing** - Classical three-dimensional viewing, computer viewing, specifying views, parallel and perspective projective transformations; Visibility- Z-buffer, BSP trees, Open-GL culling, hidden- surface algorithms.

UNIT-III

Shading - Light sources, illumination model, Gouraud and Phong shading for polygons. Rasterization- Line segment and polygon clipping, 3D clipping, scan conversion, polygonal fill, Bresenham's algorithm.

UNIT-IV

Discrete Techniques- Texture mapping, compositing, textures in OpenGL; Ray Tracing- Recursiveray tracer, ray-sphere intersection.

Representation and Visualization- Bezier curves and surfaces, B-splines, visualization,

interpolation, marching squares algorithm.

RECOMMENDED BOOKS

Sr. no.	Name	Author(s)	Publisher
1	Interactive Computer Graphics. A Top-Down Approach Using OpenGL	Edward Angel	Pearson Education
2	Computer Graphics with OpenGL	Donald Hearn and Pauline Baker	Prentice Hall
3	Computer Graphics using OpenGL	F. S. Hill Jr. and S. M. Kelley	Prentice Hall
4	Computer Graphics (first edition)	Peter Shirleyand Steve Marschner	A. K. Peters

PROGRAMME CODE- UG059

Course Code	**CSR110**
Course Title	**Network Security and Cyber Crime Analysis**
Type of Course	PC
L TP	4:0:0
Credits	4
Course Prerequisites	Basic knowledge of computer system
Course Objectives (CO)	The main aim of this course is to provide knowledge about how to secure our data on the Internet.
Course Outcome	1. The students will be able to: 2. Implement cyber security best practices and risk management. 3. Integrate network monitoring and present real-time solutions. 4. Assess the impact of cybersecurity risks in an ethical, social, and professional manner. 5. Learn the basics of cyber laws and cyber forensics.

SYLLABUS

UNIT – I

Introduction to Cyber Security: Basic concepts, CIA triad, active/passive attacks, and threat actors.

Network Security: Firewalls, VPNs, intrusion detection/prevention systems (IDS/IPS), and network protocols.

UNIT – II

Cyber Crime Analysis & Investigation: Types of cybercrimes (phishing, fraud, extortion), forensic investigation methods, and data recovery.

UNIT – III

Ethical Hacking & Penetration Testing: Vulnerability assessment, social engineering, and web application security.

UNIT – IV

Cyber Law & Policy**:** Indian IT Act, intellectual property rights, and security policies.

RECOMMENDED BOOKS		
Name	**AUTHOR(S)**	**PUBLISHER**
Cybersecurity and Cyberwar: What Everyone Needs to Know®	Allan Friedmanand P. W. Singer	Oxford University Press
Cyber security for Beginners	Raef Meeuwisse	Cyber Simplicity Limited

PROGRAMME CODE- UG059

Course Code	**CSE 403**
Course Title	**Cybersecurity**
Type of Course	PC
LTP	4 0 0
Credits	4
Course Prerequisites	Basic knowledge of computer system
Course Objective(CO)	The main aim of this course is to provide knowledge about how to secure our data on the Internet.
Course Outcome(CO)	The students will be able to: 1. Implement cyber security best practices and risk management. 2. Integrate network monitoring and present real-time solutions. 3. Assess the impact of cybersecurity risks in an ethical, social, and professional manner. 4. Learn the basics of cyber laws and cyber forensics.

SYLLABUS

UNIT – I

Introduction to Cyber Security: Overview of Cyber Security; Cyber Threats – Cyber Warfare, Cyber Crime, Cyber Terrorism, Cyber Espionage.

Cyber Security Vulnerabilities and Cyber Security Safeguards:

- **Cyber Security Vulnerabilities –** Overview; vulnerabilities in software; system administration; complex network architectures; open access to organizational data; weak authentication; unprotected broadband communications; poor cyber security awareness.
- **Cyber Security Safeguards –** Overview; access control; audit; authentication; biometrics; cryptography; deception; denial of service filters; ethical hacking; firewalls; intrusion detection systems; response; scanning; security policy; threat management.

UNIT – II

Securing Web Applications, Services, and Servers: Introduction; basic security for HTTP applications and services; basic security for SOAP services; identity management and web services; authorization patterns; security considerations; challenges.

Intrusion Detection and Prevention: Intrusion; physical theft; abuse of privileges; unauthorized access by outsiders; malware infection; intrusion detection and prevention techniques; anti-malware software; network-based intrusion detection systems; network-based intrusion prevention systems; host-based

intrusion prevention systems; security information management; network session analysis systems; system integrity validation.

UNIT – III

Cryptography and Network Security: Introduction to cryptography; symmetric key cryptography; asymmetric key cryptography; message authentication; digital signatures; applications of cryptography.

Overview of Firewalls: Types of firewalls; user management; VPN security.

Security Protocols:

- Security at the application layer – PGP and S/MIME.
- Security at the transport layer – SSL and TLS.
- Security at the network layer – IPSec.

UNIT – IV

Cyberspace and the Law: Introduction; cyber security regulations; roles of international law; the state and private sector in cyberspace; cyber security standards.

The Indian Cyberspace: National Cyber Security Policy 2013.

RECOMMENDED BOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1.	Cybersecurity and Cyberwar: What Everyone Needs to Know®	Allan Fried manand P. W. Singer	Oxford University Press
2.	Cyber security for Beginners	Raef Meeuwisse	Cyber Simplicity Limited

PROGRAMME CODE- UG059

Course Code	**CSR111**
Course Title	**DevOps Engineering**
Type of Course	PC
L TP	4:0:0
Credits	4
Course Prerequisites	1. Knowledge of Linux Operating system, installation and configuration of services and command line basics. 2. Basics of Computer Networks and Software 3. Software Development Life cycle.
Course Objectives	The objective of this course is to understand the fundamentals of DevOps engineering and be fully proficient with DevOps terminologies, concepts, benefits, and deployment options to meet real world software development requirements
Course Outcomes (CO)	On completion of the course, learner will be able to: 1. Apply DevOps principles to meet software development requirements.

SYLLABUS

UNIT – I

Introduction to Software Engineering and Process Model: Software Engineering-process framework, Software Development Life Cycle (SDLC) Process Models: Incremental and Evolutionary models 06 2 Fundamentals of Agile Process: Need of Agile software development, Agile Manifesto and Principles, Stakeholders and Challenges, Overview of Agile Development Models: Scrum, Extreme Programming, Feature Driven Development, Crystal, Kanban, and Lean Software Development, Methods, Values, Roles, Artifacts, Stakeholders, and challenges. Business benefits of software agility. Introduction to Scrum: Agile Scrum Framework, Scrum Artifacts, Meetings, Activities and Roles, Scrum Team Simulation, Scrum Planning Principles, Product and Release Planning, Sprinting: Planning, Execution, Review and Retrospective; User story definition and Characteristics, Acceptance tests and Verifying stories, Burn down chart, Daily scrum, Scrum Case Study

UNIT – II

Introduction to Architectures: Introduction to Model View Controller (MVC) Framework: History of MVC, Features of MVC, MVC Architecture, MVC Examples, Popular MVC Frameworks, Advantages and Drawbacks of MVC, 3-Tier Architecture Vs MVC Architecture. 10 The Reactive Manifesto: Introduction, Reactive Principles, Reactive Systems vs Reactive Programming Clean architecture: Introduction, The Dependency Rule, A Typical Scenario..

UNIT – III

SOLID Design principles: Introduction, The Single Responsibility Principle, The OpenClosed Principle, The Liskov Substitution Principle, The Interface Segregation Principle The Dependency Inversion Principle. Reactive architecture: Introduction, Design Principles of Reactive Systems, commands and Events, Commands, Events, Messages, Commands Versus Events: An Example Destinations and Space Decoupling, Time Decoupling, The Role of Nonb locking Input/Output, Blocking Network I/O, Threads, and Concurrency, How Does Non blocking I/O Work? Reactor Pattern and Event Loop, Anatomy of Reactive Applications.

UNIT – IV

Core Technologies of Spring Framework: Introduction to Object oriented programming concept, Spring– Environment Setup, Spring beans and its scopes, Spring bean lifecycle, how to create a bean using Factory Bean? How to create a bean using static Factory Bean? Best Practices of spring Framework, Spring Dependency Injection and Inversion of Controls, Spring Java Configuration vs XML configuration. 06 6 Spring Event Handling and Aspect Oriented Programming (AOP): Event Handling in Spring, Custom Events in Spring, AOP Concepts, Types of AOP, AOP in Spring, AOP Spring Architecture, Framework Services for AOP, Using spring boot Code structure, Springs and dependency injection, spring boot Runners, Spring Boot - Application Properties

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RECOMMENDED BOOKS

Sr.no.	Name	AUTHOR(S)	PUBLISHER
1	Introduction to Data Mining	Pang-Ning Tan, Michael Steinbach, Vipin Kumar	Pearson Education India
2	Data Mining	Pieter Adrians, Dolf zantinge	Pearson Education India
3	Database Management Systems	R.Ramakrishnan,J.	Mc Graw Hill

PROGRAMME CODE- UG059

Course Code	CSE405
Course Title	**Theory of Automata and Computation**
Type of Course	PC
L T P	4:0:0
Credits	4
Course Prerequisites	Basic knowledge of Discrete mathematics and System programming,
Course Objectives	• Develop a formal notation for strings, languages, and machines. • Design finite automata to accept a set of strings of a language. • Prove that a given language is regular and apply the closure properties of languages. • Distinguish between computability and non-computability, and decidability and undecidability.
Course Outcome(CO)	The student will be able to – • Write a formal notation for strings, languages, and machines. • Design finite automata to accept a set of strings of a language. • For a given language, determine whether the language is regular or not. • Distinguish between computability and non-computability, and decidability and undecidability.

SYLLABUS

UNIT–I

Basic Theory of Automata:
Sets, relations, functions, alphabet, string, languages.

Finite Automata:
Formal languages, deterministic and non-deterministic finite automata, finite automata with ε-moves, equivalence of NFA and DFA, minimization of finite automata, two-way finite automata, Moore and Mealy machines, applications of finite automata.

Regular Expressions:
Definition, algebraic laws, conversion of regular expression (R.E.) to finite automata (F.A.), finite automata to regular expression, applications, regular grammar for finite automata.

UNIT–II

Regular Sets and Context Free Grammars:
Properties of regular sets, context-free grammars, derivation trees, Chomsky Normal Form (CNF) and Greibach Normal Form (GNF), ambiguous and unambiguous grammars.

Pushdown Automata and Parsing Algorithms:
Pushdown automata and context-free languages, top-down parsing and bottom-up parsing, properties of

CFL, applications of pumping lemma, closure properties of CFL and decision algorithms, Chomsky hierarchy

UNIT–III

Turing Machines:
Turing machines (TM), computable languages and functions, Turing machine constructions, storage and infinite control.

Variations of Turing Machines:
Recursive and recursively enumerable languages, recursive functions, partial and total recursive functions, primitive recursive functions.

UNIT–IV

Introduction to Computational Complexity:
Time and space complexity of Turing machines (TMs), complexity classes, introduction to NP-hardness and NP-completeness, PCP problem, concept of decidability and undecidability.

Undecidability:
Church–Turing thesis, universal Turing machine, the universal and diagonalization languages, reduction between languages and Rice's theorem, undecidable problems about languages.

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RECOMMENDEDBOOKS			
S	**Name**	**Author(s)**	**Publisher**
1	Introduction to Automata Theory, Languages and Computation	JohnE. Hopcroftand Jeffrey D.Ullman	Narosa Publishers
2	Theory of Computer Science (Automata, Languages& Computation)	K.L.P.Mishra& N. Chandershekaran	PHI
3	Elements of the Theory of Computation	HarryR. Lewisa Nd Christos H.Papadimitriou	Pearson Education Asia
4	Automata and Computability	Dexter C. Kozen	Undergraduate Textsin Computer Science,S pringer
5	Introduction to the Theory of Computation	Michael Sipser	PWS Publishing

PROGRAMME CODE- UG059

Course Code	**CSE481**
Course Title	**Major Project**
Type of Course	SEC
L T P	004
Credits	2
Course Prerequisites	Nil
Course Objectives	The objective of the Major Project is to enable the student to work on a project, either fully theoretical, fully practical, or involving both theoretical and practical work, under the guidance of a Supervisor from the Department alone or jointly with a Supervisor drawn from an R&D laboratory or Industry. This is expected to provide good training for the student(s) in R&D work and technical leadership.
Course Outcomes (CO)	The learner will be able to – 1. Understand the requirements of the project. 2. Prepare the report. 3. Present the findings before the department.

The Assignment shall normally include:

1. In-depth study of the topic assigned in the light of the study already done.
2. Review and finalization of the approach to the problem relating to the assigned topic, preferably in the area in which six weeks of industrial/institutional training was undertaken after the 6th semester.
3. Preparation of an action plan for conducting the investigation, including teamwork.
4. Detailed analysis, modelling, simulation, design, problem solving, and experimentation as needed.
5. Final development of the product/process, testing, results, conclusions, and future directions.
6. Preparation of a paper for conference presentation/publication in journals, if possible.
7. Preparation of a project report with running code in the standard format for evaluation by the Department.
8. Final seminar presentation before the Departmental Committee.

Course Code	**CSR112**
Course Title	**DevOps Engineering Laboratory**
Type of Course	PC
L:T:P	0:0:2
Credits	1
Course Prerequisites	1. Knowledge of Linux Operating system, installation and configuration of services and command line basics. 2. Basics of Computer Networks and Software 3. Software Development Life cycle.
Course Objective(s)	The objective of this course is to understand the fundamentals of DevOps engineering and be fully proficient with DevOps terminologies, concepts, benefits, and deployment options to meet real world software development requirements
Course Outcome(CO)	On completion of the course, learner will be able to: 1. Apply DevOps principles to meet software development requirements.

SYLLABUS

1. To understand Version Control System / Source Code Management, install git and create a GitHub account.

2. To Perform various GIT operations on local and Remote repositories using GIT Cheat-Sheet

3. To understand Continuous Integration, install and configure Jenkins with Maven/Ant/Gradle to setup a build Job.

4. To Build the pipeline of jobs using Maven / Gradle / Ant in Jenkins, create a pipeline script to Test and deploy an application over the tomcat server.

5. To understand Jenkins Master-Slave Architecture and scale your Jenkins standalone implementation by implementing slave nodes.

6. To Setup and Run Selenium Tests in Jenkins Using Maven.

7. To understand Docker Architecture and Container Life Cycle, install Docker and execute docker commands to manage images and interact with containers.

8. To learn Dockerfile instructions, build an image for a sample web application using Dockerfile.

9. To install and Configure Pull based Software Configuration Management and provisioning tools using Puppet. /Ansible.

10. To learn Software Configuration Management and provisioning using Puppet Blocks (Manifest, Modules, Classes, Function).

11. To provision a LAMP/MEAN Stack using Puppet Manifest.

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Artificial Intelligence	E.Rich	Mc Graw Hill
2	Introduction to Artificial Intelligence	E.CharniakandD. McDermott	Addison Wesley

Course Code	**CSE361**
Course Title	**Computer Graphics Laboratory**
SEC	PC
L:T:P	0 0 2
Credits	1
Course Prerequisites	Knowledge of Program Development Constructs
Course Objective(s)	This practical course work allows the students to efficiently design a working software model.
Course Outcome (CO)	The learner will be able to- 1. Implement algorithms for drawing 2D primitives 2. Implement transformations and clippings 3. Implement 3D projections

SYLLABUS

1. Implementation of Algorithms for drawing 2D Primitives – Line (DDA, Bresenham) – all slopes Circle (Midpoint)
2. 2D Geometric transformations –
   - Translation
   - Rotation Scaling
   - Reflection Shear
   - Window-Viewport
   -
3. Composite 2D Transformations
4. Line Clipping
5. 3D Transformations – Translation, Rotation, Scaling.
6. 3D Projections – Parallel, Perspective.
7. Creating 3D Scenes.
8. Image Editing and Manipulation – Basic Operations on image using any image editing software, Creating gif animated images, Image optimization.
9. 2D Animation – To create Interactive animation using any authoring tool.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**Author(s)**	**Publisher**
1	Interactive Computer Graphics. A Top-Down Approach Using OpenGL	Edward Angel	Pearson Education
2	Computer Graphics with OpenGL	Donald Hearn and Pauline Baker	Prentice Hall

PROGRAMME CODE- UG059

Course Code	**CSE485**
Course Title	**Four Weeks Industrial Training Evaluation (Under taken after 6thsemester)**
Type of Course	SEC III
L T P	
Credits	3
Course Prerequisites	Basics of programming and software development
Course Objectives	To enhance the programming skills of a learner so that the learner can find solutions to problems. The learner also gains industrial experience in software development.
Course Outcomes-(CO)	The learner will be able to – 1. Implement software using proper software life cycle models. 2. Work with the latest IT tools. 3. Develop team leadership skills.

The six weeks industrial training will give exposure to the practical aspects of the discipline, in the real-time working scenario. In addition, the student may also workon a specified task or project which may be assigned to him/her, by the industry person. The student will maintain the daily diary which will have sign turbofan industry expert, assigned to him/ her. This daily diary will be produced by the student during practical examinations, as and when scheduled by the institute. The department will evaluate student performance based on his/her project report, running software code, CD containing code and daily diary

8th Semester

PROGRAMME CODE- UG059

Course Code	**CSE466**
Course Title	**Six Months Industrial Training**
Type of Course	Training
L T P	
Credits	20
Course Prerequisites	Basics of programming and software development
Course Objectives	To enhance programming skills of a learner, so that the learner finds solutions to problems. He also gets industrial experience of software development
Course Outcomes- (CO)	The learner will be able to- 1. implement software using proper software life cycle models 2. works with latest IT tools 3. Develop team leadership

The six months industrial training will give exposure to the practical aspects of the discipline, in real time working scenario. In addition, the student may also workon a specified task or project which may be assigned to him/her, by the industry person. The student will maintain the daily diary which will have signature of industry expert, assigned to him/ her. This daily diary will be produced by the student during mid semester viva voce and internal and external end semester practical examinations, as and when scheduled by the institute. The department will get the marks assigned by the industry expert, against student performance or evaluation. The outcome of the internship should be presented in the form of a project report, running software code, CD containing code and project report, daily diary.

Course Title	**Entrepreneurship Mindset Curriculum** **(Mandatory course by Punjab Government)**
Type of Course	Practical
LTP	0 0 4
Credits	2
Course Prerequisites	None
Course Objective(s)	The learner will be able to – 1. Understand and develop an entrepreneurial mindset and key traits. 2. Encourage self-awareness and effective goal setting.
Course Outcome (CO)	**CO1:** Understand core entrepreneurial traits. **CO2:** Identify personal strengths and areas for growth. **CO3:** Develop curiosity and initiative.

Introduction

This course provides students with a holistic framework to develop entrepreneurial skills across the student's journey. The curriculum core principles of entrepreneurship, including identifying business opportunities, setting up operations, marketing, scaling, and financial management.

Throughout the program, students will choose 01 track from 5 specialized tracks:

Content Creation: This track focuses on empowering students to create, curate, and market digital content across various platforms. Students will learn how to build a personal or brand identity, develop engaging content, and monetize their platforms, whether through social media, video production, blogging, or influencer marketing.

Retail Business: This track introduces students to the fundamentals of starting and managing small-scale retail ventures. Learners will discover how to identify in-demand products, source suppliers, set up shop (physical or home-based), and attract local customers.

Professional Services: In this track, students will learn how to capitalize on freelance and contract-based opportunities. They will explore strategies for building a sustainable service-based business, manage client relationships, and maximize the flexibility that comes with this track.

E-commerce: In this track, students will learn how to build, manage, and scale an online business. From setting up an e-commerce platform to managing digital marketing strategies, inventory, and customer experience, this specialization provides the tools needed to succeed in the rapidly growing digital marketplace.

Miscellaneous: This track gives students the freedom to explore unique and diverse business ideas that don't fit into one category. Learners can identify opportunities around them, test simple solutions, and create small ventures based on local needs or personal interests. The focus is on creativity, problem-solving, and learning how to turn everyday ideas into earning opportunities.

The focus is on practical application, with students engaging in real-world projects that culminate in the creation and scaling of a business.

Learning Objectives

By the end of this course, students will be able to:

Understand and apply entrepreneurial principles to real-world business situations.
Develop and implement business strategies across different industries.
Use digital tools, including AI, to enhance and automate business operations.
Build sustainable business models, manage financials, and scale operations.

Learning Outcomes

After studying this course, students will be able to:

The aim of this course is to ensure that, by the end, learners acquire essential entrepreneurial competencies such as **strategic thinking, practical application, founders & growth mindset, operational skills,** and **foundational financial literacy.**

Launch and manage a business within their chosen track.
Identify profitable opportunities and develop innovative solutions.
Implement marketing and sales strategies using both digital and traditional methods.
Use financial metrics to track performance and make informed business decisions.
Scale a business using operational systems and automation tools.

Content Creation		
Week/ Milestone	**Milestone**	**Description**
1	**Start your journey as a content creator**	Learn how to reach thousands of followers online by creating content
2	**Decide your content topic**	Explore different topics and finalize one topic on which you will create content
3	**Start your own content channel**	Launch your official channel on YouTube or Instagram and start building your audience
4	**Plan your first week content calendar**	Learn how to create a simple weekly content calendar that would keep your audience engaged and make them follow you
5	**Plan and record your first video**	

		Learn how to create a clear and catchy script for your first video and shoot it usi your phone
6	**Edit and launch your first video**	Learn how to edit your video with trendy music and cool effects and launch your channel with first video
7	**Reach first 100 followers**	Use WhatsApp and personal Instagram account to tell people about your channel and reach first 100 followers/subscribers
8	**Master the skill of engaging people with you content**	Learn how to connect with your audience so they stay engaged and feel involved
9	**Follow latest trends and famous influencers to grow your channel**	Learn how to use trending topics and tag well-known channels or creators to boost your reach and attract more followers
10	**Learn how you can make money from your content**	Discover how to do brand deals and promote brands or products your follower truly care about
11	**Make your first partnership**	Reach out to 10 brands for partnership an turn one into your first paid deal
12	**Plan your business growt**	Create a 1 month plan on what to post on weekly basis to grow your followers and earn money

E-commerce

Week/ Milestone	Milestone	Description
1	**Learn how to start selling online**	Learn what an E-commerce business is an how you can start selling online in less tha 30 days
2	**Choose your product**	Explore different products and finalize what you want to sell online
3	**Find a supplier who will deliver the product for you**	Identify suppliers who can send your product directly to the customer and help you launch your E-commerce business
4	**Create your E-commerce store**	Make a simple online store using Instamojo and learn how to upload produ images and description on the store
5	**Activate payments on you store**	Learn how to link your bank account to a payment gateway and integrate that with your Instamojo store to start receiving payments
6	**Launch your online store**	Connect your domain name to your Instamojo account, create your launch poster, and officially launch your E-commerce store
7	**Get first 100 people visit your online store**	Learn how to write simple and catchy messages to promote your store and send to 100 people
8	**Make your first sale**	Convert one paying customer and learn how to process the order from beginning delivery
9	**Create and post your first ad**	Learn how to design a simple promotional ad and post it to bring in more people and sales

10	**Take feedback from customers**	Engage with your paid customers, take product feedback, and upload success stories or reviews on your website
11	**Get a repeat customer or referral**	Build trust with your paid customers to ge either a repeat order or a referral
12	**Plan your business growth**	Make a 1 month plan to promote and grov your E-commerce store and earn more money

Professional Service		
Week/ Milestone	**Milestone**	**Description**
1	**Start your journey in professional services**	Learn what is a service and how you can earn money by offering your skill as a service
2	**Choose your service skill**	Choose one skill you are good at and turn into a service that people will pay for
3	**Find your ideal customer**	Talk to people directly or through social media apps, understand who is willing to pay for your service and "WHY"
4	**Build your online profile and show what you offer**	Explore apps or websites such as WhatsApp Business, Upwork, or Urban Company, and learn how to create an online profile
5	**Write your service description**	Learn how to write your service in a simp and powerful way that gets people excited to try it
6	**Finalize your pricing and launch your service**	Learn how to set the right price that your customer finds fair and launch your servi
7	**Get first 100 leads for you service**	Learn how to write catchy messages to promote your service in the market and g first 100 leads

8	**Offer a free service and learn from feedback**	Give your service for free to real users and use their feedback to make it better
9	**Make your first sale**	Get one paying customer for your service and work really hard to get a 5 star rating and a video testimonial
10	**Build trust with customer and get repeat orders**	Use your trust and good relationship with existing customers to get your first repeat customer
11	**Earn your first referral**	Start offering bonus or other additional services to your existing customers and ge your first referral
12	**Plan your business growth**	Make a 1 month plan on how to get more customers and earn more money

Retail Business

Week/ Milestone	Milestone	Description
1	**Learn how to start retail business**	Understand how retail works, the types of business you can start, and talking to local shops
2	**Choose your product and ideal customer**	Look at products in demand in your area and choose what you'll focus on based on your customer needs
3	**Find a supplier for your product**	Identify suppliers or wholesalers who can give you quality products/raw materials at good prices
4	**Setup your business**	Arrange your shop/home or prepare your product stocked with shopkeepers

5	**Decide product prices an prepare stock**	Decide the right selling price, maintain a simple record of sales, and get ready to handle cash or digital payments
6	**Launch your business**	Put up posters near your shop, and share the announcement with friends, family, and local community groups
7	**Promote your business ir your area**	Learn how to use simple ways to promote your business locally
8	**Make your first sale**	Ensure the buying process is smooth and the customer is happy
9	**Take feedback from customers**	Engage with your paid customers and take product feedback
10	**Discover other platforms to grow your sales**	Learn how to set up a free WhatsApp Business account for your shop and collect orders there
11	**Get a repeat customer or referral**	Build trust with your paid customers to get either a repeat order or a referral
12	**Plan your business growt**	Make a 1 month plan to promote and grow your retail business and earn more money

Miscellaneous

Week/ Milestone	Milestone	Description
1	**Start your journey as an Entrepreneur**	Learn what entrepreneurship means and how you can start earning by solving problems around you
2	**Identify and validate a problem to solve**	Look around yourself, talk to people, and pick one real problem that many people face

3	**Define your customer an their pain points**	Find out who will buy from you, what difficulties they face, and why they need your solution
4	**Generate business ideas and finalize one idea**	Think of different ways to solve the problem, compare options, and choose or idea to move ahead with
5	**Define your product or service**	Decide clearly what product or service you will provide and how it will solve the customer's problem
6	**Finalize your pricing and launch your business**	Set a fair price for your product or service and take the first step to launch your business
7	**Promote your business and get first 100 leads**	Tell people about your business using wor of mouth, posters, or social media, and collect interest from 100 people
8	**Make your first sale**	Get your first paying customer and delive your product or service with full effort
9	**Take feedback from customers and improve**	Listen to what customers say after using your product/service and make it better step by step
10	**Build trust with customers and get your first repeat order**	Keep your promise, give good quality, and motivate your customer to buy from you again
11	**Earn your first referral and expand your sales**	Ask happy customers to recommend you t friends and family so that you can grow your sales
12	**Plan your business growth**	Make a simple plan for the next month to get more customers, increase sales, and grow your business

Evaluation Criteria

Evaluation Component	Description	Weightage
Weekly Task Completion	Timely submission of weekly tasks, including activities, reflection prompts, graded quizzes etc	60%
Target Completi	Performance-based evaluation on hitting revenue or profit targets (e.g., generating ₹10,000 revenue)	20%
Final Project	A comprehensive project depending the theme of the semester	20%

Recommended Readings

1. Start with Why - Simon Sinek

Explains how great leaders and entrepreneurs inspire action by starting with a clear sense of "why." Perfect for understanding purpose-driven entrepreneurship.

2. The Lean Startup - Eric Ries

A must-read on how to test ideas, build fast, and learn quicker ideas for first-time entrepreneurs trying to reduce risk and start smart.

3. Contagious: How to Build Word of Mouth in the Digital Age - Jonah Berger

Introduces how small ideas spread and how anyone can build buzz, useful for content creators and small sellers.

4. Shoe Dog - Phil Knight (Founder of Nike)

An inspiring story of how a college runner built one of the world's biggest shoe companies with almost nothing. Very relatable in its early struggle phase.

5. Rework - Jason Fried & David Heinemeier Hansson

Offers fresh, simple ideas about doing business differently. Ideal for breaking traditional thinking and seeing how less can be more.

6. Ikigai: The Japanese Secret to a Long and Happy Life . Héctor García & Francesc Miralles

Helps students reflect on passion, purpose, and how to connect what they love with what the world needs perfect for Value Map exercises.

7. Tools of Titans (Selected Chapters) - Tim Ferriss

Pick short, digestible parts from interviews with entrepreneurs, creators, and doers. Recommended as optional deep-dives.

8. Zero to One: Notes on Startups, or How to Build the Future - Peter Thiel co-written with Blake Masters

Indian, relatable, and deeply practical. Breaks down failure, money, motivation, and mindset in a raw and honest way.

9. Romancing The Balance Sheet - Anil Lamba

This book will teach you all the intelligent ways of Good Financial Management.

This book will teach you all the intelligent ways of Good Financial Management.

10. Young Entrepreneurs (Series) - The Better India / YourStory articles

Real Indian stories of youth starting businesses, snackable reads that show what's possible.

Syllabus Overview for Semester 1-5

Semester	Learning Focus	Learner's demonstration	Revenue Target
1	Setup & Launch	**Understand. Create. Start.**	₹10,000
2	Marketing Basics	**Engage. Share. Grow.**	₹40,000
3	Operations & Scale	**Earn. Deliver. Expand.**	₹80,000
4	Organic Growth	**Attract. Retain. Build.**	₹160,000
5	AI Automation & Finance mastery	**Simplify. Track. Sustain**	₹400,000

Semester 1: Setup & Launch

In Term 1, students will explore what entrepreneurship means and how it connects to their daily lives. They will learn to identify problems, shape simple business ideas, and test them in real settings. This semester builds the foundation—mindset, observation, value creation, and action.

Semester 2: Marketing Basics

In Term 2, students will learn how to attract customers and grow their visibility using digital platforms and community-based marketing strategies. Students will also begin to run paid advertising campaigns and learn how to optimize their marketing efforts.

Semester 3: Operations & Scale

This semester focuses on the day-to-day operations of running a business, including order fulfillment, customer service, and logistics. Students will also focus on scaling operations as demand grows, with an emphasis on managing resources effectively.

Semester 4: Organic Growth

Students will learn how to grow their businesses organically, using referrals, partnerships, and community engagement. This semester focuses on building a loyal customer base and using word-of-mouth marketing to increase reach and credibility.

Semester 5: AI Automation & Financial Mastery

The final semester prepares students for long-term sustainability. Students integrate AI to improve productivity, automate routine tasks, and enhance decision-making. They also dive deep into financial planning, learning to set income goals, track expenses, understand profit margins, and create simple financial forecasts. This semester helps students solidify their entrepreneurial identity design systems for financial stability and scalability.

Open Electives

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Course Code	**CSE391**
Course Title	**Basics of AI**
Type of Course	PC
L: T:P	3:0:0
Credits	3
Course Prerequisites	Nil
Course Objective(s)	1. To get introduced to the basic knowledge representation, problem solving, and learning methods of Artificial Intelligence. 2. To solve problems in Artificial Intelligence using Python. 3. To familiarize yourself with knowledge processing in expert systems.
Course Outcome (CO)	CO1 Understand the informed and uninformed problem types and apply search strategies to solve them. CO2 Apply difficult real-life problems in a state space representation to solve them using AI techniques like searching and game playing. CO3 Design and evaluate intelligent expert models for perception and prediction from an intelligent environment.

SYLLABUS

Unit 1: Foundations of Artificial Intelligence

Introduction to AI: Definition and brief history of Artificial Intelligence, AI applications across different domains, Overview of AI subfields: symbolic AI, machine learning, and deep learning.

Search Algorithms and Knowledge Representation: Problem-solving agents, Uninformed search algorithms: Breadth-first search, Depth-first search, Informed search algorithms: A* search, Heuristic search, Propositional logic and first-order logic (Syntax and semantics, Resolution and inference), Semantic networks and frames (Representation and inference).

Unit 2: Machine Learning Basics

Introduction to Machine Learning: Basics of machine learning, Supervised, unsupervised, and reinforcement learning, Evaluation metrics in machine learning.

Classical Machine Learning Algorithms: Linear regression (Simple and multiple linear regression, Gradient descent optimization), Logistic regression (Binary and multinomial logistic regression, Sigmoid function and probability estimation),

Decision trees and ensemble methods (Decision tree construction, Bagging, boosting, and random forests).

Unit 3: Deep Learning and Neural Networks

Neural Networks: Introduction to artificial neural networks (Perceptron's and activation functions, Feed forward and back propagation), multi-layer perceptron's (Hidden layers and network architecture, Activation functions), Training neural networks (Gradient descent and stochastic gradient descent, Regularization techniques).

Unit 4: Applications and Ethical Considerations

Natural Language Processing: Basics of natural language processing (NLP), Text preprocessing and tokenization, NLP applications (Sentiment analysis, Named entity recognition, Part-of-speech tagging, Word embeddings and semantic similarity).

Reinforcement Learning and Ethical Implications: Introduction to reinforcement learning (Markov decision processes, Policy iteration and value iteration), Q-learning and deep Q-networks (DQN) (Experience replay and target networks, Deep reinforcement learning algorithms), Privacy concerns and data ethics (Data anonymization and de-identification techniques, Case studies of AI regulation worldwide).

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Artificial Intelligence	E. Rich	McGrawHill
2	Introduction to Artificial Intelligence	E. Charniak and D. McDermott	Addison Wesley

Course Code	**CSE393**
Course Title	**Introduction to Cloud Computing**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Distributed System, Operating Systems and Networking
Course Objectives (CO)	This Course work provides the complete understanding of Cloud system, its implementation techniques and its various applications in the field of computer Science.
Course Outcome	The learner will be able to- 1. Understand characteristics and types of cloud computing 2. Describe architecture of cloud computing 3. Explain applications of cloud 4. Demonstrate their knowledge of cloud computing to real world examples

SYLLABUS

UNIT-I

Cloud Computing Basics, History of Cloud Computing, Importance, Characteristics of Cloud Computing, Benefits and Challenges to Cloud architecture.

UNIT-II

Types of Cloud: Public Cloud, Private Cloud, Hybrid and Community Cloud. Differences between public and private cloud, Status of Cloud Computing in India, Cloud Service Models, Role of virtualization in enabling the cloud; Differences between Grid computing and cloud computing, differences between grid computing and utility computing, Cloud Computing security concerns and proposed security model for future cloud computing.

UNIT-III

Cloud Computing- Logical architecture, Developing Holistic Cloud Computing Reference Models- Seven step model of migrating to cloud.

Virtualization types, Virtual Machine Life Cycle, Virtualization applications, Pitfalls of Virtualization, CPU Virtualization.

UNIT-IV

Case Study of Cloud Computing, Cloud Computing Risks. Cloud Tools, Cloud Applications, Future Trends, Mobile cloud, Jungle Computing, Big Data –Features and applications

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(s)**	**Publisher**
1	Cloud Computing–A Practical Approach	Anthony Teletubby J.Velte and RobertE	TMH
2	Cloud Computing –Web based Applications	Michael Miller	Pearson Publishing

Course Code	**CSE491**
Course Title	**Introduction to Operating Systems**
Type of Course	PC
L T P	3:0:0
Credits	3
Course Prerequisites	Overview of Computer Architecture
Course Objectives	To learn the fundamentals of Operating Systems. 1. To learn the mechanisms of OS to handle processes and threads and their communication 2. To learn the mechanisms involved in memory management in contemporary OS 3. To gain knowledge on distributed operating system concepts that include architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols 4. To know the components and management aspects of concurrency management 5. Learning to implement simple OS mechanisms
Course Outcome (CO)	**The learner will be able to-** 6. Create processes and threads. 7. Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time. 8. For a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and improving the access time. 9. Design and implement file management system. 10. For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstractionbyperformingoperationsforsynchronizationbetweenCPUandI/O controllers.

SYLLABUS

UNIT-I

Introduction: Operating Systems functions, Types of operating systems, Multiprogramming systems, Batch systems, Time-sharing systems, Operating system operations, Special purpose operating systems, distributed systems, Different computing environments.

UNIT-II

Operating System Organization: Processor and user modes, user operating system interface, Kernels, System calls and its types, System programs, Operating system structures, Virtual machines.

Process Management: Process states, Process Scheduling, Process hierarchy, Threads, Threading issues, multi-threading models, non-preemptive and pre-emptive scheduling algorithms, Concurrent processes, Critical section, Semaphores, methods for inter-process communication, Deadlocks.

UNIT-III

Memory Management: Physical and virtual address space, Memory allocation strategies, Paging, Segmentation, Virtual memory and Demand paging, Page replacement algorithms.
File and I/O Management: Directory structure, File operations, Files system mounting, File allocation methods, Device management, Disk scheduling algorithms.

UNIT-IV

OS and Security: Security breaches, types of attacks, attack prevention methods, security policy and access control, OS design considerations for security, access control lists and OS support, internet and general network security, Policy mechanism, Program, network and system threats, Authentication.

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Operating System Concepts Essentials	9th Edition by Avi Silberschatz, Peter Galvin, Greg Gagne	Wiley Asia Student Edition.
2	Operating Systems: Internals and Design Principles	5thEdition, William Stallings	Prentice Hall of India
3	Operating System: A Design-oriented Approach	1stEditionbyCharlesCrowley	Irwin Publishing
4	Operating Systems: A Modern Perspective	2nd Edition byGary J. Nutt	Addison-Wesley

Course Code	CSE493
Course Title	Basics of Networking
Types of Course	OE
L T P	3: 0: 0
Credits	3
Course Prerequisites	NA
Course Objectives	It aims to introduce students to the fundamental techniques used in implementing secure network communications, and to give them an understanding of common threats and attacks.
Course Outcomes (CO)	The student will be able to- CO1: Understand basic concepts and security in network technology CO2: Explain IPv6 CO3: Explain classical encryption techniques CO4: Illustrate applications of Network Security

Syllabus

UNIT- I

Introduction to Network Technology: SLIP/PPP Dedicated lines, BOOTP, DHCP, Domain management (DNS), Transport Layer issues, TCP/IP, Gateway, Dial-up, Internet networking TCP/IP protocols, IP addressing.

UNIT-II

Basics of Network security- Fundamentals of network security, Basics of IPv6, IPsec: overview of IPsec, IP and IPv6, Authentication header (AH), Encapsulating Security Payload (ESP).

Security Trends – Attacks and services, Classical crypto systems, Different types of ciphers, LFSR sequences, Basic Number theory, Congruences, Chinese Remainder theorem, Modular exponentiation, Fermat and Euler's theorem, Legendre and Jacobi symbols, Finite fields, continued fractions.

UNIT-III

Model of Network security- Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Block Cipher and the Data Encryption Standard - Modes of operation, Triple DES, AES, RC4, RSA, Attacks, Primality test, Factoring.

Discrete Logarithms –Digital signatures, RSA, ElGamal, DSA, Unwanted traffic: denial of service attacks.

UNIT-IV

Authentication applications – Kerberos, X.509, PKI, Electronic Mail security, PGP, S/MIME, IP security, Web Security, SSL, TLS, SET.

System Security – Intruders, Malicious software, viruses, Firewalls and filters, Security Standards.

BOOKS RECOMMENDED			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1.	Network Security and Ethical Hacking	Rajat Khare	Luniver Press
2.	Cryptography and Network Security	Atul Kahate	Tata Mc-Graw Hill
3.	Computer Networks	A.S Tanenbaum	Pearson

Course Code	**CSE495**
Course Title	**Introduction to Digital Marketing**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Nil
Course Objective	The main objective of this course is to provide learners with the knowledge of business advantages of digital marketing and its importance for marketing success; to develop a digital marketing plan; to make SWOT analysis; to define a target group; to get introduced to various digital channels, their advantages and ways of integration;
Course Outcomes	The learner will be able to- 1. Identify the importance of digital marketing for marketing success, 2. Manage customer relationships across all digital channels and build better customer relationships, 3. Create a digital marketing plan, starting from the SWOT analysis and defining a target group, then identifying digital channels, their advantages and limitations. 4. Perceiving ways of integration taking into consideration the available budget.

SYLLABUS

UNIT I

Introduction: Marketing and its definition, Digital Marketing, How we do Marketing, Benefits of Digital marketing, Digital marketing platforms and Strategies, Defining Marketing Goals, Latest Digital marketing trends, introduction to traditional and new methods of marketing Requirement: Requirements for digital marketing, its uses.

UNIT II

Search Engine Optimization: Introduction to Search Engines, How the search engine works, Components of Search Engines. Keyword Research and Competition: Introduction to Keyword Research, Types of Keywords, Keyword Research Methodology, Business Analysis & Categorization, Google Keyword Planner, Market Research and Analysis, New Keyword Ideas, Competition Analysis, Finalizing the Keywords List.

UNIT III

On page Optimization: Introduction to On page ,What is Webmaster Tools, Selecting Target Location, On page Analysis Methodology, Fundamental On-page Factors , Website Speed , Domain name in SEO, URL Optimization , Title Tag Optimization , Meta Tags Optimization , Content Optimization , Sitemaps Generation , Using Robot.txt in Site URL , Redirecting Techniques , Canonical Links, Rich Snippets.

UNIT IV

Off page Optimization : What is Link Building , Types of Linking Methods , Do Follow Vs. No Follow Link building Guidelines , Linking Building Methodology , Links Analysis Tools , Directory Submissions, Local Business Directories , Social Bookmarking , Using Classifieds for Inbound traffic ,Question and Answers , Blogging & Commenting , Guest Blogging Local SEO: What is Local SEO, Importance of Local SEO , Submission to Google My Business , Completing the Profile , Local SEO Ranking Signals , Local SEO Negative Signals , Citations and Local Submissions

Course Code	CSE497
Course Title	**Basics Concepts of IOT**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	NIL
Course Objectives	The Internet is evolving to connect people to physical things and physical things to other physical things all in real time. It's becoming the Internet of Things (IoT). The course enables students to understand the basics of Internet and protocols. It introduces some of the application areas where Internet of Things can be applied.
Course Outcome(CO)	At the end of the course the learner will be able to- 1. Understand and describe Functional blocks of IOT 2. Explain MAC protocol and various routing protocols 3. Describe data aggregation and data dissemination 4. Evaluate and explain challenges in IoT design 5. Demonstrate the ability to develop applications through IoT tools

UNIT-I

Introduction to IoT Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models and APIs

UNIT-II

IoT & M2M Machine to Machine, Difference between IoT and M2M, Software define Network, Network and Communication aspects Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment and Node discovery, Data aggregation and dissemination

UNIT-III

Challenges in IoT Design challenges, Development challenges, Security challenges, other challenges Domain specific applications of IoT Home automation, Industry applications, Surveillance applications, Other IoT applications

UNIT-IV

Developing IoTs Introduction to Python, Introduction to different IoT tools, developing applications through IoT tools, developing sensor-based application through embedded system platform, Implementing IoT concepts with python

BOOKS RECOMMENDED

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	The Internet of Things in the Cloud:A Middleware Perspective	Honbo Zhou	CRC Press,2012

Course Code	**CSE489**
Course Title	**ECOMMERCE**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Basics of Internet
Course Objectives (CO)	This course examines the evolution of enterprise resource planning(ERP) systems - from internally focused client/server systems to externally focused e-business. This class studies the types of issues that managers will need to consider in implementing cross-functional integrated ERP systems. The objective of this course is to make studentsaware of the potential and limitations of ERP systems. This objective will be reached through hands-on experience, case studies, lectures, guest speakers and a group project.
Course Outcomes	The course would equip students with the basics of E-Commerce, technologies involved with it and various issues associated with.

SYLLABUS

UNIT I

Introduction and Concepts Networks and commercial transactions - Internet and other novelties;Networks and electronic transactions today, Model for commercial transactions; Internet environment - internet advantage, world wide web and other internet sales venues; Online commerce solutions. Security Technologies: Why is internet insecure? A brief introduction to Cryptography; Public key solution. Digital payment systems; First virtual internet payment system; cyber cash model Operational process of Digicash, Ecash Trail; Using Ecash; Smart cards; Electronic Data Interchange: Its basics; EDI versus Internet and EDI over Internet.

UNIT II

Introduction ERP An Overview, Enterprise-An Overview, Benefits of ERP, ERP and Related Technologies, Business Process Reengineering (BPR), Data Warehousing, Data Mining, On-line Analytical Processing (OLAP), Supply Chain Management, Management Information systems (MIS), Decision support system (DSS), Executive Information systems (EIS). ERP – A Manufacturing Perspective Materials Requirement Planning (MRP), Bill of Material (Bom), Distribution Requirements Planning (DRP), JIT & Kanban, CAD/CAM.

UNIT III

ERP Implementation - ERP Implementation Lifecycle, Implementation Methodology, Not all Packages are Created Equal!, ERP Implementation-The Hidden Costs, Organizing the Implementation, Vendors, Consultants and Users, Contracts with Vendors, Consultants and Employees, Project Management and Monitoring, After ERP Implementation.

UNIT IV

The Business Modules- Business Modules in an ERP Package, Finance, Manufacturing (Production), Human Resources, Plant Maintenance, Materials Management, Quality Management,Sales and Distribution

RECOMMENDED BOOKS			
S.No.	**Name**	**Author(s)**	**Publisher**
1	Enterprise Resource Planning	S. Sadagopan	Tata McGraw Hill 2000
2	E-Commerce: The Cutting Edge of Business	Bajaj, Kamlesh K. and Nag, Debjani	Tata McGraw-Hill Publishing Company
3	Enterprise Resource Planning	Alexis Leon	Tata McGraw Hill 2001
4	Electronic Commerce	Loshin, Pete and Murphy, Paul	Second edition, 1990, Jaico Publishing House, Mumbai

Course Code	**CSE499**
Course Title	**Introduction to Cyber security**
Type of Course	PC
L T P	3:0: 0
Credits	3
Course Prerequisites	Basic knowledge of computer system
Course Objective (CO)	The main aim of this course is to provide knowledge about how to secure our data on the Internet.
Course Outcome (CO)	The students will be able to: 1. Implement cyber security best practices and risk management 2. Integrate network monitoring and present real-time solutions 3. Impact cyber security risk in an ethical, social, and professional manner. 4. Learning basics of cyber laws and cyber forensic

SYLLABUS

UNIT I:

Introduction to Cyber Security: Overview of Cyber Security, Cyber Threats: - Cyber Warfare-Cyber Crime-Cyber Terrorism-Cyber Espionage

Cyber Security Vulnerabilities and Cyber Security Safeguards: Cyber Security Vulnerabilities-Overview, vulnerabilities in software, System administration, Complex Network Architectures, Open Access to Organizational Data, Weak Authentication, Unprotected Broadband communications, Poor Cyber Security Awareness. Cyber Security Safeguards- Overview, Access control, Audit, Authentication, Biometrics, Cryptography, Deception, Denial of Service Filters, Ethical Hacking, Firewalls, Intrusion Detection Systems, Response, Scanning, Security policy, Threat Management.

UNIT II:

Securing Web Application, Services and Servers: Introduction, Basic security for HTTP Applications and Services, Basic Security for SOAP Services, Identity Management and Web Services, Authorization Patterns, Security Considerations, Challenges.

Intrusion Detection and Prevention: Intrusion, Physical Theft, Abuse of Privileges, Unauthorized Access by Outsider, Malware infection, Intrusion detection and Prevention Techniques, Anti-Malware software, Network based Intrusion detection Systems, Network based Intrusion Prevention Systems, Host based Intrusion prevention Systems, Security Information Management, Network Session Analysis, Systems, System Integrity Validation.

UNIT III:

Cryptography and Network Security: Introduction to Cryptography, Symmetric key Cryptography, Asymmetric key Cryptography, Message Authentication, Digital Signatures, Applications of Cryptography. Overview of Firewalls- Types of Firewalls, User Management, VPN Security Security Protocols: - security at the Application Layer- PGP and S/MIME, Security at Transport Layer- SSL and TLS, Security at Network Layer-IPSec.

UNIT IV:

Cyberspace and the Law: Introduction, Cyber Security Regulations, Roles of International Law, the state and Private Sector in Cyberspace, Cyber Security Standards. The INDIAN Cyberspace, National Cyber Security Policy 2013.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1.	Cyber security and Cyberwar: What Everyone Needs to Know®	Allan Friedman and P. W. Singer	Oxford University Press
2.	Cyber security for Beginners	Raef Meeuwisse	Cyber Simplicity Limited
3.	Cybe security Essentials	Charles J. Brooks, Christopher Grow, Donald Short, and Philip Craig	Sybex