Programme Code: UG 018

SCHEME AND SYLLABUS

B.Tech Computer Science and Engineering

(As per NEP 2026)

Department of Computer Science and Engineering
University Institute of Engineering Technology
Sant Baba Bhag Singh University
Batch 2026

Programme Code:UG018

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ABOUTTHEDEPARTMENT

The Department of Computer Science and Engineering focuses not only on the theoretical aspects but emphasize the overall development of the students. There are Special Interest Groups among the faculty who are focused in their research domains like Data Mining and Big Data Analytics, Wireless & Mobile Computing, Security & Trust Computing, Wireless Sensor Networks & IOT, Soft Computing, Image Processing, Machine Learning and Data Analytics, Natural Language Processing, Cloud Computing and Social Networking, Network Security, Service Oriented Architecture and Theoretical Computer Sciences. The departments many strengths include its high faculty to student ratio, state of the art facilities, strong focus on teaching learning balanced with leading-edge research and emphasis on leadership, service and ethics.TheefficacyoftheTeachingLearningprocessisreflectedintheconsistentlyexcellentresultsbeingachieved every year. To augment professional competence, the department supports outside talents to gain more inputs, organizes hackathons, seminars, workshops, industrial visits and expert lectures not only To offer a new dimension to the learning process but also infuse leadership qualities in the budding engineers.

SALIENTFEATURESOFTHEDEPARTMENT

1. Provides a learning environment strongly focused on collaborative and interdisciplinary research under the guidance of experienced and qualified faculty. The majority of the faculty members hold doctoral degrees.
2. The teaching programme is devised keeping in view the significance of industry–academia interaction, enabling students to face global competitiveness with effective communication skills.
3. The CSE Department regularly organizes conferences, hackathons, seminars, student symposia, short-term training programs, and value-added courses. This provides a wide range of opportunities for faculty and students to bring out their potential and innovative skills in a variety of fields.
4. The department has well-equipped computing laboratories and a rich repository of software covering a wide spectrum of applications. In collaboration with IIT, the department has set up a Virtual Lab for remote experiments. Besides this, the department offers NPTEL and MOOC courses for both students and faculty.
5. The Digital Library provides access to journals and video lectures delivered by eminent professors.

B.TECH (BACHELORSINTECHNOLOGY)

Educational qualification matters a lot in gaining success. Along with academic qualification, technical skills are also required. Job openings for Software professionals are much higher in the corporate sector than in public sector. Professionals can join as junior programmer, database administrator, junior network manager, Data Analyst, Software Developer, Software Engineer, and Client-Server Systems Manager etc in the initial stage.

Students have job opportunities at organizations like IBM, Intel, HP, TCS, Infosys, Wipro, Tech Mahindra, CTS, and Dell in India and abroad.

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VISION

Empower every student to be innovative and creative, and to acquire skills in Computer Science & Engineering to enrich society and achieve a happy, successful, and meaningful life.

MISSION

Our mission is to provide high-quality undergraduate and postgraduate education in Computer Science & Engineering that ensures the all-round growth of individuals by creating a futuristic environment that fosters critical thinking, dynamism, and innovation. We aim to transform students into globally competitive professionals while empowering youth in rural communities through computer education.

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ELIGIBILITYCRITERIA

- Passed 10+2 examinations with Physics & Mathematics as a compulsory subject along with one of the Chemistry/ Computer Science/ Biology/Biotechnology/ Technical Vocational subjects. Obtained at least45%marks (40%incaseofcandidatebelongingtoreservedcategory)in the above subject stake together.
- B.Tech(LateralEntry)DiplomainEngineering&technologyfromAICTEapprovedinstitutionorB.Sc (N.M) from UGCapproveduniversityatleast45%marks.(40%incaseofreservedcategory)

DURATION

B.TechCSE-4yearsB.TechCSELeet-3years

CAREERPATHWAY

Job openings for software professionals are much higher in the corporate sector than in the public sector. Professionals can begin their careers as Junior Programmers, Database Administrators, Junior Network Managers, Data Analysts, Software Developers, Software Engineers, and Client–Server Systems Managers at the initial stage.

Students have job opportunities at organizations like IBM, Intel, HP, TCS, Infosys, Wipro, Tech Mahindra, CTS, and Dell in India and abroad. These are some of the well-known companies that aspiring software engineers are familiar with. In addition, companies such as Infosys, Capgemini, Accenture, Cognizant, and others typically offer salary packages ranging between 3–3.5 LPA for fresher.

All the companies mentioned above are leading recruiters of B.Tech CSE graduates. As a B.Tech CSE graduate, a candidate's starting salary may range from 2 LPA to 10 LPA, depending on individual skills, performance, and opportunities. Overall, the field offers significant earning potential and strong career growth prospects.

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CHOICE BASED CREDIT SYSTEM (CBCS)

PREAMBLE

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

OBJECTIVES

1. To shift the focus from teacher-centric to learner-centric education.
2. To allow students to choose courses according to their learning needs, interests, and aptitude.
3. To provide flexibility by enabling students to choose interdisciplinary courses, change majors, and select suitable programs.
4. To make education broad-based, allowing students to earn credits by choosing unique course combinations.
5. To promote self-paced learning with flexibility. Students can opt for up to 26 credits per semester.
6. To enable students to decide their own pace of learning—slow, normal, or accelerated—and sequence their choice of courses. Students also learn to face challenges through term work and project work and may venture out to acquire additional knowledge or proficiency through add-on courses.

Programme Code: UG

All India Council for Technical Education, New Delhi

UPDATION/ADDENDUM
In
Model Curriculum for Undergraduate Degree Courses in Engineering &Technology

January 2018(Volume-II)

(Asper 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. Nameofthecourse'UniversalHumanValues2: Self, Society and Nature's re-named as **"Universal Human Values 2: Understanding Harmony".**

b. Contents of **"Universal Human Values 2: Understanding Harmony'** 'to be included.

Programme Code: UG 018

All India Council for Technical Education, New Delhi

Undergraduate Degree Courses in Engineering & Technology

COMPUTER SCIENCEANDENGINEERING

Chapter-1

General, Course structure & Theme&

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 Undergraduate degree in Engineering. A student will be eligible to get Under Graduate degree with Honor's or additional Minor Engineering, if he/she completes an additional 20 credits. They should be acquired through MOOC s.

C. Structure of Undergraduate Engineering Program:

S. No.	Category	Credit Break up for CSE students
1	Humanities and Social Sciences including Management courses	15
2	Basic Science courses	23
3	Engineering Science courses includingworkshop,drawing,basicsofelectrical/mechanical/computeretc	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 else where	15
8	Mandatory Courses [EnvironmentalSciences,InductionProgram,IndianConstitution,EssenceofIndianKnowledgeTradition]	(non-credit)
	Total	**162**

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

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C. Course code and definition:

Course code	**Definitions**
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	Mandatory courses
SI	Summer Industry Internship
PROJ	Project

ProgrammeCode:UG018

Induction Program (Please refer Appendix-A for guidelines)

Induction program(mandatory)	**3 weeks duration** *(Please refer Appendix-A for guidelines and also details available in the curriculum of mandatory courses.)*
Induction program for students to be offered right at the star to 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

ProgrammeCode:UG018

	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 fundamentals, and 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 specifications, considering public health and safety, as well as cultural, societal, and environmental factors.
	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 their limitations.
	PO6	**The 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 the 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 and responsibilities and norms of the engineering practice.
	PO9	**Individual and teamwork:** Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings..
	P10	**Communication:** Communicateeffectivelywiththeengineeringcommunityandwithsocietyatlarge. Be able to comprehend and write effective reports 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.

Undergraduate Programme Specific Outcomes (PSO)	
PSO1	Ability to acquire knowledge in Computer Science and Engineering and develop innovative solutions to complex problems.
PSO2	Design and build websites, Android apps, and 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.

Undergraduate Programme Educational Objective (PEO)	
The Graduate /Undergraduate will be….	
PEO1	**Acquiring knowledge of Computer Science and other engineering disciplines for analyzing and developing innovative solutions to real-world problems.**
PEO2	**Developing interdisciplinary projects using latest tools, techniques and models for the benefit of the society and environment.**
PEO3	**Demonstrating team leadership and effective communication skills while pursuing a career in life-long learning, research and development or generating employment through startups.**
PEO4	**Preparing for competitive examinations for higher studies abroad or for getting jobs in private, public or multinational companies.**

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Semester-wise structure of curriculum

[L=Lecture, T=Tutorials, P=Practical's & C=Credits]

SEMESTER I

Scheme for B.Tech.1st Semester (common to all branches)

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	3:1:0	3:1:0	4	4
3	AEC-1/ HS	AEC0010	Communication Skills-I	2:0:0	2:0:0	2	2
4	BS	*PHY115	Engineering Physics (include semiconductor unit)	4:0:0	4:0:0	4	4
5	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 -1(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=34

Total Credit Hours= 22

Programme Code: UG018

SEMESTER II

Scheme for B.Tech 2nd semester (common to all branches)

I. Theory Subjects

S. No.	Type	Subject Code	SubjectName	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total CreditHours
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
3	ES	ME101	Engineering Graphics and Design	2:0:4	2:0:2	6	4
4	ES	EE102	Basic Electrical Engineering	3:0:0	3:0:0	3	3
5	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)	Credits (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

Programme Code: UG018

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	CSE251	Computer Organization and Architecture	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
	PC	CSE252	Object Oriented Programming using C++	4:0:0	4:0:0	4	4
5	PC	MAT271	Engineering Mathematics-III	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	CSE261	Computer Organization and Design Laboratory	0:0:2	0:0:1	2	1
2	PC	CSE263	Data structure and Algorithms Laboratory	0:0:2	0:0:1	2	1
3	PC	CSE264	Object Oriented Programming using C++ Laboratory	0:0:2	0:0:1	2	1
4	PC	CSE267	Operating System Laboratory	0:0:2	0:0:1	2	1
5	EMC	EMC211	Entrepreneurship Mindset Curriculum -III: (Mandatory course by Punjab Government)	0:0:**4**	0:0:2	4	2
6	SI	CSE269	FOUR WEEKS INSTITUTIONAL/ INDUSTRIAL TRAINING EVALUATION (undertaken after 2nd sem)		0:0:3		3
7	PT	PT201/PT203/ PT205	Physical Training-III(NSO/NCC/NSS)	0:0:2	NC	2	NC

Total Contact Hours= 34
Total Credits Hours= 29

Programme Code: UG018

SEMESTER IV

I. Theory subjects:

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	TotalContact Hours	Total Credit Hours
1	BS	MAT212	Discrete Mathematics	4:0:0	4:0:0	4	4
2	PC	CSE259	Computer Programming using python	3:0:0	3:0:0	3	3
3	PC	CSE254	Database Management System	4:0:0	4:0:0	4	4
4	MDC	MDC019	Universal Human Values: Understanding Harmony	3:0:0	3:0:0	3	3
5	AEC/HS	AEC0015	Effective Technical Communication Skills	2:0:0	2:0:0	2	2
6	PC	CSE258	Computer Networks	4:0:0	4:0:0	4	4

II. **Practical S**

S. 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	CSE265	Computer Programming using python laboratory	0:0:2	0:0:1	2	1
3	PC	CSE266	Computer Networks 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 (NSO/NCC/NSS)	0:0:2	NC	2	NC

Note: 4 weeks industrial/institutional training after 2nd year/4th semester

Total Contact Hours= 32

Total Credits Hours= 25

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SEMESTER V

I. TheorySubjects

S.No.	Type	Subject Code	Subject Name	Contact Hours(L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PC	CSE353	Design and Analysis of Algorithms	4:0:0	4:0:0	4	4
2	PC	CSE355	Computer Graphics	4:0:0	4:0:0	4	4
3	PC	CSE351	Advanced Computer Networks	4:0:0	4:0:0	4	4
4	PC	LAW005	Constitution of India	3:0:0	NC	3	NC
5	PE		Professional Elective-I	3:0:0	3:0:0	3	3
6	OE		Open elective-I	3:0:0	3:0:0	3	3

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	CSE361	Computer Graphics Laboratory	0:0:2	0:0:1	2	1
2	PC	CSE357	Advanced Computer Networks Laboratory	0:0:2	0:0:1	2	1
3	PC	CSE377	Design and Analysis of Algorithms Laboratory	0:0:2	0:0:1	2	1
4	SEC-II	CSE367	Four weeks industrial/institutional training evaluation (undertaken after 4th sem)	-	0:0:3	-	3
5	EMC	EMC311	Entrepreneurship Mindset Curriculum -V: (Mandatory course by Punjab Government)	0:0:**4**	0:0:2	4	2
6	MC	PT301/PT303 /PT305	Physical Training-V (NSO/NCC/NSS)	0:0:2	NC	2	NC

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
4	PE	CSE375	Neural Networks and Deep Learning	3:0:0	3:0:0	3	3
5	PE	CSE377	Introduction to Cyber Security	3:0:0	3:0:0	3	3

Total Contact Hours= 33
Total Credits Hours = 26

Programme Code: UG018

SEMESTERVI

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
3	PE		Professional Elective-II	3:0:0	3:0:0	3	3
4	PE		Professional Elective-III	3:0:0	3:0:0	3	3
5	MDC	MDC018	**Gender, Culture& Development**	3:0:0	3:0:0	3	3

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	CSE380	Software Engineering 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-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	CSE378	Advanced Parallel Computing	3:0:0	3:0:0	3	3
6	PE	CSE380	Data Science	3:0:0	3:0:0	3	3

IV. Professional Elective-III

S. No.	Type	Subject Code	Name	Contact Hours(L :T:P)	Credits(L:T:P)	Total Contact Hours	Total Credit Hours
1	PE	CSE320	Optimization Techniques in Machine Learning	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	Block Chain	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 after 3rd year/6th semester

Total Contact Hours=31
Total Credits Hours =26

Programme Code: UG018

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	PC	CSE479	Cyber Security	4:0:0	4:0:0	4	4
2	PE		Professional Elective-IV	3:0:0	3:0:0	3	3
3	OE		Open Elective-II	3:0:0	3:0:0	3	3
4	OE		Open Elective-III	3:0:0	3:0:0	3	3
5	PC	CSE407	Theory of Automata and 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	0:0:2	4	2
3	SEC-III	CSE485	Four weeks industrial training evaluation (undertaken after 6thsem)	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	CSE453	Multimedia and Animation	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	CSE457	Quantum Computing	3:0:0	3:0:0	3	3

Total Contact Hours= 21
Total Credits Hours= 22

Programme Code: UG018

SEMESTERVIII

I. **Practical Subjects**

S.No.	Type	Subject Code	SubjectName	TotalCreditHours
1	SEC-IV	CSE466	Six Months Industrial Training	20

Total Credits Hours= 20

Programme Code: UG018

Open-Elective-I

1. **Basic 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 Cybersecurity**

Programme Code: UG018

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)	1. To gain experience about structured programming. 2. To help students to understand the implementation of Programming language. 3. To understand various features in Programming Language.
Course Outcome (CO)	The students will be able to: 1. Illustrate the flow chart and to develop C programs. 2. DevelopconditionalanditerativestatementstowriteCprograms and exercise user defined functions to solve realtimeproblems 3. Inscribe C programs that use Pointers to access arrays, stringsandfunctions. 4. Exercise user defined data types including structures and unions to solve 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

Programme Code: UG018

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.

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1.	Programming in C	By ron Gottfried,Jitender Chhabra	Schuamoutlineseries
2.	LetusC	Yaswant Kanetkar	BPBPublication
3.	A structured Programming approachusing C	Behrouz Forouzan	Thomas learning

Programme Code: UG018

CourseCode	**MAT171**
CourseTitle	**EngineeringMathematics-I**
Type ofcourse	Theory
L T P	4:0:0
Credits	4
Courseprerequisite	+2withnon- medical
Course Objective	The objective of this course is to familiarize the prospective engineers with techniques in basic calculus and linear algebra. It aimsto equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards Tackling more advanced level of mathematics and applications that theywouldfind useful intheirdisciplines.
CourseOutcome(CO)	**By the end of the course, students will be able to:** **CO1:** Apply differential and integral calculus to notions of curvature and to improper integrals. **CO2:** Understand the Beta and Gamma functions. **CO3:** Comprehend tools of matrices and linear algebra, including linear transformations, eigenvalues, diagonalization, and orthogonalization.

Syllabus

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.

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1.	Advanced Engineering Mathematics	Erwin Kreyszig	John Wiley & Sons, 2006.
2.	Higher Engineering Mathematics	Ramana B.V	Tata McGraw Hill New Delhi

Programme Code: UG018

Course Code	**AEC0010**
Course Title	**Communication Skills - I**
Type of course	AEC-1
LTP	2:0:0
Credits	2
Course prerequisite	+2inanystream
Course Objective (CO)	**Objectives of the course:** 1. Equip the learner with proficiency in reading comprehension. 2. Enable the learner with improved writing skills and command over official/corporate communication. 3. Enhance the learners' range of vocabulary and knowledge of the essentials of grammar.
Course Outcomes	1. Have fairly good proficiency in reading comprehension. 2. Have enhanced writing skills and command in official/corporate communication. 3. Develop confidence in making presentations: oral or documentary. 4. Develop speaking skills

SYLLABUS

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, and the role of communication in society.

UNIT-II: Listening and Reading Skills
Listening Skills: Listening process, hearing vs. listening, types of listening, effective listening, barriers to effective listening, and note-taking.

Reading Skills: Purpose of reading, process of reading, reading skills models and strategies, scanning, skimming, SQ3R method, approaches to reading, and comprehension passages for practice.

UNIT-III: Writing Skills
Purpose of writing, effective writing, types of writing, business correspondence, precise writing, memo writing, and minutes of meetings.

UNIT-IV: Speaking Skills
Speech process, skills of effective speaking, role of audience, feedback skills, and oral presentation.

Programme Code: UG018

Recommended Books:

SrNo	Author(s)	Title	Publisher
1.	Bhupender Kour	Effectual Communication Skills	S.K.Kataria and Sons
2.	R.Datta Roy and K.K.Dh eer	Communications Skills	Vishal Publishing Compa ny

Programme Code: UG018

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(CO)	The aim of the subject is to enhance the knowledge of engineering students about Semiconductor Physics and apply the knowledge to engineered semi conductor materials.
CourseOutcome(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 semi conductor interaction. CO3: illustrate the measurements of carrier density, resistivity and hall mobility using different techniques. CO4: Analyze engineered semiconductor materials and its applications.

Syllabus-

UNITI

Electronic materials: Free electron theory, Density of states and energy band diagrams, Kronig-Penny model (to introduce origin of band gap), Energy bands in solids, E-k diagram, Direct and indirect band gaps. Types of electronic materials: metals, semiconductors, and insulators, Density of states, Occupation probability, Fermi level, Effective mass, Phonons.

UNITII

Semiconductors and Light-semiconductor interaction: Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction, Metal-semiconductor junction (Ohmic and Schottky), Semiconductor materials of interest for opto-electronic devices.

Optical transitions in bulk semiconductors: absorption, spontaneous emission, and stimulated emission; Joint density of states, Density of states for photons, Transition rates (Fermi's golden rule), Optical loss and gain; Photovoltaic effect, Exciton, Drude model.

UNITIII

Measurements: Four-point probe and vander Pauw measurements for carrier density, resistivity, and hall mobility; Hot-point probe measurement, capacitance-voltage measurements, parameter extraction from diode I-V characteristics, DLTS, bandgap by UV-spectroscopy, absorption/transmission.

UNITIV

Engineered semi conductor materials: Density of states in 2D, 1d and 0D (qualitatively). Practical examples of low-dimensional systems such as quantum wells, wires, and dots: design, fabrication, and characterization techniques. Hetero junctions and associated band-diagrams.

Text and Reference Books

S.No	Name	Author(S)	Publisher
1	Semiconductor Optoelectronics: Physics and Technology	J.Singh	McGraw-Hill Inc.(1995).
2	Fundamentals of Photonics	B.E.A. Saleh and M. C.Teich	John Wiley & Sons, Inc.(2007).
3	Semiconductor Devices: Physics and Technology	S.M. Sze	Wiley (2008).
4.	Photonics: Optical Electronics in Modern Communications	A.Yariv and P.Yeh	Oxford University Press, NewYork (2007).
5.	Semiconductor Optoelectronics (online course)	MR Shenoy	NPTEL
6.	Optoelectronic Materials and Devices (online course)	Monica Katiyar and Deepak Gupta	NPTEL

Programme Code: UG018

Course Code	EVS002
Course Title	Environmental Science
Type of Course	VAC/ MC
L T P	3:0:0
Credits	3
Course Prerequisites	NA
Course Objective (s)	To connect and sensitize the students towards the environment and prevailing environmental issues (natural, physical, social and cultural).
Course Outcome (CO)	Thestudents will beableto: 1. To understand the importance of environment in their life Developconditionalanditerativestatementstowrite C programs and exercise user defined functions to solverealtimeproblems 2. To learn about the concept of Ecosystem Exerciseuserdefineddatatypesincludingstructuresand unions to solve problems. 3. To understand the relation between social issues and environment 4. To learn about the new technology in harmony with environment.

SYLLABUS

UNIT I

Introduction: Definition, scope and role of Environmental studies in Engineering. Visarenessof basic concept of environment.

Types of Natural Resources and its management: Renewable and non-renewable resources case studies and there over-exploitation: Forest resources, Water resources, Mineral resources, Food resources, Land resources

Ecosystems. Types of Ecosystem. Energy Flow. Biodiversity, Biogeographical classification of India. Mega diversity centers, Hotspot, Threats to biodiversity: habitat loss, Conservation. Endangered andendemic species of India.

UNIT II

Environmental Pollution and Engineering Disaster: Definition, Causes, effects and control measures of air pollution, Water pollution, Soil pollution. Marine pollution, Noise pollution Natural disaster (Avalanche. Landslide, floods, cyclones, earth quakes and volcano eruption of catchment area for human purpose and man-made disaster (chernobyl explosion, Electronic Graveyard China, The Exxon Valdez Oil Spill. Bhopal gas tragedy). Environmental ethics: Issues andpossible solutions. Wasteland reclamation. Consumerism and waste products. Salient features of various environment, forest, wildlife and pollution acts. Manufacturing green technology, The National Green Tribunal Act 2010, scheme and labeling of

Environment friendly products, Ecomarks

Environment and Social Issues: Sustainable development, urban problems related to energy, energyover-consumption and its impact on the environment, economy, and global change, Climate change, global warming, acid rain, ozone layer depletion. Solid waste management. Liquid waste management, Waste water recycling, rain water harvesting.wanershest management, Environment economics

UNIT IV

Definition and concepts: green technology, green energy, green economy. Alternative source as green (bio fuels, wind energy, geothermal energy, ocean energy: nuclear energy); need for energy efficiency; energy conservation and sustainability. Sustainable development; case studies of environment movements (Appiko Movement, Chipko Movement, Narmada Bachao Andolan).

Text and reference Books:

S. No.	Name	Author(S)	Publisher
1	Text Book for Environmental Studies	Erach Bharucha	UGC and Bharti Vidyapeeth Institute of Environment Educationand Research, Pune
2	Environmental Biology	Agarwal, K.C. 2001	Nidi Publ. Ltd. Bikaner
3	Environmental Science	Miller TG. Jr	Wadsworth
4	Perspectives in Environmental Studies	Kaushik, A and Gaurav Garg	New Age International Publishers

Programme Code: UG018

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)	To help students to underst and the implementation of language.This Programming language helps in solving a problem.
Course Outcome(CO)	The students will be able to: 1. Illustrate flow charts and develop C programs. 2. Develop conditional and iterative statements to write C programs and use user-defined functions to solve real-time problems. 3. Write C programs that use pointers to access arrays, strings, and functions. 4. Use user-defined data types, including structures and unions, to solve problems.

SYLLABUS

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

8. **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.
9. **Function Prototypes and Definitions:** Create a program with function prototypes and definitions to find the maximum of two numbers.
10. **Parameter Passing:** Write a program that swaps two numbers using call-by-reference parameter passing.
11. **Array Manipulation:** Implement a program to sort an array of integers in ascending order using the bubble sort algorithm.
12. **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.
13. **Structures**: Create a program to store and display information about a student using a structure.
14. **Unions:** Write a program to create a union of different data types and display its values.

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1.	Programming in C	By ron Gottfried,Jitender C hhabra	Schuamoutlineseries
2.	LetusC	Yaswant Kanetkar	BPBPublication
3.	A structured Programming appro achusing C	Behrouz Forouzan	Thomas learning

Programme Code: UG018

Course Code	ME105
Course Title	**Workshop/Manufacturing Practices**
Programme	ES
L T P	0 0 6
Credits	3
Course Prerequisites	+2 Physics and Mathematics
Course Objectives	Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using Different materials.
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.

1. ManufacturingMethods-casting,forming,machining,joining,advancedmanufacturingmethods
2. Fitting operations and power tools
3. Electrical and Electronics
4. Carpentry
5. Metal casting
6. Welding (arc welding 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.

RECOMMENDEDBOOKS

Sr.no.	Name	AUTHOR(S)	PUBLISHER
1.	Workshop Technology	HSBawa	McGraw-Hill Publishing Company Limited
2.	Workshop Technology I,II,III	S K Hajra, Choudhary and AKChoudhary	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: UG018

Course Code	**PHY107**
Course Title	**Engineering Physics Practical**
Type of course	Practical
L T P	0:0:2
Credits	1
Course prerequisite	10+2 with physics as core subject.
Course Objectives	The aim of the subject is to enhance the Practical knowledge of students about various aspects of fundamental of physics including mechanics, optics, wave optics, quantum mechanics; solid-state physics and its applications.
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 the list given below.

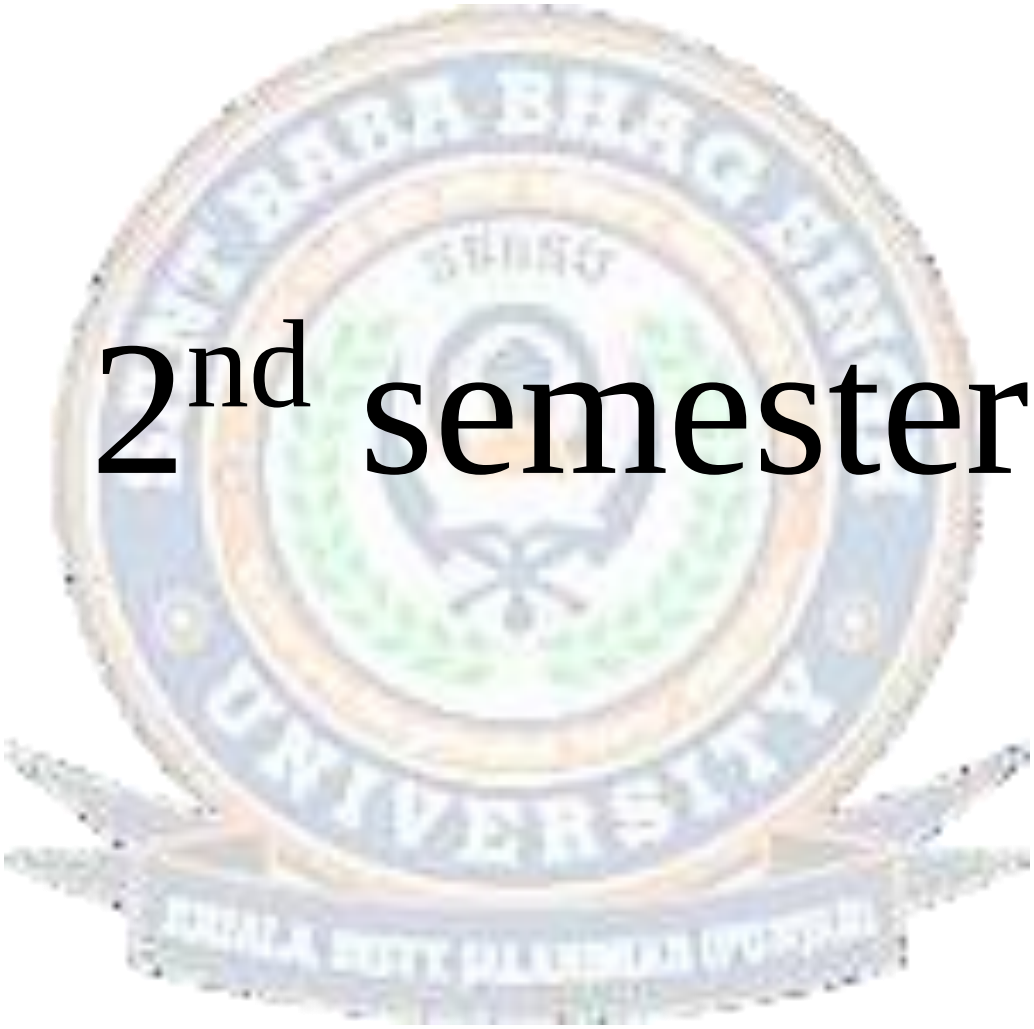
1. To study the variation of magnetic field with distance along the axis of a circular coil carrying current.
2. To determine the magnetic dipole moment of a bar magnet and horizontal intensity of earth's magnetic field using a deflection galvanometer.
3. To study B-H curve using CRO.
4. To study the laser beam characteristics like divergence using diffraction grating aperture.
5. To determine the wavelength of a laser using Michelson 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 the 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 a 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 other prominent lines of mercury by normal incidence method.
17. To find the acceleration of the cart in the simulator (Newton's 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 Practicals	Michael Nel sonand Jon M.Ogborn	Heinemann Educational Publishers
3	A Textbook of Practical Physics	Indu Prakash and Rama krishna	Kitab Mahal,New Delhi

ProgrammeCode: UG018



2nd semester

ProgrammeCode: UG018

Course Code	**CHM105**
Course Title	Engineering Chemistry
Type of course	BS
L T P	3:1:0
Credits	4
Course prer equisite	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 student 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 related chemical behavior. **CO4:** List major chemical reactions that are used in the synthesis of molecules. .

SYLLABUS

UNIT-I: Atomic and Molecular Structure

Schrödinger 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 diatomics. 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 and their 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: Thermodynamics and Periodic Properties

Use of Free Energy in Chemical Equilibria: Thermodynamic functions: energy, entropy, and free energy. Estimations of entropy and free energies. Free energy and emf, cell potentials, the Nernst equation, and applications. Acid-base, oxidation-reduction, and solubility equilibria. Water chemistry and corrosion. Use of free energy considerations in metallurgy through Ellingham diagrams.

Periodic Properties: Effective nuclear charge, penetration of orbitals, variations of s, p, d, and f orbital 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, and molecular geometries.

UNIT-IV: Stereochemistry and Organic Reactions

Stereochemistry: Representations of 3-dimensional structures, structural isomers and stereoisomers, configurations, symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations, and conformational analysis. Isomerism in transitional metal compounds.

Organic Reactions and Synthesis 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	Name	Author (S)	Publisher
1.	Engineering chemistry	J.C.Curiacose andJ.Raja Ram	Tata Mcgraw- HillCo.New Delhi.
2	Inorganic Chemistry	Gary L.Miessler,Paul J.Fischer and DonaldA. Tarr,(2013).	Pearson
3	Introduction To spectroscopy (2008).	Pavia,D.L.,Lampman, G.M.,Kriz,G.S.,andVy vyan,J. A.	CengageLearning.
4	Principles of Organic Synthesis	Norman and Coxon	*CRCPress*
5	Inorganic Chemistry 4th edition	D.F.Shriverand P.W.Atkins,	Oxford University, Oxford (2006)
6	Stereo chemistryc on formation And Mechanism	P.S.Kalsi	New Age International

ProgrammeCode: UG018

Course Code	**MAT172**
Course Title	**Engineering Mathematics -II**
Type of course	BS
LTP	4 0 0
Credits	4
Course prerequisite	+2 with Non-Medical, B.TechIst 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 understand the notion of probability and random variables and various discrete and continuous probability distributions and their properties. CO2 apply the basics of statistics including measures of central tendency, correlation and regression in the problems related to the discipline. CO3 use the statistical methods of studying data samples.

SYLLABUS

UNIT-I: Matrices

Linear Systems of Equations; Linear Independence; Rank of a Matrix; Determinant, Inverse of a matrix, System of linear equations; Symmetric, skew-symmetric and orthogonal matrices.

Determinants; Eigenvalues and eigenvectors; Cayley-Hamilton Theorem (without proof).

UNIT-II: First order ordinary differential equations

Exact, linear and Bernoulli's equations. Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT-III: Ordinary differential equations of higher orders

Second order linear differential equations with variable coefficients: Euler-Cauchy equations, solution by variation of parameters; Power series solutions: Legendre's equations and Legendre polynomials, Frobenius method.

UNIT-IV: Complex Variables

Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties.

Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof); Taylor's series, zeros of analytic functions, Laurent's series; Cauchy Residue theorem (without proof).

Recommended books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th Edition, John Wiley & Sons, 2006.
2. S. L. Ross, Differential Equations, 3 rd Edition, Wiley India, 1984.
3. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
5. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36 th Edition, 2010.

ProgrammeCode: UG018

Course Code	**ME101**
Course Title	**Engineering Graphics and Design**
Type Of Course	ES
L T P	2:0:4
Credits	4
Course Pre-requisites	NIL
Course objectives	Toprepare you to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability to prepare you to communicate effectively ton prepare you to use the Techniques, skills and modern engineering tools necessary for engineering practice.
Course outcome(CO)	**By theend of the course, students will be able to learn:** CO1: Introduction to engineering design and its place in society and engineering communication. CO2: Exposure to visual aspects and engineering graphics of engineering design standard, exposure to solid modeling CO3: Exposure to computer aided geometric design creating working drawings.

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 bothplanes; Projections ofplanesinclinedPlanes–AuxiliaryPlanes;

UNIT-II

Projections of Regular Solids

Inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and

The course includes floor plans that feature windows, doors, and fixtures such as WC, bath, sink, and shower. It covers sections and sectional views of right-angular solids, including prism, cylinder, pyramid, and cone, along with auxiliary views. Students will study the development of surfaces of right regular solids—prism, pyramid, cylinder, and cone—and draw sectional orthographic views of geometrical solids, industrial objects, and dwellings from foundation to slab.

UNIT-III

IsometricProjections

Principles of isometric projection, including isometric scale, isometric views, and conventions. Isometric views of lines, planes, and simple and compound solids are covered, along with the conversion of isometric views to orthographic views and vice versa, following standard 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 multiviews 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 colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to

Building Information Modelling (BIM).

Recommendedbooks:

S. No	Name	Author(s)	Publisher
1.	Engineering Drawing	BhattN.D.,Panchal V.M.&IngleP.R.,(2014)	Charotar Publishing House
2.	Engineering Drawing and Computer Graphics	Shah,M.B.&Rana B.C.(2008)	Pearson Education
3.	Engineering Graphics	AgrawalB.&AgrawalC. M. (2012)	TMH Publication
4.	Text book on Engineering Drawing	Narayana,K.L.&PK annaiah(2008)	Scitech Publishers

ProgrammeCode: UG018

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:** 1. Understand and analyze basic electric and magnetic circuits 2. Study the working principles of electrical machines and power converters 3. Introduce the components of low voltage electrical installations

Syllabus

UNIT-I

DC Circuits Electrical circuit elements (R, L and 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, B-H characteristics, ideal and practical transformer, 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 motor. 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.

Recommendedbooks:

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	Mc Graw Hill, 2009
3.	Fundamentals of Electrical Engineering	L.S.Bobrow	Oxford University Press, 2011
4.	Electrical and Electronics Technology	E.Hughes	Pearson,2010
5.	PrenticeHallIndia,1989	Electrical Engineering Fundamental s	V.D.Toro

ProgrammeCode: UG018

Course Code	**MDC023**
Course Title	**Indian Knowledge System**
Type of Course	MDC-1
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: 1. Students will grasp the essence of the Indian knowledge system, encompassing health, mathematics, and cultural heritage. 2. Upon completion, students will appreciate the influence of ancient Indian texts, mathematicians, and cultural practices on contemporary society.

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.

ProgrammeCode: UG018

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1.	The Story of Numbers	David M. Burton	**McGraw Hill Education**
2.	Introduction to Indian Philosophy	Sati Chandra Chatterjee	**Rupa & Co**

ProgrammeCode: UG018

Course Code	**CHM107**
Course Title	**Engineering Chemistry Practical**
Type of course	BS
LTP	002
Credits	1
Course Objectives	Thechemistrylaboratorycoursewillconsistofexperimentsillustratingtheprinciplesoftchemistryrelevanttothestudyofscienceand engineering.
Course Outcome(CO)	Thestudents willlearnto: 1. Estimaterateconstantsofreactionsfromconcentrationofreactants/productsasafunctionof time 2. Measuremolecular/systempropertiessuch assurfacetension,viscosity,conductanceof solutions,redoxpotentials,chloridecontentofwater,etc 3. Synthesizeasmalldrugmoleculeandanalyzeasalt sample.

SYLLABUS

List of Experiment (Choiceof 10-12experiments fromthefollowing)

1. Determination of surface tension and viscosity of liquids.
2. Determination of viscosity of oil by means of Red Wood Viscometer.
3. Thin layer chromatography: Determination of RF value of a mixture by TLC.
4. Separation of methyl orange and phenolphthalein from given mixture by paper chromatography.
5. Ion exchange column for removal of hardness of water / Determination of total hardness of water by EDTA method.
6. Determination of Total Residual Chlorine in water sample.
7. Colligative properties using freezing point depression.
8. Determination of the rate constant of a reaction.
9. Determination of cell constant and conductance of solutions.
10. Potentiometry – determination of redox potentials and EMFs.
11. Determine the strength of a solution pH metrically.
12. Synthesis of a polymer/drug: Preparation of Urea Formaldehyde Resin.
13. Synthesis of paracetamol.
14. To bring catalysed condensation or to prepare a pure sample of dibenzalpropane.
15. Saponification / acid value of an oil.
16. Chemical analysis of a salt.
17. Lattice structures and packing of spheres.
18. Models of potential energy surfaces.
19. Chemical oscillations – Iodine clock reaction.
20. Determination of the partition coefficient of a substance between two immiscible liquids.
21. Adsorption of acetic acid by charcoal.
22. Use of the capillary viscosity meters to demonstrate the isoelectric point as the pH of minimum viscosity for gelatin sols and/or coagulation of the white part of egg.

ProgrammeCode: UG018

Course Code	**EE104**
Course Title	**Basic Electrical Engineering Laboratory**
Type Of Course	ES
L T P	002
Credits	1
Course Pre-requisites	Basics of Electrical Engineering
Course objectives	To familiarize with various AC, DC circuits,Transformer,Ele ctrical Machine and Measuring Instruments
Course outcome(CO)	**By the end of the course,students will be able to:** CO1: Get an exposure to common electrical components and their ratings. CO2: Make electrical connections by 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..

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.

Synchronous Machine operating as a generator: stand-alone operation with a load. Control of voltage through field excitation.

8. Demonstration of (a) DC-DC converters, (b) DC-AC converters – PWM waveform, (c) the use of DC-AC converter for speed control of an induction motor, and (d) components of LT switchgear.

ProgrammeCode: UG018

3rd semester

ProgrammeCode: UG018

Course Code	**CSE251**
Course Title	**Computer Organization and Architecture**
Type of Course	PC
L T P	400
Credits	4
Course Prerequisites	Basic knowledge of computers and its components
Course Objectives	To expose the students to the following: 1. Understand the internal structure and operation of digital computers. 2. Learn instruction set architecture and its impact on processor design. 3. Explore memory hierarchy, I/O systems, and performance optimization. 4. Develop skills to design and analyze CPU components and control units.
Course Outcome(CO)	**Thelearnerwill beableto-** 1. Explain the basic structure and functional units of a computer system. 2. Design and analyze instruction formats, addressing modes, and control units. 3. Evaluate performance trade-offs in memory and I/O systems. 4. 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

- Memory hierarchy: cache, main, virtual, and secondary memory
- Associative memory and mapping techniques
- Cache performance and replacement policies
- Virtual memory: paging and segmentation
- RAID and memory management hardware

Unit IV: I/O Systems & Parallel Processing

- I/O interface and data transfer modes
- DMA, interrupt-driven I/O, and programmed I/O
- Pipelining: instruction and arithmetic pipelines
- RISC vs CISC architectures
- Vector processing and multiprocessor systems

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Computer System Architecture	M.Morris Mano	Pearson Education
2	Computer Organization and Design: The Hardware/ Software Interface	DavidA.Pattersonand John L. Hennessy	Elsevier
3	ComputerOrganization andEmbeddedSystems	CarlHamacher	McGrawHillHigher Education
4	Computer Architecture and Organization, 3rd Edition	JohnP.Hayes	WCB/McGraw-Hill

ProgrammeCode: UG018

Course Code	**CSE253**
Course Title	**Data Structure and Algorithms**
Type of Course	PC
L T P	4 00
Credits	4
Course Prerequisits	Basic knowledge of C language and C++ language
Course Objectivs	This course work provides the thorough understanding of the Linear and Non-LinearDataStructures insolving problemsandtogivethe idea of the efficiency of various algorithms.
Course Outcome (CO)	The learner will be able to– 1. For a given algorithm student will able to analyze the algorithms todeterminethetimeandcomputationcomplexityandjustifythecorrectness. 2. For a given Search problem (Linear Search and Binary Search) studentwillable to implementit. 3. For a given problem of Stacks, Queues and linked list student will ableto implement it and analyze the same to determine the time and computationcomplexity. 4. Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, QuickSort,MergeSort,HeapSortandcomparetheirperforma ncein term ofSpaceandTimecomplexity. 5. Student will able to implementGraph search and traversal algorithmsanddeterminethe timeandcomputationcomplexity.

Syllabus

UNIT-I

Introduction: BasicTerminologies: ElementaryDataOrganizations, DataStructureOperations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Spacetrade off. **Searching:** Linear Search andBinarySearchTechniques and their complexityanalysis.

UNIT-II

Stacks and Queues: ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: ExpressionConversionandevaluation– corresponding algorithmsand complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, PriorityQueue; Operations on eachtypesofQueues: Algorithmsand theiranalysis.

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 of 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.

RECOMMENDEDBOOKS			
SrNo	**Author(s)**	**Title**	**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	2nd Impression by R.G.Dr omey	Pearson Education

ProgrammeCode: UG018

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 includes 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 the 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(S)**	**PUBLISHER**
1	Operating System Concepts Essentials	9th Edition by Avi Silberschatz, PeterGalvin, GregGagne	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	1st Edition by Charles Crowley	Irwin Publishing
4	Operating Systems: AModern Perspective	2nd Edition by Gary J. Nutt	Addison-Wesley
5	Designof theUnix Operating Systems	8thEdition by Maurice Bach	Prentice-Hall of India

ProgrammeCode: UG018

Course Code	**CSE252**
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 Objective(s)	o gain experience about structured programming. To help students to understand the implementation of Programming Language. To understand various features in Programming Language.
CourseOutcome(CO)	Thestudents will be able to: 1. Understandhow**C++**improvesCwithobject - orientedfeatures. 2. Learn how to write inline functions for efficiency andperformance. 3. Learn the syntax and semantics of the **C++** Programming language. 4. Learnhowto design **C++**classesfor codereuse.

SYLLABUS

UNIT–I

Basics Introduction to C++, Tokens, Identifiers, Data Types, Control Statements, Functions, Arrays, Structures, Unions, 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 Dynamic Allocation: Arrays of Objects, Pointers, References, Dynamic Allocation Operators, and 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 and delete, Overloading Special Operators and 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 and Polymorphism: Virtual Functions, The Virtual Attribute is inherited, Virtual Functions are Hierarchical, Pure Virtual Functions, Using Virtual Functions, Early vs. Late 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 Exception Handling.
The C++ I/O System Basics: Old vs. Modern C++ I/O, Streams, Stream Classes, Formatted I/O, Overloading << and >>, Creating Manipulators.

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1.	ObjectOrientedProgrammingwithC++	E.Balaguruswamy	TataMc.GrawHill
2.	Object Oriented ProgrammingusingC++	R.Lafore	GalgotiaPublications
3.	MasteringC++	A.R.Venugopal,Rajkumar, T.Ravishanker	TMH

CourseCode	**MAT271**
CourseTitle	**Engineering Mathematics–III**
Type of course	Core(Theory)
L T P	4 0 0
Credits	4
Courseprerequisite	+2Mathematics,EngineeringMathematics-I,EngineeringMathematics- II
CourseObjective (CO)	Thiscourseisanintroductiontoabroadrangeofmathematical techniques for solving problems that arise in Science and Engineering. The goal is to provide a basic understanding ofthe derivation,analysis and use of these techniques.
Course Outcome(CO)	**Bytheendofthecourse,students willbe able to:** CO1Acquaint withthederivativeoffunctionsofmorethanone variable and the concept of Maxima & Minima. CO2Find double integralsand applythe ideain certainproblems arising in the engineering. CO3Touseeffectivemathematicaltools forthesolutionsof differential equations that model physical processes

UNIT-I: Fourier series
Definition of Fourier series, Orthogonal and orthonormal functions, Fourier series with arbitrary period, in particular periodic function with period 2, Fourier series of even and odd function, half range Fourier series.

UNIT II: Laplace Transform and Applications
Introduction, Definition of the Laplace transform, Useful properties of Laplace transform (without proof): Linearity, Frist shifting theorem, Multiplication and division by t, transforms of derivatives and integrals, Heaviside unit step function, Dirac's delta function, second shifting theorem, Laplace transform of Periodic function, Inverse Laplace transform using partial fraction and Convolution theorem (without proof).

UNIT III: Partial Differential Equations
Definition of Partial Differential Equations, First order partial differential equations, solutions of first Order linear PDEs; Solution to homogenous linear partial differential equations of second order by complimentary function and particular integral method. Second-order linear equations and their classification, Initial and boundary conditions, D` Alembert solution of the wave equation.

UNIT IV: Basic Statistics
Measures of Central Tendency- Mean, Median, Mode, Dispersion, Correlation and regression, Curve fitting by method of least squares-fitting of straight lines, second degree parabola and more general curves.

Recommended books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th Edition, John Wiley & Sons2006.
2. S. L. Ross, Differential Equations, 3 rd Edition, Wiley India, 1984.
3. N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications.
4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36 th Edition, 2010.

Course Code	**CSE261**
Course Title	**Computer Organization and Architecture Laboratory**
Type of Course	PC
L T P	002
Credits	1
Course Prerequisites	Basic knowledge of computer and its components
Course Objectives	1. Understand the architecture and instruction set of microprocessors (especially 8085/8086). 2. Develop assembly language programs for arithmetic, logical, and control operations. 3. Explore memory interfacing, I/O operations, and interrupt handling. 4. Strengthen low-level programming and debugging skills.
Course Outcome(CO)	**Thelearnerwill beableto-** 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. 1.

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	**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 thes tudents 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.

SYLLABUS

LaboratoryExperiments-

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 a given element in a sorted array in ascending order.

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(S)**	**Publisher**
1	Practical Data Structures Using C ::Beginner'sEasy	HarryH.Chaudhary	Createspace LLC USA
2	Object Oriented ProgrammingwithC++	Balaguruswamy	Tata Mc Graw-Hill Education
3	Data Structures throughC++	YashavantP.Kanetkar	BPB Publications

Course Code	**CSE264**
Course Title	**Object Oriented Programming using C++ Laboratory**
Type of Course	PC
LTP	002
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	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 Practicals

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

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 type of data.

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

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(S)**	**Publisher**
1	Object Oriented Programming in C++	LaforeR.	Waite Group
2	Object Oriented Programming with C++	E.Balagurus wamy	Tata McGrawHill
3	Mastering Object- Oriented Programming with C ++	R.S.Salaria	Salaria Publishing House

Course Code	**CSE267**
Course Title	**Operating System Laboratory**
Type of Course	PC
LTP	002
Credits	1
Course Prerequisites	Knowledge of Operating System,DOS Commands
Course Objectives	To provide the understanding of the operating system operation and inter-process communication.
Course outcome	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. Apply the concept of creating a new process from a parent process.

LIST OF PRACTICALS

1. Simulation of CPU Scheduling Algorithms:

- a) Round Robin
- b) Shortest Job First (SJF)
- c) First Come First Serve (FCFS)
- d) Priority Scheduling

2. Simulation of Continuous Memory Management Allocation Techniques:

- a) First Fit
- b) Best Fit
- c) Worst Fit

3. Simulation of Page Replacement Algorithms:

- a) First In First Out (FIFO)
- b) Least Recently Used (LRU)
- c) Optimal (OPT)

4. Simulation of File Allocation Strategies:

- a) Sequential Allocation
- b) Indexed Allocation
- c) Linked Allocation

5. Simulation of File Organization Techniques:

- a) Single Level Directory
- b) Two Level Directory

6. Study and Practice of Unix Commands

7. File Handling Operations:

- a) File Creation
- b) Reading from a File
- c) Writing into a File

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(S)**	**Publisher**
1	Practical Linux Programming:Device Drivers,Embedded Systems	Ashfaq A.Khan	Firewall Media
2	A Practical Guide to Linux Commands,Editors,and Shell Programming	MarkG.Sobell	Pearson Education
3	A Practical Guide to UNIX SystemV Release 4	M.G.Sobell	Benjamin/ Cummings Publishing Company
4	100ShellProgramsin Unix	SarikaJain	Pinnacle Technology

4thSEMESTER

Course Code	**MAT212**
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)	To provide students with an overview of discrete mathematics. Students will learn about topics such as logic and proofs, sets and functions, probability, recursion, graph theory, matrices, Boolean algebra, and other import antd is crete math concepts.
Course Outcome(CO)	Thestudents will beableto: 1. Uselogicalnotation. 2. Performlogicalproofs. 3. Applyrecursivefunctionsandsolverecurrencerelations. 4. Determineequivalentlogicexpressions.

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 andComposite Function, Size of a Set, Finite and infinite Sets, Countable and Uncountable Sets, Cantordiagonal argument and The Power Set theorem.

Proof Methods and Strategies: Forward Proof, Proof by Contradiction, Proof by Contraposition, Proofof 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, Coloring, Planarity, Matching.Languages of Propositional logic and First-order logic, expressing natural language sentences inlanguages of propositional and first-order logic, expressing natural language predicates in the languageof 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, Bernoullitrials, Conditional probability & independence (Bayes' Theorem).

Text Books and References:

1. Singh, S.B., Discrete Mathematics, Khanna Book Publishing Company, New Delhi.
2. Liu, C. L., & Mohapatra, D. P. (2008). Elements of Discrete Mathematics. Tata McGraw-Hill.

ProgrammeCode: UG018

Course Code	**CSE259**
Course Title	**Computer Programming using python**
Type Course	PC
L T P	3:0: 0
Credits	3
Course Pre-requisite	NA
Course Objectives (CO)	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. 4. Creating and using classes in python programming
Course Outcomes	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. 4. 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.

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(S)**	**Publisher**
1	Programming in Python 3	Mark Summerfield	Addison-Wesley
2	Python Programming: Using Problem Solving Approach	Reema Thareja	Oxford University Press

ProgrammeCode: UG018

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 Objectives	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 to Databases and Transactions: database system, purpose of database system, Filebased system, view of data, database architecture.

Data Models: The importance of data models, Basic building blocks, Business rules, The Evolution of data models, Degrees of data abstraction.

Database Design ER-Diagram: Database design and ER Model: overview, ER-Model, Constraints, ER-Diagrams, ERD Issues, weak entity sets, Codd's rules, Relational Schemas.

UNIT-II

Relational Algebra and Calculus: Relational algebra: introduction, Selection and projection,

set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, relational comparison. Calculus: Tuple relational calculus, Domain relational Calculus, calculus vs algebra

Relational database Model: Logical view of data, keys, integrity rules. Relational Database design: features of good relational database design, atomic domain and Normalization.

UNIT-III

Constraints, Views and SQL: Database Languages, Constraints and its types, Integrity constraints, Views: Introduction to views, updates on views, comparison between tables and views SQL: data definition, aggregate function, Null Values.

UNIT-IV

Transaction management and Concurrency control: Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, optimistic methods, database recovery management

Database Security and Authorization: Introduction to Database Security Issues, Discretionary Access Control Based on Granting/Revoking of Privileges.

Advance Topic: OLAP, data mining, data warehouse, multimedia database, geographical database, spatialdatabase.

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(S)**	**Publisher**
1	Database System Concepts	6th Editionby AbrahamSilberschatz,HenryF.Korth, S.Sudarshan,	McGraw-Hill.
2	Principles of Databaseand Knowledge – BaseSystems	Vol 1, J.D. Ullman	Computer SciencePress
3	Foundations ofDatabases	Reprint by Serge Abiteboul,RichardHull, VictorVianu	Addison-Wesley

ProgrammeCode: UG018

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 Outcomes (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.

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.

ProgrammeCode: UG018

Sr. No.	Name	Author(s)	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	RishabhAnand	Satya Prakashan, New Delhi

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 Objectives	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. Emphasisisplacedonteachinghowtopresentthesamefindingsorallyandi n 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. Analyse 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 goal setting, career planning, self-esteem. Managing time; personal memory, rapid reading, taking notes; complex problem solving; creativity.

UNIT-IV

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-V

Ethics- Business ethics, Etiquettes in social and office settings, Email etiquettes, Telephone Etiquettes, engineering ethics, Managing time, Role and responsibility of engineering, Work culturing, Personalmemory,Rapidreading,Takingnotes,Complexproblemsolving, Creativity

RECOMMENDED BOOKS			
Sr.No	**Author(s)**	**Title**	**Publisher**
1.	DavidF.Beer and David Mc Murrey	Guide to writing as An Engineer	John Willey.New York
2.	Diane Hacker	Pocket StyleManual	BedfordPublication,New York
3	Shiv Khera	You Can Win	Macmillan Books
4	Raman Sharma	TechnicalCommunications	Oxford Publication,London
5	Dale Jungk	Applied Writing forTechnicians	Mc Graw Hill,NewYork

Course Code	**CSE258**
Course Title	**Computer Networks**
Typeof Course	PC
L T P	400
Credits	4
Course Prerequisites	Basic knowledge of Computer, Digital Circuits, and Network Arrangement..
Course Objectives (CO)	1. To develop an understanding of modern network architectures from a design and performance perspective. 2. To introduce the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs), and Wireless LANs (WLANs). 3. To provide an opportunity to do network programming. 4. To provide WLAN measurement ideas.
Course out come	The learner will be able to – 1. Explain the functions of the different layers of the OSI Protocol. 2. Draw the functional block diagram of wide-area networks (WANs), local area networks (LANs), and Wireless LANs (WLANs) and describe the function of each block. 3. For a given requirement (small scale) of wide-area networks (WANs), local area networks (LANs), and Wireless LANs (WLANs), design it based on the market-available components. 4. For a given problem related to TCP/IP protocol, develop the network programming. 5. Configure DNS, DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open-source available software and tools.

SYLLABUS

UNIT-I

Introduction to Computer Networks: 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

Physical Layer: Introduction to Transmission Media: Twisted pair, Coaxial cable, Fiber optics, Wireless transmission (radio, microwave, infrared), switching: Circuit Switching, Message Switching, Packet Switching; their comparisons.

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, And 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. Session & Presentation Layer

RECOMMENDED BOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	DataCommunicationand Networking(4th Edition)	BehrouzA.Forouzan	McGraw-Hill.
2	Data and Computer Communication(8th Edition)	WilliamStallings	PearsonPrenticeHall India.
3	ComputerNetworks (8th Edition)	Andrew S. Tanenbaum	Pearson New InternationalEdition
4	InternetworkingwithTCP/IP, Volume 1,6th Edition	DouglasComer	PrenticeHallof India
5	TCP/IPIllustrated, Volume1	W.Richard Stevens,	Addison-Wesley, United States of America.

Course Code	**CSE260**
Course Title	**Database Management System Laboratory**
Type of Course	PC
L T P	002
Credits	1
Course Prerequisites	Knowledge of Program Development Constructs
Course Objectives	This practical course work allows the students to efficiently designa working of watremodel.
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. 5. Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS.

SYLLABUS

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.

RECOMMENDEDBOOKS			
Sr. no.	**Name**	**Author(s)**	**Publisher**
1	Database System Concepts	6th Editionby AbrahamSilberschatz, HenryF.Korth, S.Sudarshan,	SpringerScience&BusinessMedia
2	Principles of Databaseand Knowledge – BaseSystems	Vol 1, J.D. Ullman	TataMcGraw-Hill Education
3	Foundations ofDatabases	Reprint by Serge Abiteboul,RichardHull, VictorVianu	Technical Publications

Course Code	**CSE265**
Course Title	**Computer Programming using python laboratory**
Type of Course	PC
L:T:P	0:0:2
Credits	1
Course Prerequisites	NA
Course Objective(s)	1. To understand and perform python installation. 2. To create python scripts using variable, 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 variable, 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

PRACTICALS

1. **Installation and Environment Setup:**

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

2. **Basic Syntax and Data Types:**

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

3. **String Manipulation:**

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

4. **Control Structures:**

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

5. **Data Structures (Collections):**

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

6. **Functions and Parameters:**

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

7. **Lambda and Functional Programming:**

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

8. **Modules and Exception Handling:**

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

9. **Object-Oriented Programming:**

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

10. **File Handling:**

a. Write programs to read from and write to files.

Course Code	**CSE266**
Course Title	**Computer Networks Laboratory**
Type of Course	PC
L T P	200
Credits	1
Course Prerequisites	Basic knowledge of Computer,Digital Circuitsand Network Arrangement.
Course Objectives (CO)	1. To develop an understanding of modern network architectures froma design andperformance perspective. 2. Tointroducethestudenttothe majorconceptsinvolved inwide- area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs). 3. Toprovideanopportunityto donetworkprogramming 4. ToprovideaWLAN measurementidea.
Course outcome	The learner will be able to – 1. Understand functionality of various network components. 2. Prepare straight cable and cross cable. 3. Configure TCP/IP protocol in Windows & LINUX. 4. Implement file and printer sharing. 5. Design Class A, B, and C network.

SYLLABUS

List of Practicals

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.

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.

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(s)**	**Publisher**
1	A+ Guide to PC Hardware MaintenanceandRepair,Volume1	MichaelW. Graves	CengageLearning
2	Practical TCP/IP and Ethernet Networking	DeonReynders, Edwin Wright	Newnes
3	Data Communication and Networking:APracticalApproach	MassoudMoussavi	CengageLearning
4	APracticalGuidetoAdvanced Networking	JeffreyS.Beasley, Piyasat Nilkaew	Pearson

5TH SEMESTER

Course Code	**CSE 353**
Course Title	**Design and Analysis of Algorithms**
Type of Course	PC
L T P	400
Credits	4
Course Prerequisites	Data Structures,C,C++Programming language
Course Objectives(CO)	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 algorithm, 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 design situation calls for it. For a given problem, develop the greedy algorithms. 3. Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relations. 4. Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. For a given problem of dynamic programming, develop the dynamic programming algorithms and analyze it to determine its computational complexity.

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 Master's 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.

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(S)**	**Publisher**
1	Introduct ionto Algorithms	4TH Edition,Thomas H Corme n,Charles E Lieserson,Ronald LRivesta ndCliffordStein	MIT Press/McGraw-Hill
2	Fundamentals of Algorithms	E.Horowitzetal.	Pearson Education
3	Algorithm Design,1ST Edition	Jon Kleinbergand Éva Tardos	Pearson

ProgrammeCode: UG018

Course Code	**CSE 355**
Course Title	**Computer Graphics**
Type of Course	PC
L T P	400
Credits	4
Course Prerequisites	Computer graphics (basics), linear algebra, programming
Course Objectives	The main objective of this course is to give the student a comprehensiveunderstandingofcomputergraphicsandvisualizationandthei rapplications. In particular participants will have the ability to understandthe process of generating virtual images from virtual scenes, typicallyidentifiedasapipelineofgenerate, and computer andstore/display.
Course Outcome (CO)	Thelearnerwillbeableto- 1. Understandthefundamental graphicaloperationsandtheimplementationoncomputer. 2. Getaglimpseofrecentadvancesincomputergraphics. 3. Describeuserinterfaceissuesthatmakethecomputereasy for thenovicetouse. 4. Discuss interface issues that make the computer easy for thenovicetouse.

SYLLABUS

UNIT-I

Introduction - History of computer graphics, applications, graphics pipeline, physical and syntheticimages, synthetic camera, modeling, animation, rendering, relation to computer vision and imageprocessing, review ofbasicmathematicalobjects (points, vectors, matrixmethods)

Introduction to OpenGL - OpenGL architecture, primitives and attributes, simple modeling andrendering of two- and three-dimensional geometric objects, indexed and RGB color models, framebuffer,doublebuffering,GLUT,interaction,andcallbacks,picking.

UNIT-II

Geometrictransformations-Homogeneouscoordinates, affinetransformations (translation, rotation, scaling, and shear), concatenation, matrix stacks and use of model view matrix in OpenGL forthese operations.

Viewing - Classical three-dimensional viewing, computer viewing, specifying views, parallel andperspective projective transformations; Visibility- Z-buffer, BSP trees, Open-GL culling, hidden-surface algorithms.

UNIT-III

Shading-Lightsources, illuminationmodel, GouraudandPhongshadingforpolygons.Rasterization-Linesegmentandpolygonclipping, 3Dclipping, scanconversion, polygonalfill, Bresenham'salgorithm.

UNIT-IV

Discrete Techniques – Texture mapping, compositing, textures in OpenGL, Ray Tracing – Recursive ray tracer, ray–sphere intersection.

Representation and Visualization – Bezier curves and surfaces, B-splines, visualization, interpolation, marching squares algorithm.

RECOMMENDEDBOOKS

Sr.no.	Name	Author(s)	Publisher
1	Interactive Computer Graphics.ATop-Down Approach Using OpenGL	EdwardAngel	PearsonEducation
2	Computer Graphics with OpenGL	Donald Hearn and PaulineBaker	PrenticeHall
3	Computer GraphicsusingOpenGL	F.S.HillJr.andS.M.Kelley	PrenticeHall
4	ComputerGraphics(first edition)	Peter Shirley and SteveMarschner	A.K. Peters

Course Code	**CSE351**
Course Title	**Advanced Computer Networks**
Type of Course	**PC**
L T P	400
Credits	4
Course Prerequisites	Basic knowledge of computers and their components.
Course Objectives	This subject dives into next-generation networking concepts, focusing on architecture, protocols, and technologies like SDN and NFV. 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
- Control overhead & handoff algorithms

Unit IV: Network Function Virtualization (NFV)

- NFV architecture & use cases
- NFV orchestration
- NFV applications in 5G network

RECOMMENDED BOOKS

S.No.	Author(S)	Author	Publisher
1	Communication Networks: Fundamentals and Concepts and KeyArchitectures	Leon Garrcia and IndraWidjaja	TMH
2.	Computer Networks.	A.S. Tanenbaum	PHI

Course Code	**LAW005**
Course Title	Constitution of India
Type of Course	MC
L T P	3 0 0
Credits	NC
Course Prerequisites	Nil
Course Objectives (CO)	1. To enable the student to study and understand the basics of Indian Constitutions 2. To aware the learners about the duties of Citizens. 3. To acquaint the learners with political vocabulary. 4. To aware they about roots of Indian constitution and its relevance in present scenario. 5. To acquaint the learners with various posts and procedures for election.

SYLLABUS

UNIT–I

Constitution of India: - Basic features of the Indian Constitution: Sovereign, Socialist, Secular and Democratic Republic, Preamble of the Constitution of India: Text and features of Indian Federation and its importance, Nature of Indian Federalism and Centre-State Relations

UNIT–II

Fundamental Duties: Fundamental Duties included in the Constitution, Importance of Fundamental Duties, Directive Principles of the State Policy: Nature and Classification of Directive Principles, Criticism & Importance of Directive Principles, Parliament: Characteristics, Powers & Actual role of Parliament, Decline in the position of Parliament.

UNIT–III

President: Method & Stages of President Election, Powers and Position of the President, Prime Minister: Appointment of the Prime Minister, Powers, Changing role of Prime Minister, Supreme Court: Its Composition, Powers and Functions of Supreme Court, Position and Independence of judiciary.

UNIT–IV

Governor: Appointment, Powers and position of the Governor, Chief Minister: Powers and Position of the State Council Minister & Chief Minister, High Court: Its Composition, Powers and Functions of Supreme Court

RECOMMENDED BOOKS			
S. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	M.V. Pylee	Constitutional Government in India	Asia Publishing House.
2	D.D. Basu	An Introduction to the Constitution of India	Sterling publishers, New Delhi.
3	M.P. Jain	Political Theory	Guild Publication, Delhi
4	S.P.Verma	Modern Political Theory	General Publishing House, NewDelhi.

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

Course Code	**CSE357**
Course Title	**Advanced Computer Networks Laboratory**
SEC	PC
L: T:P	00 2
Credits	1
Course Prerequisites	Basic knowledge of Computer, Digital Circuits and Network Arrangement.
Course Objective(s)	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)	Thelearnerwillbeableto- 1. Understandand 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.

SYLLABUS

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

RECOMMENDED BOOKS

Sr. no.	Name	Author(s)	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 Algorithms Laboratory**
Type of Course	PC
LTP	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 out come	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.

1. **Array**

1.1: WAP to code and analyze to compute 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 element (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 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(s)**	**Publisher**
1	The Algorithm Design Manual	Steven SSkiena	Springer Science& Business Media
2	Object Oriented Programming with C++	Balagurusamy	TataMc Graw-Hill Education
3	Object Oriented Programming Using C++	Jaspreet Singh, Mrs. PinkiParampreetKaur	Technical Publications

Course Code	**CSE367**
Course Title	**Four Weeks Industrial Training Evaluation (Undertaken after 4th 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 Outcomes- (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 trainingwill 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.

CourseCode	**CSE369**
CourseTitle	**Mobile Application Development**
TypeofCourse	PE
L T P	3 0 0
Credits	3
CoursePrerequisites	Students are expected to have basic knowledge of JAVA, HTML, JavaScript, and CSS.
CourseObjectives	Students will learn the basics of 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, App Store, Google Play, Windows Store, Development environments, Xcode, Eclipse, VS2012, PhoneGap, 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 application, 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	JeffMc Wherterand ScottGowell	Wrox
2	Androidin Practice	Charlie Collins,MichaelGalpinandMatthiasKappler	Dream Tech
3	Beginning iOS 6Development:Exploring the iOS SDK	David Mark,Jack Nutting, JeffLa Marche and Frederic Olsson	Apress

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 andphysical things to other physical things all in real time. It's becoming theInternet of Things (IoT). The course enables students to understand thebasicsofInternetandprotocols.It introducessomeofthe applicationareaswhereInternet ofThingscanbeapplied.
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	TheInternetofThingsintheCloud:A Middleware Perspective	Honbo Zhou	CRCPress,2012

Course Code	**CSE373**
Course Title	**Cloud Computing**
Type of Course	PE
L T P	300
Credits	3
CoursePrerequisites	Distributed System, Operating Systems and Networking
Course Objectives(CO)	This Course work provides thec omplete understanding of Cloud system,its implementation techniques and its various applications in Thefield 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. CloudTools, CloudApplications, FutureTrends,Mobile cloud,Jungle Computing,BigData–Features andapplications

RECOMMENDED BOOKS			
Sr. no.	**Name**	**Author(s)**	**Publisher**
1	Cloud Computing – A PracticalApproach	Anthony T.Velte,Toby J.Velte and RobertE	TMH
2	CloudComputing–Web based Applications	MichaelMiller	PearsonPublishing

Course Code	**CSE375**
Course Title	**Neural Network and Deep Learning**
Type of Course	PE
L T P	300
Credits	3
Course Prerequisites	Overview of Structure and Software Analysis and Design
Course Objectives(CO)	1. Make students familiar with basic concepts and tool used in neural networks 2. Teach students structure of a neuron including biological and artificial 3. Teach learning in network (Supervised and Unsupervised) 4. Teach concepts of learning rules.
Course Outcomes	The learner will be able to 1. Design single and multi-layer feed-forward neural networks 2. Understand supervised and unsupervised learning concepts & understand unsupervised learning using Kohonen networks 3. Understand training of recurrent Hopfield networks and associative memory concepts.

SYLLABUS

Unit I: Introduction

Structure of biological neurons relevant to ANNs; models of artificial neural networks (ANNs); feedforward and feedback networks; learning rules: Hebbian learning rule, perceptron learning rule, delta learning rule, Widrow-Hoff learning rule, correction learning rule, winner-take-all learning rule, etc.

Unit II: Single layer Perception Classifier and Multi-layer Feed forward Networks

Classification model, features, and decision regions; training and classification using the discrete perceptron algorithm; single-layer continuous perceptron networks for linearly separable classifications; linearly non-separable pattern classification; Delta learning rule for multi-perceptron layers; generalized delta learning rule; error backpropagation training; learning factors; and examples**.**

Unit III: Single layer feedback Networks

Basic Concepts, Hopfield networks, Training & Examples. Associative memories: Linear Association, Basic Concepts of Recurrent.

Unit IV: Auto associative memory

Retrieval algorithm, storage algorithm; By directional associative memory, Architecture, Association encoding & decoding, Stability.

RECOMMENDED BOOKS

Sr.no.	Name	Author(s)	Publisher
1	Introduction to Artificial Neural systems	Jacek M. Zurada, 1994	Jaico Publ. ouse
2	Neural Network Fundamentals	N.K. Bose, P. Liang, 2002	M.H

Course Code	**CSE377**
Course Title	**Introduction to Cyber Security**
Type of Course	PE
L T P	3:0:0
Credits	3
Course Prerequisites	Basic knowledge of computers, internet usage, and fundamental concepts of information technology.
Course Objectives(CO)	To introduce the fundamental concepts of cyber security; to understand common cyber threats and attacks; to learn security mechanisms and tools; to develop awareness of ethical and legal aspects; and to build skills for protecting systems and data.
Course Outcomes	CO1: Understand basic concepts of cyber security and its importance. CO2: Identify various cyber threats, attacks, and vulnerabilities. CO3: Apply basic security techniques to protect systems and data. CO4: Demonstrate awareness of ethical, legal, and social issues in cyber security.

Unit 1:

Fundamentals of Cyber Security: Definition and Importance of Cyber Security. Cyber Threats, Vulnerabilities and Risks .Types of Cyber Crimes .CIA Triad (Confidentiality, Integrity, Availability) .Cyber Security Awareness

Unit 2:

Cyber Attacks and Protection Techniques: Malware: Virus, Worm, Trojan, Ransomware .Phishing and Social Engineering .Password Attacks .DoS and DDoS Attacks .Firewalls and Intrusion Detection Systems

Unit 3:

Data and Network Security: Encryption and Decryption .Symmetric and Asymmetric Cryptography . Digital Signature .VPN and Secure Communication Wireless and Cloud Security .Backup and Recovery

Unit 4:

Cyber Laws, Ethics and Emerging Trends: Cyber Laws in India .IT Act 2000 .Privacy and Data Protection .Ethical Hacking Basics .AI in Cyber Security .IoT and Mobile Security .Future Challenges in Cyber Security

RECOMMENDED BOOKS

Sr.no.	Name	Author(s)	Publisher
1	Cyber Security Essentials	Charles J. Brooks, Christopher Grow, Philip Craig, Donald Short	Wiley
2	Cybersecurity Basics	Don Maclean	Routledge

6thSEMESTER

Course Code	**CSE352**
Course Title	**Internet Web Programming**
Type of Course	PC
L T P	400
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 MySQL commands using PHPMyAdmin.

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 complexengineering problems by applying principles of engineering,science, and mathematics 2. Communicate effectively with a range ofaudiences 3. Apply engineering design to producesolutions that meet specified needs with consideration of publichealth, 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, softwarecrisis.

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 WitoldPedrycz	Wiley

Course Code	CSE356
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 in Java, includingdefiningclasses, invokingmethods, usingclasslibraries, etc. 2. Beawareoftheimportant topicsandprinciples ofsoftwaredevelopment. 3. Be able to use the Java SDK environment to create, debug and runsimpleJavaprograms. 4. Understandtheprinciplesofinheritance,packagesandinterfaces
Course Outcome	The learner will be able to – . Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs. . Read and make elementary modifications to Java programs that solve real-world problems. . Validate input in a Java program. . 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.

Course Code	**MDC018**
Course Title	**Gender ,Culture and Development**
Type of Course	MDC/HS
LTP	300
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

IntroductiontoGender

1. DefinitionofGender
2. BasicGenderConceptsandTerminology
3. ExploringAttitudestowardsGender
4. SocialConstructionof Gender

UNIT-II

GenderRoles andRelations

1. TypesofGender Roles
2. GenderRolesandRelationshipsMatrix
3. Gender-basedDivisionandValuationofLabour

UNIT-III

GenderDevelopmentIssues

1. IdentifyingGender Issues
2. GenderSensitiveLanguage
3. Gender,GovernanceandSustainableDevelopment
4. GenderandHumanRights

Gender-basedViolence

1. Theconceptofviolence
2. TypesofGender-basedviolence
3. Therelationshipbetweengender,developmentandviolence
4. Gender-basedviolencefromahumanrights perspective

UNIT-IV

GenderandCulture

1. GenderandFilm
2. GenderandElectronicMedia
3. GenderandAdvertisement
4. GenderandPopularLiterature

Course Code	**CSE380**
Course Title	**Software Engineering Laboratory**
Type of Course	PC
L T P	0 0 2
Credits	1
Course Prerequisites	Knowledge of Program Development Constructs
Course Objectives	This practical coursework allows the students to efficiently Design a working software model.
Course Outcome (CO)	The students will be able to: CO1: Understand real time business requirements and design SRS documents and Use Case model CO2: Understand notations used in UML diagrams and design UML Class Diagram, Interaction diagrams

SYLLABUS

 Use **Case Models**

1.1: To develop a problem statement.

1.2: Develop an IEEE standard SRS document. Also develop risk management and project plan (Gantt chart).

1.3: Identify Use Cases and develop the Use Case model.

 UML Diagrams

2.1: Identify the conceptual classes and develop a domain model with UML Class diagram.

2.2: Using the identified scenarios, find the interaction between objects and represent them using Object diagrams.

2.3: Draw UML Interaction diagrams: Collaboration and Sequence diagrams.

2.4: Draw the State Chart diagram.

2.5: Identify the business activities and develop a UML Activity diagram.

 Implementations of Layers

3.1: Draw Component diagrams.

3.2: Draw Deployment diagrams.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**Author(s)**	**Publisher**
1	UML 2 and the Unified Process: Practical Object-Oriented Analysis and Design	Jim Arlow, Ila Neustadt	Pearson Education
2	Practical Object-Oriented Design With UML	Priestley	Tata McGraw-Hill Education
3	Object-Oriented Software Engineering: Practical Software Development Using UML and Java	Lethbridge	Tata McGraw-Hill Education

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. 2. 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 Practicals

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, onchange, 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).

Subject Code	**CSE384**
Course Title	**Programming in Java Laboratory**
Type of Course	PC
LTP	0 0 2
Credits	1
Course Prerequisite	NA

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.

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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 applythese techniques.
Course Outcome (CO)	The learner will be able to- 1. Understand 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.

Course Code	**CSE314**
Course Title	**Computer Vision**
Typeof Course	PE
LTP	3 0 0
Credits	3
Course Prerequisites	Computer Graphics
Course Objectives(CO)	To familiarize the student with specific, well-known computer vision methods, algorithms, and results. To understand the roles of image transformations and the inherent variances in pattern recognition and classification..
Course Outcomes	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: Overview and State-of-the-art, Fundamentals ofImage Formation, Transformation: Orthogonal, Euclidean, Affine, Projective, etc.; Fourier Transform, Convolutionand Filtering, Image Enhancement, Restoration,Histogram Processing.

Depth estimation and multi-camera views: Perspective, Binocular Stereopsis: Camera and EpipolarGeometry; Homography, Rectification, DLT, RANSAC, 3-Dreconstructionframework; Auto- calibration.

UNIT-II

Feature Extraction: Edges - Canny, LOG, DOG; Line detectors (Hough Transform), Corners - Harrisand Hessian Affine, Orientation Histogram, SIFT, SURF, HOG, GLOH, Scale-Space Analysis- ImagePyramidsand Gaussian derivativefilters,GaborFilters and DWT.

Image Segmentation: Region Growing, Edge Based approaches to segmentation, Graph-Cut, Mean- Shift, MRFs, TextureSegmentation; Object detection.

PatternAnalysis:Clustering:K-Means,K-Medoids,MixtureofGaussians,Classification:DiscriminantFunction,Supervised,Un-supervised,Semi- supervised;Classifiers:Bayes,KNN,ANNmodels;DimensionalityReduction: PCA, LDA, ICA; Non- parametricmethods.

UNIT-III

Motion Analysis: Background Subtraction and Modeling, Optical Flow, KLT, Spatio-Temporal Analysis, Dynamic Stereo; Motion parameter estimation.

Shape from X: Light at Surfaces; Phong Model; Reflectance Map; Albedo estimation; Photometric Stereo; Use of Surface Smoothness Constraint; Shape from Texture, Color, Motion, and Edges.

Perceptual Organization and Cognition: Vision as model-building and graphics in the brain, learning to see. Lessons from neurological trauma and visual deficits, Visual agnosias and illusions, and what they may imply about how vision works.

NIT-IV

Model Estimation: Machine learning and statistical methods in vision. Machine learning applications in computer vision. Discriminative and generative methods. Content-based image retrieval.

Miscellaneous Applications: CBIR, CBVR, Activity Recognition, Computational Photography, Biometrics, Stitching and Document Processing. Modern trends – Super-resolution; GPU, Augmented Reality; Cognitive models, Fusion, and SR & CS.

RECOMMENDEDBOOKS			
Sr. no.	**Name**	**Author(s)**	**Publisher**
1	Computer Vision: Algorithms andApplications	RichardSzeliski	Springer
2	Computer Vision: A ModernApproach	D.A.Forsyth,J.P once	PrenticeHall
3	IntroductoryTechniquesfor3DC omputerVision	Trucco andVerri	PrenticeHall
4	Computervision	Shapiro, L. &Stockman, G	PrenticeHall
5	Three-dimensional ComputerVision:Ageometric approach	OlivierFaugeras	OlivierFaugeras

Course Code	**CSE362**
Course Title	**Compiler Construction**
Type of Course	PE
L T P	300
Credits	3
Course Prerequisites	Basic understanding of Programming Languages, Data Structures, and Machine Architecture
Course Objectives (CO)	To understand and list the different stages in the process of compilation. 1. Identify different methods of lexical analysis. 2. Design top-down and bottom-up parsers. 3. Identify synthesized and inherited attributes. 4. Develop syntax-directed translation schemes. 5. Develop algorithms to generate code for a target machine.
Course Outcome(CO)	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, from regular expressions to finite automata, scanner generator (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 generator (yacc, bison).

UNIT-II

Semantic Analysis: Attribute grammar, syntax-directed definition, evaluation and flow of attributes in a syntax tree.

Symbol Table: Its 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, different types of intermediate forms.

Code Improvement (Optimization): Analysis – control-flow, data-flow dependence, etc.; Code improvement – local optimization, global optimization, loop optimization, peep-hole optimization, etc.

UNIT-IV

Architecture Dependent Code Improvement: Instruction scheduling (for pipeline), 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.

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RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(s)**	**Publisher**
1	Compilers Principles,Techniques, &Tools	A.V. Aho, R. Sethi&J.D. Ullman	PearsonEducation
2	Engineering a Compiler	Keith Cooperand LindaTorczon,	Morgan-Kaufman Publishers
3	Crafting a compiler	C.Fischerand R. LeBlanc	Benjamin Cummings

Course Code	**CSE 348**
Course Title	**Digital Marketing**
Type of Course	PE
L T P	300
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 a SWOT analysis to define a target group; and 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. Perceive 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.

UNITIII

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 are Link Building, Types of Linking Methods, and Do Follow Vs.? No Follow Link building Guidelines , Linking Building Methodology, Links Analysis Tools , Directory Submissions , Local Business Directories, Social Bookmarking, Using Classifieds for In bound 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 Henne berry	John Wiley &Sons,Inc.,
2	**Social Media Marketing All-in-one Dummies**	Jan Zimmerman, Deborah Ng	JohnWiley&SonsInc,4th editio n

Course Code	**CSE378**
Course Title	**Advanced Parallel Computing**
Type of Course	PE
L T P	300
Credits	3
Course Prerequisites	Basic knowledge of Computer System Architecture
Course Objectives	Students become familiar with parallel computer architecture and algorithms.
Course Outcome(CO)	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 Band width 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 & Parallel Programming

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; Vectorisation Compiler

Performance Evaluation: Introduction to performance evaluation; Metric of Parallel overhead; Law Speedup; Measurement Tools

RecentTrends: Multi-componentCPU;ApexarchitectureIA64;Hyperthreading

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Advanced Computer Architecture: Parallelism, Scalability, Programmability	Hwang,K	Tata McGraw Hills
2	Introduction to Parallel Processing	Sasikumar M., Shikhare, D., Ravi Prakash	Prentice Hallof Indiapvt.ltd. New Delhi
3	Computer Architecture and Parallel Processing	Hwang,K.,Briggs, F. A.	McGraw Hill

Course Code	CSE380
Course Title	**Data Science**
Type of Course	PE
L T P	300
Credits	3
Course Prerequisites	Basic knowledge of Computer System Architecture
Course Objectives	Students become familiar with parallel computer architecture and algorithms.
Course Outcome(CO)	1. Understand basic terms used in parallel computing. 2. Classify parallel computers. 3. Describe parallel computer architecture. 4. Analyze parallel algorithms.

Unit 1:

Introduction to Data Science: Data Science & its importance. Data Science lifecycle .Applications in real-world (healthcare, business, etc.). Types of data (structured, unstructured) . Roles in Data Science.

Unit 2:

Statistics & Mathematics: Descriptive statistics (mean, median, mode, variance).Probability basics .Data distributions (normal, binomial) .Correlation & covariance. Hypothesis testing basics.

Unit 3:

Programming & Data Handling: Python basics (variables, loops, functions).Libraries: NumPy, Pandas **.**Data collection & cleaning **.**Handling missing values **.**Data transformation.

Unit 4:

Machine Learning & Visualization: Types of ML (supervised, unsupervised).Algorithms: Linear Regression, KNN, K-means .Data visualization (Matplotlib, Seaborn) .Model evaluation (accuracy, precision, recall**)**

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Data Science for Business	Foster Provost, Tom Fawcett	O'Reilly Media
2	Python for Data Analysis	Wes McKinney	Prentice Hallof Indiapvt.ltd. New Delhi

Course Code	**CSE320**
Course Title	**Optimization Techniques in Machine Learning**
Type of Course	**PE**
L-T P	300
Credits	3
Course Prerequisites	Discrete mathematics
Course Objectives	To understand learning models and learning algorithms
Course Outcomes(CO)	1. Recognize the characteristics of machine learning that make it useful to real-world problems. 2. Characterize and differentiate between supervised and unsupervised learning techniques. 3. Explain Reinforcement Learning and its control. 4. Represent concepts of Decision Trees.

SYLLBUS

UNIT I

Introduction: Basic concepts, machine learning problems, types of learning, designing a learning system, goals and applications of machine learning.

Learning Theory: Bias–variance tradeoff, Union and Chernoff/ Hoeffding bounds, VC dimension, worst case (online) learning, learning algorithms.

UNIT II

Supervised Learning: Supervised learning setup, LMS, Logistic Regression, Perceptron, Exponential Family, Generative Learning Algorithms, Gaussian Discriminant Analysis, Naive Bayes, Support Vector Machines, model selection and feature selection.

Unsupervised Learning: Clustering, K-means, EM, Mixture of Gaussians, Factor Analysis, PCA (Principal Components Analysis), ICA (Independent Components Analysis).

UNIT III

Reinforcement Learning and Control: MDPs, Bellman equations, value iteration and policy iteration, Linear Quadratic Regulation (LQR), LQG, Q-learning, value function approximation, policy search, Reinforce, POM.

UNIT IV

Decision Tree Learning: Representing concepts as decision trees, recursive induction of decision trees, picking the best splitting attribute (entropy and information gain), searching for simple trees and computational complexity, Occam's razor, overfitting, noisy data.

RECOMMENDED BOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	PatternRecognitionandMachineLearning	Bishop,C.	Berlin:Springer-Verlag.
2	ElementsofStatisticalLearning	Hastie,Tibshirani, andFriedman	Springer
3	MachineLearning	TomMitchell	Mc-GrawHill

Course Code	**CSE322**
Course Title	**Distributed System**
Type of Course	PE
L T P	300
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 Distributes Operating Systems, Resource sharing and the Web Challenges.

System Models: Architectural models, Fundamental Models Theoretical Foundation for Distributed System: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks,Lamport's&vectorslogicalclocks,Causalorderingofmessages,globalstate,andterminationdetection.

UNIT-II

Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms, performance metric for distributed mutual exclusion algorithms.

Distributed Deadlock Detection: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock 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(s)**	**Publisher**
1	Advanced Concepts in Operating Systems	Mukesh Singhal & Niranjan G. Shivaratri	TataMcGrawHill
2	Distributed Operating Systems	S.Tanenbaum	PearsonEducation

Course Code	**CSE324**
Course Title	**Wireless Communications**
Type of Course	PE
L T P	300
Credits	3
Course Prerequisites	Nil
Course Objective	To gain an understanding of the principles behind the design of wireless communication systems and technologies.
Course Outcomes	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.

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, pre-detection 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(s)**	**Publisher**
1	Wireless Communications	T.S.Rappaport,	Principles Edition,and Practice, 2nd PearsonEducationAsia,2010.
2	Mobile Cellular Telecommunications	William CYLee	2ndEdition,MGH.
3	Mobile and Personal Communication systems and services	Raj Pandya	Prentice HallofIndia.
4	Wireless and Digital Communications	Dr.Kamilo Feher	TMH

Course Code	**CSE326**
Course Title	**Block Chain**
Type of Course	PE
L T P	300
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 block chain. 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 the theory of Bitcoin. 3. Describe the components of blockchain. 4. Explain applications of blockchain in financial services and supply chain management.

SYLLABUS

Unit-I

Introduction to Block chain–I: Basics, History, Architecture, Conceptualization, and Bitcoinbasics.

Unit-II

Consensusin Bitcoin–I (The Basics, Po Wand Beyond, The Miners), PermissionedBlockchain (Basics, Consensus)

Unit-III

Block chain for Enterprise–Overview, Block chain Components and Concepts, Hyperledger Fabric Transaction Flow, Hyperledger Fabric Details. Fabric – Membership and Identity Management

Unit-IV

Block chain UseCases.Block chain in Financial Service (Payments and Secure Trading, Compliance and Mortgage, Financial Trade). Block chain in Supply Chain

BlockchaininOtherIndustries.BlockchaininGovernment (Advantages, UseCases, Digital Identity)

RECOMMENDEDBOOKS		
Name	**AUTHOR(S)**	**PUBLISHER**
Block chain	Melanie Swa, O'Reilly	O'Reilly
Zeroto Block chain, An IBM Redbooks course	BobDill, DavidSmits	https://www.redbooks.ibm.com/Redbooks.nsf/RedbookAbstracts/crse0401.html

Course Code	**CSE376**
Course Title	**ADVANCE DATA BASE MANAGEMENT SYSTEM**
Type of Course	PE
L T P	300
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, a solid technical overview of database management systems. In addition to technical concerns, more general issues are emphasized. These include data independence, integrity, security, recovery, performance, database Design principles and data base administration.
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. **CO5:** Explain spatial and multimedia databases.

Syllabus

UNITI

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

Transaction Processing and Concurrency Control: Transaction Management, Concurrency Control and Serializability Recoverability and Strictness; Two-phase locking, Multiple Granularity, Timestamp based Protocol.

Data base protection in RDBMS–Integrity, Availability

UNITII

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.

UNITIII

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

UNITIV

Emerging Database Technologies: Spatial & Multimedia data bases, Mobile Computing & Mobile Databases

NewTopicsandApplications:(a)InformationRetrieval(b)Bioinformatics(c)Incompleteand Uncertain Databases (d) Non-relational Databases, (e) Data Stream Management

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Advanced data base management system	Rini Chakrabarti, ShilbhadraDasGupta	Wiley India Pvt.Ltd.
2	Distributed Databases	OzsuandValduriez	Pearson Education
3	Advanced Database Management System	VaishaliP.Yadav	Pearson Education India

7th Semester

Course Code	CSE479
Course Title	Cyber security
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®	AllanFriedmanandP. W. Singer	Oxford University Press
2.	Cybersecurityfor Beginners	RaefMeeuwisse	Cyber Simplicity Limited

Course Code	CSE407
Course Title	**Theory of Automata and Computation**
Type of Course	PC
L T P	400
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 JeffreyD.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,Springer
5	Introduction to the Theory of Computation	Michael Sipser	PWS Publishing
6	Introduction to Languages and The Theory of Computation	John Martin	TataMc Graw-Hill.

The

Course Code	**CSE481**
Course Title	**Major Project**
Type of Course	PROJ
L T P	0 0 4
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.

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	**CSE485**
Course Title	**Four Weeks Industrial Training Evaluation (Under taken after 6thsemester)**
Type of Course	SECIII
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.

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 coursework provides a thorough understanding of network security and various cryptography techniques to obtain security on networks and computers.
Course outcome(CO)	The learner will be able to – 1. Understand concepts related to security attacks, encryption and decryption techniques, and substitution and transposition techniques. 2. Describe the principles of public key cryptography and the RSA algorithm. 3. Explain authentication requirements and the use of hash functions.

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 (S-DES); block cipher principles; Data Encryption Standard (DES); strength of DES.**Encryption Algorithms:** Triple DES; International Data Encryption Algorithm (IDEA); 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 exchange.

UNIT – IV

Message Authentication and Hash Functions: Authentication requirements; authentication functions; message authentication codes (MACs); hash functions; security of hash functions and MACs; digital signatures; authentication protocols; SHA-1; RC-4; RC-5.

Course Code	**CSE453**
Course Title	**Multimedia & Animation**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Basic knowledge of Computer Graphics & Image Processing.
Course Objectives	The main objective of the subject is to impart knowledge about animation execution, workflow, and post-production.
Course Outcomes (CO)	The learner will be able to – 1. Understand the fundamentals of animation. 2. Gain knowledge of 3D modeling tools. 3. Compare polygon modeling and NURBS modeling.

SYLLABUS

UNIT – I

Fundamentals of Animation: Animation drawings/cells, rough drawings, clean-ups, color reference drawings, layout, model sheet, key drawing, master background, concept piece, character drawing, storyboard.

Modeling Concepts: Introduction to Maya, types of 3D modeling, advantages and disadvantages, difference between polygon modeling and NURBS modeling.

Texturing – Assigning Materials to Models: UV texturing; texturing of characters and props; shading; different Maya shaders.

UNIT – II

Lighting and Shadows: Sources of light – natural and artificial lights; types of lights in Maya; types of shadows in Maya.

Rigging and Skinning of a Model: Joints, inverse kinematics, forward kinematics, types of skinning.

Animation Types: Types of animation; stop motion vs. motion graphics.

UNIT – III

Rendering Process: Process; types of renderers.

Data Management: How to manage 3D assets.

Compositing: Basics of compositing; chroma keying; background colors; even lighting; processing the video; various tools used.

UNIT – IV

Music and Dubbing: Process of adding music to the clip; tools used for placing and editing the soundtracks.

Editing Clips: Process; tools used for editing.

Output and Formats: Types of output formats; lossless and lossy compression techniques.

RECOMMENDED BOOKS			
Sr.no.	**Name**	**Author(s)**	**Publisher**
1	3D Animation for The Raw Beginner Using Maya	Roger King	Chapmanand Hall
2	Editing Digital Video -The Complete CreativeandTechnical Guide	Robert Goodman	McGraw-Hill
3	Maya Documentation	https://knowledge.autodesk.com	Autodesk

Course Code	**CSE455**
Course Title	**Natural Language Processing**
Type of Course	PE
L TP	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.

UNIT-I

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 text such as web documents; hybrid of rule-based and probabilistic parsing; scope ambiguity and attachment ambiguity resolution.

UNIT – III

Understanding Part of Speech and 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.

RECOMMENDEDBOOKS			
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 ,Danand Martin, James	Second Edition, Prentice Hall

Course Code	**CSE477**
Course Title	**Data mining in Business Intelligence**
Type of Course	PE
L TP	3 0 0
Credits	3
Course Prerequisites	Basic knowledge of Data mining in Business Intelligence
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 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 vs. database management systems; data mining techniques – association rules, classification, regression, clustering, neural networks.

UNIT – III

Clustering: Introduction; 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.	Mc Graw Hill

Course Code	CSE457
Course Title	Quantum Computing
Type of Course	PE
L TP	3:0:0
Credits	3
Course Objectives	To understand fundamental concepts of quantum computing, including qubits, quantum gates, algorithms, and their practical applications.
Course Outcomes(CO)	CO1: Understand the basic principles of quantum mechanics relevant to computing. CO2: Explain the concepts of qubits, superposition, and entanglement. CO3: Design and analyze simple quantum circuits using quantum gates. CO4: Apply quantum algorithms to solve computational problems.

UNIT-1

Fundamental Concepts: Global Perspectives, Quantum Bits, Quantum Computation, Quantum Algorithms, Quantum Information, Postulates of Quantum Mechanisms.

UNIT-II

Quantum Computation: Quantum Circuits – Quantum algorithms, Single Orbit operations, Control Operations, Measurement, Universal Quantum Gates, Simulation of Quantum Systems, and Quantum Fourier transform, Phase estimation, Applications, Quantum search algorithms – Quantum counting – Speeding up the solution of NP – complete problems – Quantum Search for an unstructured database.

UNIT-III

Quantum Computers: Guiding Principles, Conditions for Quantum Computation, Harmonic Oscillator Quantum Computer, Optical Photon Quantum Computer – Optical cavity Quantum electrodynamics, Ion traps, Nuclear Magnetic resonance.

UNIT-IV

Quantum Error Correction: Introduction, Shor code, Theory of Quantum Error –Correction, Constructing Quantum Codes, Stabilizer codes, Fault – Tolerant Quantum Computation, Entropy and information – Shannon Entropy, Basic properties of Entropy, Von Neumann, Strong Sub Additivity, Data Compression, Entanglement as a physical resource .

RECOMMENDED BOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Quantum Computation and Quantum Information	. Micheal A. Nielsen. &Issac L. Chiang	Cambridge University Press, Fint South Asian edition, 2002.
2	Quantum Computing - A Gentle Introduction	Eleanor G. Rieffel , Wolfgang H. Polak	(Scientific and Engineering Computation) Paperback – Import, 3 Oct 2014
3	Computing since Democritus	Scott Aaronson	Mc Graw Hill

8th Semester

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 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 lifecycle models. 2. Work with the latest IT tools. 3. Develop team leadership skills.

The six-month industrial training will provide exposure to the practical aspects of the discipline in a real-time working scenario. In addition, the student may also work on a specified task or project assigned by the industry expert.

The student will maintain a daily diary, signed by the industry expert, which will be submitted during the mid-semester viva voce and the internal and external end-semester practical examinations, as scheduled by the institute. The department will consider the marks assigned by the industry expert based on the student's performance and evaluation.

The outcome of the internship should be presented in the form of a project report, running software code, a CD containing the code and project report, and the daily diary.

Open Electives

Course Code	**CSE391**
Course Title	**Basics of Artificial Intelligence**
Type of Course	OE
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 (Perceptrons and activation functions, feedforward and backpropagation)

- Multi-layer Perceptrons (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 (NLP): Basics of 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

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	**CSE 393**
Course Title	**Introduction to Cloud Computing**
Type of Course	OE
L TP	3 0 0
Credits	3
Course Prerequisites	Distributed System, Operating Systems and Networking
Course Objectives (CO)	This coursework provides a complete understanding of cloud systems, their implementation techniques, and their various applications in the field of Computer Science.
Course Outcome	The learner will be able to- 1. Understand characteristics and type 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

Introduction to Cloud Computing: 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; status of cloud computing in India; cloud service models; role of virtualization in enabling the cloud.

UNIT – III

Cloud Computing Architecture: Logical architecture; developing holistic cloud computing reference models; seven-step model of migrating to cloud.

UNIT – IV

Applications and Case Studies: Case study of cloud computing; cloud computing risks; cloud tools; cloud applications; future trends; mobile cloud.

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

Course Code	**CSE491**
Course Title	**Introduction to Operating Systems**
Type of Course	OE
LTP	3:0:0
Credits	3
Course Prerequisites	Overview of Computer Architecture
Course Objectives	**Course Objectives:** The course aims to teach the fundamentals of Operating Systems: 1. To learn the mechanisms of an 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 of distributed operating system concepts, including architecture, mutual exclusion algorithms, deadlock detection algorithms, and agreement protocols. 4. To understand the components and management aspects of concurrency control. 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, Turn around Time, Waiting Time, Response Time. 3. 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. 4. Design and implement file management system. 10. Fora given I/O devices and OS (specify)develop theI/O management functions in OS as part of a uniform device abstractionbyperformingoperationsforsynchronizationbetweenCPU andI/ O controllers.

SYLLABUS

UNIT-I

Introduction: Operating Systems functions, Types of operating systems, Multiprogramming systems, Batch systems, Time-sharing systems.

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.

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.

RECOMMENDED BOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Operating System Concepts Essentials	9thEditionby AviSilbers chatz,PeterGalvin, Greg Gagne	WileyAsi a Student Edition.
2	Operating Systems :Internals and Design Principles	5thEdition,WilliamStallings	Prentice Hall of India
3	Operating System:A Design-oriented Approach	1stEditionbyCharlesCrowley	Irwin Publishing
4	Operating Systems:A Modern Perspective	2ndEditionbyGaryJ.Nutt	Addison-Wesley

ProgrammeCode:UG018

Course Code	**CSE493**
Course Title	**Basics of Networking**
Types of Course	**OE**
L T P	**3:0:0**
Credits	**3**
Course Prerequisites	Overview of Networking
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:Understandbasicconceptsandsecurityinnetworktechnology CO2: Explain IPv6 CO3:Explainclassicalencryptiontechniques CO4:IllustrateapplicationsofNetworkSecurity

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, IP and IPv6, Authentication Header (AH), Encapsulating Security Payload (ESP).

Security Trends: Attacks and services; classical cryptosystems; different types of ciphers; LFSR sequences; basic number theory; congruences; Chinese Remainder Theorem; modular exponentiation; Fermat and Euler's theorems; 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 (DES) – 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	TataMc-GrawHill
3.	Computer Networks	A.STanenbaum	Pearson

Course Code	**CSE495**
Course Title	**Introduction to Digital Marketing**
Type of Course	PE
L T P	300
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 conduct a SWOT analysis; to define a target group; and 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. Determine ways of integrating digital channels, taking into consideration the available budget.

SYLLABUS

UNITI

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.

UNITII

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.

UNITIII

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,LocalBusinessDirectories,SocialBookmarking,UsingClassifiedsforInboundtraffic ,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 TP	300
Credits	3
Course Prerequisites	NIL
Course Objectives	The Internet is evolving to connect people to physical things and physical things to other physical things in real time, forming the Internet of Things (IoT). This course enables students to understand the basics of the Internet and its protocols and introduces some of the application areas where the 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 the functional blocks of IoT. 2. Explain MAC protocols and various routing protocols. 3. Describe data aggregation and data dissemination. 4. Evaluate and explain challenges in IoT design.

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 andM2M, 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	CRCPress,2012

Course Code	**CSE489**
Course Title	**ECOMMERCE**
Type of Course	PE
L TP	300
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. It studies the types of issues that managers need to consider when implementing cross-functional integrated ERP systems. The objective of this course is to make students aware of the potential and limitations of ERP systems. This objective will be achieved 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

UNITI

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, EcashTrail; UsingEcash; Smartcards; Electronic Data Inter change:Its basics; EDI versus Internet andEDI over Internet.

UNITII

Introduction ERP An Overview, Enterprise-An Overview, Barehousing, Data Mining, On-line Analytical Processing(OLAP), Supply Chain Managementenefits of ERP, ERP and Related Technologies, Business Process Reengineering(BPR),Data W, 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.

UNITIII

ERP Implementation-ERPImplementationLifecycle,ImplementationMethodology, Notall Packagesare 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.

UNITIV

TheBusinessModules-

BusinessModulesinanERPPackage,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	TataMcGrawHill2000
2	E-Commerce: The Cutting Edgeof Business	Bajaj,KamleshK.andNag, Debjani	Tata McGraw-Hill Publishing Company
3	Enterprise Resource Planning	Alexis Leon	TataMcGrawHill2001
4	Electronic Commerce	Loshin, Pete nd Murphy,Paul	Second edition, 1990, JaicoPublishingHouse, Mumbai

Course Code	**CSE499**
Course Title	**Introduction to Cyber security**
Type of Course	PC
LTP	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 cybersecurity 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 Safeguards:

- **Vulnerabilities:** Overview; vulnerabilities in software, system administration, complex network architectures, open access to organizational data, weak authentication, unprotected broadband communications, poor cyber security awareness.
- **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.

Firewalls and Security Protocols: 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.

Indian Cyberspace: National Cyber Security Policy 2013.

RECOMMENDED BOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1.	Cyber security and Cyber war: What Everyone Needs to Know®	Allan FriedmanandP. W.Singer	Oxford University Press
2.	Cyber security for Beginners	Raef Meeuwisse	Cyber Simplicity Limited
3.	Cyber security Essentials	Charles J. Brooks, Christopher Grow , DonaldShort,and PhilipCraig	Sybex

Course Title	**Entrepreneurship Mindset Curriculum** **Mandatory course by Punjab Government)**
Type of Course	Practical
LTP	004
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

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.

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.**

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 using 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 your content**	Learn how to connect with your audience so they stay engaged and feel involved
9	**Follow latest trends and famous influencers to**	Learn how to use trending topics and tag well-known channels or creators to boost

	grow your channel	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 followers truly care about
11	**Make your first partnership**	Reach out to 10 brands for partnership and turn one into your first paid deal
12	**Plan your business growth**	Create a 1 month plan on what to post on a 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 and how you can start selling online in less than 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 product images and description on the store
5	**Activate payments on your 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 it to 100 people
8	**Make your first sale**	Convert one paying customer and learn how to process the order from beginning to 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 get either a repeat order or a referral
12	**Plan your business growth**	Make a 1 month plan to promote and grow 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 it 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 simple 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 service
7	**Get first 100 leads for your service**	Learn how to write catchy messages to promote your service in the market and get 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 customers 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 get 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 and 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 in 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 growth**	Make a 1 month plan to promote and grow your retail business and earn more money

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9	**Take feedback from**	Engage with your paid customers and take product feedback

	customers	
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 growth**	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 and 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 one 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 word of mouth, posters, or social media, and collect interest from 100 people
8	**Make your first sale**	Get your first paying customer and deliver 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 to 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	Weightag
Weekly Task Completion	Timely submission of weekly tasks, including activities, reflection prompts, graded quizzes etc	60%
Target Completio	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.

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.
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.