Choice Based Credit System
SCHEME

B.Tech Computer Science & Engineering

Department of Computer Science & Engineering
UIET

Sant Baba Bhag Singh University

2020

ABOUT THE DEPARTMENT

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. The efficacy of the Teaching-Learning process is reflected in the consistently excellent results being achieved 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.

SALIENT FEATURES OF THE DEPARTMENT

1. Provides a learning environment strongly focused on collaborative and interdisciplinary research under the guidance of experienced and qualified faculty. Majority of the faculty members are doctorates.
2. The teaching programme, here, is devised keeping in view the significance of Industry-Academia interaction enabling the students to face the global competitiveness with effective communication skills.
3. The CSE Department regularly organizes conferences, hackathons, seminars, student symposia, short- term training program 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. The department in collaboration with IIT has setup Virtual lab for remote experiments. Besides this department takes in NEPTEL and MOOC courses both for its students and faculty.
5. Digital Library with access to journals and video lectures of eminent professors.

B. TECH (BACHELORS IN TECHNOLOGY)

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, TECHMAHINDRA, CTS and Dell in India and abroad.

VISION

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

MISSION

Our mission is to provide a high-quality undergraduate and post graduate education in Computer Science & Engineering that provides all-round growth of an individual by creating futuristic environment that fosters critical thinking, dynamism and innovation to transform them into globally competitive professionals and empowering the youth in rural communities with computer education.

ELIGIBILITY CRITERIA

- 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 least 45% marks (40% in case of candidate belonging to reserved category) in the above subjects taken together.
- B. Tech (Lateral Entry) Diploma in Engineering & technology from AICTE approved institution or B.Sc (N.M) from UGC approved university at least 45% marks. (40% in case of reserved category)

DURATION

4Years

CAREER PATHWAY

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, TECHMAHINDRA, CTS and Dell in India and abroad.

These are some of the big names that aspiring software engineers are aware of. On the other hand, there are companies like Infosys, Capgemini, Accenture, Cognizant, etc that pay anywhere between**3–3.5 lac P.A** to

fresher. All the companies mentioned above are the leading companies that hire B. Tech CSE freshers. So as a B. Tech CSE graduate, candidate can be happy with 2 LPA or 10 LPA, it totally depends on him/her. But there's definitely so much money to make

CHOICE BASED CREDIT SYSTEM (CBCS)

PREAMBLE:

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

OBJECTIVES

1. Shift in focus from Teacher-Centric to Learner-Centric education.

2. Allow students to choose according to their learning needs, interests and aptitude.

3. Provide flexibility to the students allowing them to choose inter-disciplinary courses, change majors, programs

4. Make education broad-based. Students can earn credits by choosing unique combinations.

5. Help self-paced learning with flexibility. Students can opt for as many as 26 credits per semester.

6. Student can exercise the option to decide his/her own pace of learning- slow, normal or accelerated plan and sequence the choice of courses, learn to face challenges through term/project work and may venture out to acquire extra knowledge/proficiency through add-on courses.

Model Curriculum

Undergraduate Degree Courses in Engineering & Technology

COMPUTER SCIENCE AND ENGINEERING

General, Course structure & Theme &

Semester-wise credit distribution

A. Definition of Credit:

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

B. Range of credits–

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

C. Structure of Undergraduate Engineering program:

Sr. No	Category	Suggested Breakup of Credits(Total 160)
1	Humanities and Social Sciences including Management courses	12*
2	Basic Science courses	25*
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc	24*
4	Professional core courses	48*
5	Professional Elective courses relevant to chosen specialization/branch	18*
6	Open subjects – Electives from other technical and /or emerging subjects	18*
7	Project work, seminar and internship in industry or elsewhere	15*
8	Mandatory Courses [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge]	(non-credit)
	Total	160*

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

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

	Under graduate Programme Outcomes (PO) **At the end of 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, and engineering sciences.
	PO3	**Design/development of solutions:** Design solutions for complex engineering problemsand design system components, processes to meet the specifications with considerationfor the public health and safety, and the cultural, societal, and environmental considerations.
	PO4	**Conduct investigations of complex problems:** Use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
	PO5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
	PO6	**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 the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and needfor sustainable development.
	PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
	PO9	**Individual and team work:** Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings.
	P10	**Communication:** Communicate effectively with the engineering community and with society at large. Be able to comprehend and write effective reports 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 engagein independent and life-long learning in the broadest context of technological change.

Under Graduate 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, automated projects using the knowledge of programming, testing,life cycle models, artificial intelligence, machine learning and CASE tools.
PSO3	Pursue life long learning in advanced technologies of Computer Science and Engineering and apply it for the benefit of the society.

Under Graduate Programme Educational Objective (PEO) **The Graduate/Undergraduate will be….**	
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 employments through startups.**
PEO4	**Preparing competitive examinations for higher studies abroad or for getting job in private, public or multinational companies.**

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Course Scheme, B.Tech Computer Science &Engineering

General Course Structure

CourseCodeandDefinition

CourseCode	Definition
BS	BasicScience
ES	EngineeringScience
HS	HumanitiesScience
PC	ProfessionalCore
PE	ProfessionalElective
OE	OpenElective
MC	MandatoryCourse
SI	SummerIndustryInternship
PROJ	Project

Semester-wisestructureofcurriculum

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

SEMESTER I /II

SchemeforB.Tech.1stYear(Commontoall disciplines)(PhysicsGroup)

I. Theory Subjects

S.No.	Type	Subject Code	SubjectName	Contact Hours(L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	BS	*PHY105	Engineering Physics	3:0:0	3:0:0	3	3
2	BS	MAT103/ MAT104	Engineering Mathematics-I/ Engineering Mathematics-II	4:1:0	4:1:0	5	5
3	ES	*EE101	Basic Electrical Engineering	2:0:0	2:0:0	2	2
4	ES	*CSE101	Fundamentals of Computer Technology	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)	TotalContact Hours	Total Credit Hours
1	BS	*PHY107	Engineering Physics Laboratory	0:0:2	0:0:1	2	1
2	ES	*EE103	Basic Electrical Engineering Laboratory	0:0:2	0:0:1	2	1
3	ES	*CSE103	Fundamentals of Computer Technology Laboratory	0:0:4	0:0:2	4	2
4	ES	*ME107	Engineering Workshop	0:0:6	0:0:3	6	3
5	MC	*PT101/PT103 /PT105	Physical Training-I (NSO/NCC/NSS)	0:0:2	NC	2	NC

- In the 2nd Semester the scheme for Physics and Chemistry group will interchange
- In the 2nd Semester Engineering Mathematics-I will be replaced by Engineering Mathematics-II
- *Indicates that the subject will be offered in both the Semesters

Total Contact Hours= 29

Total Credits Hours= 20

SEMESTER I /II

Scheme for B.Tech. 1st Year (Common to all disciplines) (Chemistry Group)

I. Theory Subjects

S.No.	Type	Subject Code	SubjectName	Contact Hours (L:T:P)	Credits (L:T:P)	TotalContact Hours	Total Credit Hours
1	BS	*CHM105	Engineering Chemistry	3:0:0	3:0:0	3	3
2	BS	MAT103/ MAT104	Engineering Mathematics-I/ Engineering Mathematics-II	4:1:0	4:1:0	5	5
3	ES	*ECE101	Basic Electronics and Communication Engineering	2:0:0	2:0:0	2	2
4	HS	*ENG121	Communication Skills-I	2:0:0	2:0:0	2	2
5	ES	*ME103	Engineering Drawing	1:0:6	1:0:3	7	4

II. Practical Subjects

S.No.	Type	Subject Code	SubjectName	Contact Hours (L:T:P)	Credits (L:T:P)	TotalContact Hours	Total Credit Hours
1	BS	*CHM107	Engineering Chemistry Laboratory	0:0:2	0:0:1	2	1
2	ES	*ECE103	Basic Electronics and Communication Engineering Laboratory	0:0:2	0:0:1	2	1
3	HS	*ENG123	Communication Skills-I Laboratory	0:0:2	0:0:1	2	1
4	MC	*PT102/PT104/PT106	Physical Training-II (NSO/NCC/NSS)	0:0:2	NC	2	NC

- In the2nd Semester the scheme for Physics and Chemistry group will interchange
- In the 2nd Semester Engineering Mathematics-I will be replaced byEngineering Mathematics-II
- *Indicates that the subject will be offered in both the Semester.

TotalContactHours= 27
TotalCreditsHours= 19

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	CSE201	Introduction to Data Structures	4:0:0	4:0:0	4	4
2	PC	CSE203	Object Oriented Programming Systems	4:0:0	4:0:0	4	4
3	BS	MAT253	Engineering Mathematics-III	4:1:0	4:1:0	5	5
4	ES	ECE207	Digital Electronics	3:0:0	3:0:0	3	3
5	HS	ENG205	Professional Communication Skills	3:0:0	3:0:0	3	3
6	PC	CSE205	IT Workshop (Sci Lab/ MATLAB)	1:0:0	1:0:0	1	1

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	CSE207	Introduction to Data Structures Laboratory	0:0:2	0:0:1	2	1
2	PC	CSE209	Object Oriented Programming Systems Laboratory	0:0:2	0:0:1	2	1
3	ES	ECE211	Digital Electronics Laboratory	0:0:2	0:0:1	2	1
4	PC	CSE211	IT Workshop (Sci Lab/ MATLAB)	0:0:4	0:0:2	4	2
5	MC	PT201/PT203/ PT205	PhysicalTraining- III (NSO/NCC/NSS)	0:0:2	NC	2	NC

Total Contact Hours= 32
Total Credits Hours= 25

SEMESTER IV

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	MAT212	Discrete Structures	4:0:0	4:0:0	4	4
2	PC	CSE204	Computer Organization and Design	3:0:0	3:0:0	3	3
3	PC	CSE206	Operating Systems	3:0:0	3:0:0	3	3
4	PC	CSE208	Database Design and Management-I	3:0:0	3:0:0	3	3
5	MC	EVS101	Environmental Sciences	3:0:0	NC	3	NC
6	ES	ECE212	Microprocessor	4:0:0	4:0:0	4	4
7	MC		**EducationalTour**	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	PC	CSE210	Operating Systems Laboratory	0:0:2	0:0:1	2	1
2	PC	CSE212	Database Design and Management-I Laboratory	0:0:2	0:0:1	2	1
3	ES	ECE214	Microprocessor Laboratory	0:0:2	0:0:1	2	1
4	MC	PT202/PT204 /PT206	PhysicalTraining-IV (NSO/NCC/NSS)	0:0:2	NC	2	NC

- **4 Weeks Industrial Training**

Total Contact Hours= 28

Total Credits Hours= 20

SEMESTER V

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	CSE301	Principles of Software Engineering and Design	3:0:0	3:0:0	3	3
2	PC	CSE303	Design and Analysis of Algorithms	3:1:0	3:1:0	4	4
3	PE		Professional Elective-I	3:0:0	3:0:0	3	3
4	PC	CSE305	Computer Graphics	3:0:0	3:0:0	3	3
5	HS	SSC303	Human Values and Professional Ethics	3:0:0	3:0:0	3	3
6	MC	PLS303	Constitution of India	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	PC	CSE307	Principles of Software Engineering and Design Laboratory	0:0:2	0:0:1	2	1
2	PC	CSE309	Design and Analysis of Algorithms Laboratory	0:0:4	0:0:2	4	2
3	SI	CSE311	*Industrial Training (undertaken after 4th semester)	FourWeeks			3

III. Professional Elective-I

S.No.	Type	Subject Code	SubjectName	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PE	CSE313	Mobile Application Development	3:0:0	3:0:0	3	3
2	PE	CSE315	Programming in Java	3:0:0	3:0:0	3	3
3	PE	CSE347	Introduction to Internet of Things	3:0:0	3:0:0	3	3
4	PE	CSE371	Artificial Intelligence	3:0:0	3:0:0	3	3
5	PE	CSE363	Theory of Automata and Computation	3:0:0	3:0:0	3	3

*The students will undertake Training in Industry of course relevance for 4 weeks after the completion of 4th semester. The evaluation of the student will be done in 5th semester on the basis of report writing and presentation for the training done in Industry.

Total Contact Hours= 25

Total Credits Hours= 22

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	CSE302	Internet web Programming	4:0:0	4:0:0	4	4
2	PC	CSE304	Data Communication and Networks	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	OE		Open Elective-II	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	CSE378	Internet web programming Laboratory	0:0:8	0:0:4	8	4
2	PC	CSE308	Data Communication and Networks Laboratory	0:0:4	0:0:2	4	2
3	PROJ	CSE310	Minor Project	0:0:2	0:0:1	2	1

III. Professional Elective-II

S.No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	TotalContact Hours	Total Credit Hours
1	PE	CSE366	Digital Image Processing	3:0:0	3:0:0	3	3
2	PE	CSE314	ComputerVision	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	CSE318	Computational Intelligence	3:0:0	3:0:0	3	3

IV. Professional Elective-III

S.No.	Type	Subject Code	SubjectName	Contact Hours (L:T:P)	Credits (L:T:P)	TotalContact Hours	Total Credit Hours
1	PE	CSE320	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 DataBase Management System	3:0:0	3:0:0	3	3

- **Six Weeks Industrial Training after End semester examinations of 6th semester**

Total Contact Hours= 31

Total Credit Hours=24

SEMESTERVII

I. Theory Subjects

S.No.	Type	Subject Code	SubjectName	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PE		Professional Elective-IV	3:0:0	3:0:0	3	3
2	PE		Professional Elective-V	3:0:0	3:0:0	3	3
3	PE		Professional Elective-VI	3:0:0	3:0:0	3	3
4	OE		Open Elective-III	3:0:0	3:0:0	3	3
5	HS	MGT401	Organization Behavior	4:0:0	4:0:0	4	4
6	OE		Open Elective-IV	3:0:0	3:0:0	3	3

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	SI	CSE401	*Industrial Training evaluation (undertaken after 6th semester)	0:0:4	0:0:2	4	2

III. Professional Elective-IV

S.No.	Type	Subject Code	SubjectName	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PE	CSE403	Cryptography and Security	3:0:0	3:0:0	3	3
2	PE	CSE405	Multimedia and Animation	3:0:0	3:0:0	3	3
3	PE	CSE407	Data Science using Python	3:0:0	3:0:0	3	3
4	PE	CSE457	Advanced Communication Network	3:0:0	3:0:0	3	3
5	PE	CSE411	Digital Signal Processing	3:0:0	3:0:0	3	3

IV. Professional Elective-V

S.No.	Type	Subject Code	SubjectName	Contact Hours(L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PE	CSE413	GraphTheory	3:0:0	3:0:0	3	3
2	PE	CSE417	Cloud Computing	3:0:0	3:0:0	3	3
3	PE	CSE419	R Programming	3:0:0	3:0:0	3	3

4	PE	CSE421	Adhoc Witreless Networks	3:0:0	3:0:0	3	3
5	PE	CSE469	Neural Network	3:0:0	3:0:0	3	3

V. Professional Elective-VI

S.No.	Type	Subject Code	SubjectName	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PE	CSE460	Data Mining in Business Intelligence	3:0:0	3:0:0	3	3
2	PE	CSE462	Image and Speech recognition	3:0:0	3:0:0	3	3
3	PE	CSE464	Introduction to Natural Language Processing	3:0:0	3:0:0	3	3
4	PE	CSE466	Design and Management of Big Data	3:0:0	3:0:0	3	3
5	PE	CSE468	Advanced Prallel Computing	3:0:0	3:0:0	3	3

*The students will undertake Training in Industry of course relevance for 6 weeks after the completion of 6th semester. The evaluation of the student will be done in 7th semester on the basis of report writing and presentation for the training done in Industry.

TotalContactHours= 23

TotalCreditsHours= 21

SEMESTERVIII

IV. Theory Subjects

S.No.	Type	Subject Code	SubjectName	Total Credit Hours
1	PROJ	CSE466	Six Month Industrial Training	20

TotalCreditsHours= 20

OpenElective-I

S.No.	Type	Subject Code	SubjectName	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	OE	CSE371	Basics of Database Design	3:0:0	3:0:0	3	3
2	OE	CSE373	Fuzzy Logic	3:0:0	3:0:0	3	3
3	OE	ME371	Total Quality Management	3:0:0	3:0:0	3	3
4	OE	ME373	Production Planning and Control	3:0:0	3:0:0	3	3
5	OE	EE371	Electrical Energy Conservation and Auditing	3:0:0	3:0:0	3	3
6	OE	EE373	Element of power System	3:0:0	3:0:0	3	3
7	OE	ECE371	Signal Systems	3:0:0	3:0:0	3	3
8	OE	ECE373	Micro Controller and Applications	3:0:0	3:0:0	3	3
9	OE	CE371	Renewable Energy Resources	3:0:0	3:0:0	3	3
10	OE	CE373	Architecture and Town Planning	3:0:0	3:0:0	3	3

OpenElective-II

S.No.	Type	Subject Code	SubjectName	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	OE	CSE372	Communication Networks	3:0:0	3:0:0	3	3
2	OE	CSE374	Computer Organization	3:0:0	3:0:0	3	3
3	OE	ME372	Industrial Engineering Management	3:0:0	3:0:0	3	3
4	OE	ME374	Lean Manufacturing	3:0:0	3:0:0	3	3
5	OE	EE372	Industrial Electrical System	3:0:0	3:0:0	3	3
6	OE	EE374	Fundamentals of Electrical Machines	3:0:0	3:0:0	3	3
7	OE	ECE372	Analog and Digital Communications	3:0:0	3:0:0	3	3
8	OE	ECE374	Analog Circuits	3:0:0	3:0:0	3	3
9	OE	CE372	Construction of Metro System	3:0:0	3:0:0	3	3
10	OE	CE374	Traffic Engineering	3:0:0	3:0:0	3	3

OpenElective-III

S.No.	Type	Subject Code	SubjectName	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	OE	CSE471	Concepts of Operating System	3:0:0	3:0:0	3	3
2	OE	CSE473	Data Warehouse and Data Mining	3:0:0	3:0:0	3	3
3	OE	ME471	Material Management	3:0:0	3:0:0	3	3
4	OE	ME473	Maintenance and Reliability Engineering	3:0:0	3:0:0	3	3
5	OE	EE471	Wind and Solar Energy System	3:0:0	3:0:0	3	3
6	OE	EE473	Instrumentation Engineering	3:0:0	3:0:0	3	3
7	OE	ECE471	Biomedical Electronics	3:0:0	3:0:0	3	3

8	OE	ECE473	Principles of VLSI Design	3:0:0	3:0:0	3	3
9	OE	CE471	Rural Technology and Community Development	3:0:0	3:0:0	3	3
10	OE	CE473	Waste Water Engineering	3:0:0	3:0:0	3	3

Open Elective-IV

S.No.	Type	Subject Code	SubjectName	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	OE	CSE472	Image Analysis	3:0:0	3:0:0	3	3
2	OE	CSE474	Concepts of Cloud Computing	3:0:0	3:0:0	3	3
3	OE	ME472	Operation Management	3:0:0	3:0:0	3	3
4	OE	ME474	Industrial Safety	3:0:0	3:0:0	3	3
5	OE	EE472	Electrical Materials	3:0:0	3:0:0	3	3
6	OE	EE474	Electrical and Hybrid Vehicles	3:0:0	3:0:0	3	3
7	OE	ECE472	Embedded System	3:0:0	3:0:0	3	3
8	OE	ECE474	Advanced Optical Communication System	3:0:0	3:0:0	3	3
9	OE	CE472	Tall Building	3:0:0	3:0:0	3	3
10	OE	CE474	Remote Sensing and Geographical Information System	3:0:0	3:0:0	3	3

Open Elective-V

S.No.	Type	Subject Code	SubjectName	Contact Hours(L:T:P)	Credits(L:T:P)	Total Contact Hours	Total Credit Hours
1	OE	CSE476	Big Data	3:0:0	3:0:0	3	3
2	OE	CSE478	Network Security	3:0:0	3:0:0	3	3
3	OE	ME476	IC Engine	3:0:0	3:0:0	3	3
4	OE	ME478	Power Plant Engineering	3:0:0	3:0:0	3	3
5	OE	EE476	Electrical Measurement	3:0:0	3:0:0	3	3
6	OE	EE478	Energy Auditing and Management	3:0:0	3:0:0	3	3
7	OE	ECE476	Digital System Design	3:0:0	3:0:0	3	3
8	OE	ECE478	Broadband Communication	3:0:0	3:0:0	3	3
9	OE	CE476	Infrastructure and real estate management	3:0:0	3:0:0	3	3
10	OE	CE478	Site investigation	3:0:0	3:0:0	3	3

COURSE SCHEME SUMMARY

Sem	L	T	P	Contact hrs/week	Credits	HS	BS	ES	PC	PE	OE	Project/Training/ Seminar	MC
1	12	1	16	29	20	-	9	11	-	-	-	-	-
2	12	1	14	27	19	3	9	7	-	-	-	-	-
3	19	1	12	32	25	3	5	4	13	-	-	-	-
4	20	0	8	28	20	-	-	5	15	-	-	-	3
5	18	1	6	25	22	3	-	-	13	3	-	3	3
6	15	0	16	31	24	-	-	-	14	6	3	1	-
7	19	0	4	23	21	4	-	-	-	9	6	2	-
8					20	-	-	-	-			20	-
Total	**112**	**4**	**78**	**195**	**171**	**13**	**23**	**27**	**55**	**18**	**9**	**26**	**0**

DETAIL COURSES UNDER B.TECH(CSE)

Course	Credit			Total
	Lecture	Tutorial	Practical	
	(#Subject*Credit)	(#Tutorial*Credit)	(#Practical*Credit)	
I.PC (12Papers)	6* 4 =24 5* 3 =15 1 * 1 =1		5* 1 =5 4* 2 =8	55
II.PE (6Papers)	6 * 3 =18	-	-	18
III.ES (6Papers)	2*3=6 2*4=8 2*2=4		4* 1 =4 1* 2 =2 1 * 3 =3 -	27
IV.BS (5Papers)	2 * 3 =6 3 * 5 =15		2 * 1 =2	23
V.HS (4Papers)	1* 2 =2 2* 3 =6 1* 4 =4	-	1 * 1 =1	13
VI.OE (4Papers)	3 * 3 =9	-	-	9
VII. Training/ Project	-	-	1 * 3=3 1 * 1=1 1 * 2=2 1 * 20=20	26
Total				**171**

MC-6units

SCHEMEFORCHOICEBASEDCREDITSYSTEM

PC (12)	BS (5)	ES (7)	HS(4)	PE (6)	OE (4)	Project/Training/Seminar(4)	MC(2)
	Engineering Physics	Basic Electrical Engineering					
	Engineering Mathematics-I	Fundamentals of Computer Technology					
		Engineering Workshop					
	Engineering Chemistry	Basic Electronics and Communication Engineering	Communication Skills				
	Engineering Mathematics - II	Engineering Drawing					
C1	Engineering Mathematics -III	Digital Electronics	Professional Communication Skills				
C2							
C3							
C4		Microprocessor					EnvironmentalScience
C5							EducationalTour
C6							
C7							
C8			Human Values and Professional Ethics	PE-I		IndustrialTraining	ConstitutionofIndia

	C9							
	C10							
VI	C11				PE-II	OE-II	Minor Project	
	C12				PE-III			
VII				Organization Behavior	PE-IV	OE-III	Industrial Training Cum Project	
					PE-V PE-VI	OE-IV		
VIII							Six Months Industrial Training	

First Semester

CourseCode	**PHY105**
CourseTitle	Engineering Physics
Typeof course	Theory
L T P	3 0 0
Credits	3
Coursepreprerequisite	10+2(non-medical)
Course Objective(CO)	To provide high quality, comprehensive educational and training opportunities those are compatible to changing needs of the students. Engineering Physics is a field that provides broad training in physics and basic training in engineering and design. Our engineering physics program aims to educate students to become professionals with in-depth knowledge and skills in engineering to understand physical systems; to research, design, and solve problems; and to provide the foundation for graduate study and lifelong learning.
Course Outcome (CO)	The learner will be able to- 1. Understand the importance of Applied Physics in describing physical phenomena. 2. Employ the knowledge of crystallography and X-Rays to understand the structure-property relationship of materials. 3. Implement the concept of Theory of relativity and Quantum mechanics for research applications. 4. Recognize the use of Laser, Magnetic materials, Superconductors and optical fibers in various fields. 5. Acquire Basic knowledge of EMFT in communication and Nanophysics for its applications in the field of medicine, datastorage devices and electronics.

SYLLABUS

UNIT-I

Electromagnetics: Physical significance of Gradient, Divergence & Curl, Differential approachto Gauss Law, Ampere's law and Faraday's law, Stoke's theorem, Gauss divergence theorem, Equation of continuity, Maxwell's Equations, Dielectric polarization, displacement Current.

Physics of Materials: Basic ideas of Dia, Para, Ferro and Ferri, Ferrites, Domain theory, Magnetic Anisotropy, Magnetostriction, B-H curve, Hard and Soft magnetic materials, Superconductivity, Superconductors as ideal diamagnetic materials, Meissner Effect, Type I &Type II superconductors, London Equations, Introduction to BCS theory.

UNIT-II

Special Theory of Relativity: Concept of Ether, Michelson Morleyexperiment, Einstien'spostulates, Lorentz transformation equations, length, time and simultaneity in relativity, Addition of velocity, Variation ofmasswithvelocity, Energy momentum relations.

UNIT-III

Lasers: Introduction, Spontaneous and Stimulated emissions, Einstein's Coefficients, Population Inversion, Pumping Mechanisms, Components of a laser System, Lasing action, properties of laser, Ruby, He-Ne, CO_2 and semiconductor Lasers, Characteristics of different types of lasers, Applications of lasers, Holography.

FibreOptics: Introduction, Acceptance Angle, Numerical Aperture, Normalized Frequency, Modes of propagation, Losses in Optical Fibre, Applications of Optical Fibres.

UNIT-IV

Physics of crystallography: Unit cell, Basis, Space lattice, Crystal Systems, Miller Indices ofPlanes & Directions in cubic system, Continuous & Characteristic X-Rays, X-Ray Diffraction &Bragg'slawin Crystals.

Nanophysics: Nanoscale, Nanoparticles (1D2D3D), Nanomaterials and their properties, Synthesis Methods-Ball milling and sol-gel techniques, Carbon nanotubes (Synthesis and properties), Applications of nanomaterials.

Recommended books:-

S.No	Name	Author(S)	Publisher
1	PhysicsforScientists and Engineers (Vol.I&II)	Serway and Jewett, 6th Edition	CengageLearning.
2	EngineeringPhysics,	HK Malik, AK Singh	TataMcGrawHill
3	MaterialsScience&Engg.,	Raghvan V.	PrenticeHallofIndia
4	Concepts of ModernPhysics	Beiser; A., Mahajan; S., Choudhary; SR	TataMcGrawHill
5	Solid State Physics	DanWei	CengageLearning
6	Introduction to Solids	Azaroff LV	TataMcGrawHill
7	Introduction to Electrodynamics	Griffiths ; DJ,	PrenticeHall
8	Lasers and Optical engineering	Dass; P,	NarosaPublishers
9	Optical Fibre system, Technology, Design and Applications	Kao; CK	McGrawHill.

CourseCode	**MAT103**
CourseTitle	EngineeringMathematics-I
Typeof course	BS
L T P	4 1 0
Credits	5
Courseprerequisite	+2withnon-medical
Course Objective	Mathematics is really a great tool to understand the things correctly. The aim of the course is to enable students: (1) To understand the theory knowledge as well as practical knowledge of different formulas. (2) To inculcate the skills to use different methods to solve the applied problems. (3) To check the accuracy of every formula by using different strategies. (4) To give them a sound foundation that eventually will help the min their coming technical futures.
Course Outcome(CO)	The learner will beableto- 1. Inculcateanability to identify engineering problems 2. Inculcateanability to formulate engineering problems 3. Inculcateanability to solve engineering problems

SYLLABUS

UNIT-I

Matrices: Algebra of matrices, Inverse and rank of a matrix, rank-nullity theorem; System of linearequations; Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigenvalues andeigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, Orthogonal transformation and quadratic to canonical forms.

UNIT-II

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

UNIT-III

Vectorspaces: Vector Space, linear dependence of vectors, basis, dimension; Linear transformations(maps), range and kernel of a linear map, rank and nullity, Inverse of a linear transformation, rank- nullity theorem, composition of linear maps, Matrix associated withalinear map.

UNIT-IV

Calculus: Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; indeterminate forms and L'Hospital's rule; Maxima and minima. 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.

Recommended books:-

S.No	Name	Author(S)	Publisher
1	Higher Engineering Mathematics	Dr.B.S.Grewal	KhannaPublishers
2	Fourier Series and Boundary Values Problems	Churchill	McGrawHill.
3	Complex Variables & Applications	Churchill	McGrawHill.
4	Engineering Mathematics	Bali&lyingar	LaxmiPublication.
5	Advanced Engineering Mathematics	WylieandBarren	Mcgrawhill,6thedition,1995
6	Advanced Engineering Mathematics	Kreyszig, John Wiley	

CourseCode	**EE101**
CourseTitle	**Basics Of Electrical Engineering**
TypeOfCourse	ES
L T P	2 0 0
Credits	2
CoursePrerequisites	Physics and Mathematics
Courseobjectives	To familiarize with AC, DC circuits & their fundamentals, Magnetic circuits and Transformer, Electrical Machines and Measuring Instruments
CourseOutcome(CO)	Thelearner willbe ableto- 1. Understand and identify elements of DC circuits 2. Apply Kirchoffs law 3. Describe concept of 3-phase EMF generation 4. Compare magnetic and electric circuits.

SYLLABUS

UNIT-I

DC Circuits

Circuits : Identifying the Elements and the Connected Terminology, Ohm's Law- Statement ,Illustration and limitation, Kirchhoff's Laws –Statement and Illustration ,Method of solving aCircuits by Kirchhoff's Laws, Computation of Resistance at Constant temperature, TemperatureDependence of resistance, Computation of Resistance at different temperatures, Units – Work,Powerand Energy (Electrical, Thermal and Mechanical).

UNIT-II

AC Fundamentals

Generation of Alternating Emf, Concept of 3-phase EMF Generation, Root Mean Square or Effective Value, Average value of AC, Phasor Representation of Alternating quantities, Representation of Alternating Quantities in Rectangular and Polar forms, Introduction of Resistors, Inductors and Capacitors, R-L Series Circuits, R-C Series Circuits, R-L-C SeriesCircuits, Admittance and its components, Resonance in Series and Parallel, Analysis of simple 3 phase system, star-delta connections and conversion.

UNIT-III

Magnetic Circuits

Comparison between Magnetic and Electric circuits, Electromagnetic Induction, Magnetic Effects of Electric Current, Current carrying conductor in Magnetic field, Law of Electromagnetic Induction, Self-Inductance, Mutual Inductance, Coupling Coefficient between two magnetically coupled Circuits.

UNIT-IV

Electrical Machines Transformer: principle, construction, working, efficiency and applications. D.C. Generator: principle, construction, working and applications. D.C. Motor: principle, construction, working & applications. Three Phase Induction Motor: principle, construction, working and applications.

Measuring Instruments

Classification of Instruments, Basic Principles of indicating instruments, Moving Iron Instruments – Attraction and Repulsion Type, Moving Coil Instruments – Permanent Magnet -DynamometerType, Multimeters.

Recommended Books			
Sr.No.	Name	Author	Publisher
1	Basic Electrical, Electronics and Computer Engineering	Rmuthusubramanian, S Salivahanan, KA Muraleedharan	TataMcgrawHill
2	A Textbook of Electrical Technology	B.LTheraja.&A.KTheraja	SChand
3	Fundamentals of Electrical Engineering	VincentDeltoro	PrenticeHall.
4	A Course in electrical and electronic Measurements and Instumentation	A.KSawhney	DhanpatRai&co.
5	Basic Electrical Engineering	H.M Rai and S.Marwaha	SatyaPrakashan, Delhi

CourseCode	**CSE101**
CourseTitle	Fundamentals of Computer Technology
TypeofCourse	ES
L T P	3 0 0
Credits	3
Course Prerequisites	Basics of computer and any high level language
Course Objectives	To familiarize the students of all branches in engineering with computer organization, operating systems, problem solving and programming in C++.
Course Outcome(CO)	The learner will be able to- 1. Understand the basic building blocks of general-purpose digital computer system like computer hardware/software, memory and peripheral devices, internet applications and services. 2. Describe the program development life cycle using various tools like flowcharts and algorithms and pseudo-code. 3. Classify operators, expressions, character set, data types and control structures. 4. Write programs using object-oriented concepts like classes and objects, filehandling

SYLLABUS

UNIT-I

Introduction to Computers: Define a Computer System, Block diagram of a Computer System and its working, associated peripherals, memories, RAM, ROM, secondary storage devices, Computer Software and Hardware.

Working Knowledge of Computer System and Office automation: Introduction to the operating system, its functions and types, working knowledge of GUI based operating system, introduction to word processors and its features, creating, editing, printing and saving documents, spellcheck, mailmerge, creating powerpoint presentations, creating spreadsheets and simple graphs

Problem Solving & Program Planning: Need for problem solving and planning a program; program design tools– algorithms, flowcharts, and pseudo code; illustrative examples.

UNIT-II

Overview of C++ Language: Introduction to C++ language, structure of a C++ program, concepts of compiling and linking, IDE and its features; Basic terminology-Character set, tokens, identifiers, keywords, fundamental data types, literal and symbolic constants, declaring variables, initializing variables, type modifiers.

Operators and expressions: Operators in C++, precedence and associativity of operators, expressions and their evaluation, type conversions.

Beginning with C++ program: Input/output using extraction (>>) and insertion (<<) operators, writing simple C++programs, comments inC**++,** stages of program execution.

UNIT-III

Control Structures and Functions: Decision making statements: if, nested if, if – else. Else ifladder, switch, Loops and iteration: while loop, for loop, do – while loop, nesting of loops, break statement, continue statement, go to statement, Advantages of using functions, structure of a function, declaring and defining functions, return statement, formal and actual arguments, constant argument, default arguments

Arrays and Strings: Declaration of arrays, initialization of array, accessing elements of array, I/Oof arrays, passing arrays as arguments to a function, multidimensional arrays. String as array ofcharacters, initializing string variables, I / O of strings, string manipulation functions (strlen, strcat, strcpy, strcmp), passing strings to a function. Use of arrays and strings through illustrative programming examples**.**

Classes and Objects: Concept of classes, Declaration of classes, Defining access specifier, Public, Private, Protected derivations, defining member functions in a class, use of scope resolution operatoroutsidethe class definition. Defining objects. Friend function.

UNIT-IV

CAD/CAM: Introduction to the basics of CAD and CAM, Study 2-D sketching entities like lines, rectangle, parallelogram, polygon, circle etc., under SKETCH ENTITY MENU.

Evolution of Internet and its applications and services.

RECOMMENDED BOOKS

Sr. no.	Name	Author(s)	Publisher
1.	Object-Oriented Programming With C++	E.Balagurusamy	TataMcGrawHill
2.	Object-Oriented Programming withC++	Lafore, R	Waite Group
3.	The C++ Programming Language	Bjarne Stroustrup	AddisonWesley
4.	Fundamentals of Computers	R.S. Salaria	Salaria PublishingHouse

CourseCode	**PHY107**
CourseTitle	Engineering Physics Laboratory
Typeof course	BS
L T P	0 0 2
Credits	1
Course prerequisite	Nil
Course objectives	1. To impart physical measurement skills. 2. To make the students understand coherence between theoretical and practical measurement. 3. Develop the skills needed to set up the equipment required to test models or theory developed in the lecture course 4. Be able to interpret results and develop correct conclusions. 5. Maintain a laboratory notebook and write formal reports of practical workout
Course Outcome (CO)	The learner will be able to – 1. Develop skills to impart practical knowledge in real time solutions. 2. Understand principle, concept, working and application of new technology and comparison of results with theoretical calculations. 3. Design new experiments/instruments with practical knowledge 4. Gain knowledge of new concept in the solution of practical oriented problems and to understand more deep knowledge about the solution to theoretical problems.

SYLLABUS

1. To study the magnetic field of a circular coil carrying current.
2. To find out polarizability of a dielectric substance.
3. To study the laser beam characteristics like; divergence using diffraction grating aperture.
4. To study laser interference using Michelson‟s Interferometer.
5. Study of diffraction using laser beam and thus to determine the grating element.
6. To determine numerical aperture of an optical fibre.
7. To determine attenuation & propagation losses in optical fibres.
8. To find out the frequency of AC mains using electric-vibrator.
9. To find the refractive index of a material using spectrometer.
10. To find the refractive index of a liquid.
11. To study B-H curve using CRO.

CourseCode	**EE103**
Course Title	**Basics Of Electrical Engineering Lab**
Type Of Course	ES
L T P	0 0 2
Credits	1
Course Pre-requisites	Basics of Electrical Engineering
Course objectives	To familiarize with various AC, DC circuits, Transformer, Electrical Machine and Measuring Instruments
Course outcome (CO)	1. Study different meters and instruments for measurement of electrical quantities. 2. Study the linear and nonlinear characteristics of different types of loads experimentally 3. Design and experiment potential divider circuits. 4. Experimentally verify the basic circuit theorems.

SYLLABUS

1) To find voltage, current relationship and power factor of a given R-L circuit.
2) To perform open- circuit and short circuit test on a transformer and determine the following:
   (a) The transformation ratio (b) the transformer efficiency.
3) To find out the line voltage, phase voltage relationship, line current and phase current relationship in case of star and delta connected 3- phase balanced load.
4) To connect 3 identical single phase transformers for three phase power transformations through following connections (a) star-delta (b) star-star(c) delta-star (d) delta-delta and to find phase and line voltage ratio.
5) To connect, start and reverse the direction of rotation of a 3- phase induction motor.
6) To perform the Block Rotor test of 3-phase induction motor test.
7) To study various measuring instruments(Moving Iron Instruments – Attraction Type, Moving Iron Instruments – Repulsion Type, Moving Coil Instruments – Permanent Magnet Type, Moving Coil Instruments – Dynamometer Type).
8) To study the speed control of characteristic of D.C. Motor.
9) To verify the rating of compact fluorescent lamp (CFL).
10) To verify Ohm's Law and its limitations.
11) To verify Kirchhoff's Laws.
12) To measure the resistance and inductance of a coil by ammeter-voltmeter method.
13) To measure power and power factor in a single- phase AC circuit.
14) To verify series and parallel resonance in AC circuits.

Recommended Books		
Name	Author	Publisher
Basic Electrical, Electronics and Computer Engineering	R Muthu Subramanian, S Salivahanan, K A Muralitharan	Tata McGraw Hill
A Textbook of Electrical Technology	B.L Theraja and A.K Theraja	S Chand

CourseCode	**CSE103**
Course Title	Fundamental of Computer Technology Laboratory
Type of Course	ES
L T P	0 0 4
Credits	2
Course Prerequisites	Basics of computer and knowledge of any high level language
Course Objectives (CO)	To familiarize the students of all branches in engineering with computer organization, operating systems, problem solving and programming in C++.
Course Outcome (CO)	The learner will be able to- 1. Understand the basic building blocks of general purpose digital computer system like computer hardware/software, memory and peripheral devices, internet applications and services. 2. Understand the program development life cycle using various tools like flowcharts and algorithms and pseudo-code. 3. Classify operators, expressions, character set, data types and control structures. 4. Design and develop modular programming and code reusability using library functions.

SYLLABUS

Familiarization with the Computer System:

1) To explain the part of the computer system such as system unit, input devices, output devices connected to the computer.

2) To explore the outside view of the system unit that includes the panels on front and ports at the rear.

3) To explore the inside view of the system unit that includes the motherboard, processor, expansion slots, various add-on cards, storage devices, power supply, fans.

4) To understand the booting process that includes switching on the system, execution of POST routine, then bootstrap loader, and loading of the operating system, and getting it ready for use.

5) To introduce the graphical user interface (desktop) of Windows operating System to explain the various elements of the desktop such as taskbar, icons (My Computer, Recycle Bin, etc.), short cuts, notification area.

6) To configure the desktop that includes selecting the wallpaper, selecting the screen saver with or without password protection, selecting the screen resolution and color quality.

Explore Office automation

1) Creating, Formatting documents with Word, explore the various toolbar options, Mail Merge, Spell Check, Word –Art.

2) Creating PowerPoint presentations with Power Point, Explore various views of PPT, Charts, Graphs, animation, multimedia.

3) Creating Sheets in Excel using formulas, chart and graphs.

Programming using C++

1) Implement programs using various operators in C++

2) Implement various Branch statements: if, if-else, nested if, switch

3) Implement various loop statements: for, while, do-while

4) Implement other control statements: go-to, exit function, continue

5) Implement various programs using arrays and string

6) Implement various programs classes and objects

Computer Aided Tools and Internet

1) Exercise with CAD/CAM

2) Internet surfing and E-mail

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1.	Object-Oriented Programming with C++	E. Balagurusamy	Tata McGraw Hill
2.	Object-Oriented Programming with C++	Lafore R	Waite Group
3.	The C++ Programming Language	Bjarne Stroustrup	Addison Wesley.
4.	Fundamentals of Computers	R. S. Salaria	Salaria Publishing House

Course Code	**ME107**
Course Title	Engineering Workshop
Programme	ES
L T P	0 0 6
Credits	3
Course Prerequisites	+2 Physics and Mathematics
Course Objectives	To become aware of different manufacturing process in industry.
Course Outcome (CO)	The learner will be able to- 1. Use carpentry tools to make joints 2. Prepare small sand moulding and casting in foundry shop 3. Understand and demonstrate knowledge of various operations that can be performed on lathe and shaper machine. 4. Perform experiments involving use of gas or electric arc welding

SYLLABUS

1. Carpentry and Pattern making: Various types of timber and practice boards, defects in timber, seasoning of wood, tools, wood operations and joints, exercises involving use of important carpentry tools to practice various operations and making joint.

2. Foundry Shop: Introduction to moulding material, mould, melting furnaces, foundry tools and equipment's used in foundry shops; firing of a cupola furnace, exercises involving preparation of small sand moulding and casting.

3. Forging practice: introduction to forging tools; equipment's and operations forge ability of metals; exercises on simple smithy; forging exercises.

4. Machine shop: Machines ; introduction to lathe and shaper machine and its operation performed on it.

5. Welding shop: introduction to different welding methods; welding equipment's; electrodes; welding joints; welding defects; exercises involving use of gas/electric arc

welding.

6. Electrical and electronics shop: introduction to electrical wiring; preparation of PCBs involving soldering applied to electrical and electronic applications; exercises preparation of PCBs involving soldering applied to electrical and electronic applications.

7. Sheet metal shop: shop development of surfaces of various objects; sheet metal forming and joining operation, joints, soldering and brazing; exercises involving use of sheet metal forming operations for small joints.

8. Fitting shop: introduction of fitting practice and tool used in fitting shop; exercise involving marking cutting fitting practice (right angles) male female mating parts practice.

RECOMMENDED BOOKS			
S. No	Name	Author(S)	Publisher
1.	Workshop Technology	HS Bawa	McGraw-Hill Publishing Company Limited
2.	Workshop Technology I, II, III	S K Hajra, Choudhary and A K Choudhary	Media Promoters and Publishers Pvt. Ltd., Bombay
3.	Manual on Workshop Practice	K Venkata Reddy	MacMillan India Ltd. New Delhi
4.	Basic Workshop Practice Manual	T Jeyapoovan	VikasPublishing House (P) Ltd., New Delhi

Second Semester

CourseCode	**CHM105**
CourseTitle	Engineering Chemistry
Typeof course	BS
L T P	3 0 0
Credits	3
Course prerequisite	NA
Course Objective (CO)	The objectives of the 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 Outcome	The learner will be able to- 1. Gain knowledge about types of boiler problems, various physical and chemical techniques for water treatment and its analysis, desalination process used to produce potable water from brackish water. 2. Describe different types of corrosion and differentiate between wet and dry corrosion. 3. Explain applications of UV/Visible spectroscopy. 4. Describe fundamental modes of vibrations and its types. 5. Understand twelve principles of Green Chemistry with emphasis on the use of alternative feedstock (bio fuels) 6. Demonstrate Natural gas treatment process and Gain chemical knowledge on concepts of polymers, their structural properties and moulding techniques required for solving interdisciplinary problems in polymer industries.

SYLLABUS

UNIT-I

Water and its Treatment: Boiler feed water: Specification, Scales and sludge formation; Priming & foaming; Different methods of the water purifications and softening; Water for domestic use; Specifications; Disinfection of water.

Corrosion and its Prevention: Introduction; Different types of corrosion ;Wet and Dry corrosion; Mechanisms of wet & Dry corrosion; Concentration cell corrosion and differential aeration corrosion; Soil and microbial corrosions; waterline, stress corrosions; Prevention measure against corrosion.

UNIT-II

Spectroscopy and its Applications: An introduction

1). UV/Visible Spectroscopy: Selection rules; Line widths and intensities Chromophores and

autochromes; Principle and instrumentation; Electronic Transitions lines; Franck Condon principle; Applications of UV/Visible spectroscopy.

2).I.R. spectroscopy: Fundamental modes of vibrations and types; Factors affecting vibration frequency; Applications of I.R. spectroscopy.

3). NMR Spectroscopy: Principle & instrumentation; Chemical shift; Spin-Spin Splitting; applications of N.M.R. spectroscopy.

Photochemistry: Introduction; Photo physical& photochemical processes; Light sources in photochemistry; Beer Lambert Law; Laws of Photochemistry; Quantum yield (primary and overall); Primary and secondary photochemical reactions; Jablonski diagram; Semiconductor photochemistry, Photovoltaic cells Introduction to optical sensors.

UNIT-III

Green Chemistry and its Applications: Introductory overview Definition and concepts of Green chemistry; Twelve principles of Green Chemistry with emphasis on the use of alternative feedstock (bio fuels); Design of the safer chemicals; Microwave and ultrasonic radiation in Green synthesis minimizing energy consumption.

Polymers and Reinforced Composites: Introduction; Functionality; Types of polymerization; Specific features of polymers; Tactility of polymers; Average molecular weights and size; polymers; Introduction: polymer reinforced composite; Effect of molecular weight on the properties of polymers; Biodegradable polymers.

UNIT-IV

Nano-chemistry: Introduction; Materials self-assembly; Molecular vs. materials self assembly; Self-assembling materials; Two dimensional assemblies; Mesoscale self assembly; Coercing colloids; Nanocrystals; Super molecular structures Nanoscale materials; Future perspectives.

Petrochemicals: Introduction; First, second & third generation petrochemicals; Primary Raw Materials for Petrochemicals, Natural gas: Natural gas treatment processes; Natural gas liquids; Properties of natural gas; Crude oil: Composition of crude oil-Hydrocarbon compounds; Non-hydrocarbon compounds; Metallic Compounds, Crude oil classification Physical separation processes; Conversion processes; Renewable and non renewable source of energy.

RECOMMENDED BOOKS

S. No	Name	Author(S)	Publisher
1.	Engineering chemistry	J.C. Curiacose and J.Raja Ram	Tata Mcgraw-Hill Co. New Delhi.
2.	Chemical applications of infrared spectroscopy	CNR. Rao.	Academic Pres, New York.

3.	Ultra violet and visible spectroscopy chemical applications	CNR, Rao	Plenum press

Course Code	**MAT104**
Course Title	Engineering Mathematics-II
Type of course	BS
L T P	4 1 0
Credits	5
Course prerequisite	10+2 NON-MEDICAL
Course Objective	Mathematics is really a great tool to understand the things correctly. The aim of the course is to enable students: (1) To understand the theory knowledge as well as practical knowledge of different formulas. (2) To inculcate the skills to use different methods to solve the applied problems. (3) To check the accuracy of every formula by using different strategies. (4) To give them a soundfoundation that eventually will help them in their coming technical futures.
Course Outcome (CO)	The learner will be able to- 1. Use effective mathematical tools for the solutions of differential equations that model physical processes 2. Derive mathematical models of physical systems. 3. Use tools of differentiation and integration of functions of complex variable that are used in various techniques dealing engineering problems.

SYLLABUS

UNIT-I

Probability Distributions and Sampling Distributions: Random variables, Probability Distribution:Binomial, Poisson and Normal distributions. Fundamentals of Sampling, Large samples,

Small samples; Sampling distribution of the means, t-Distribution, F-Distribution, Chi-squareDistribution.

UNIT-II

Ordinary Differential Equations of first order and Linear Ordinary Differential Equations of second & higher order:Exact Differential equations, Equations reducible to exact form by integrating factors; Equations of the first order and higher degree. Clairaut's equation.Leibniz's linear and Bernoulli's equation Solution of linear Ordinary Differential Equations of second and higher order; methods of finding complementary functions and particular integrals. Method of variation of parameters, Cauchy’s homogenous and Legendre’s linear equation.

UNIT-III

Complex Numbers and elementary functions of complex variable: De-Moivre's theorem and its applications. Real and Imaginary parts of exponential, logarithmic, circular, inverse circular, hyperbolic, functions of complex variables. Summation of trigonometric series. (C+iS method)

UNIT-IV

Measures of Central tendency and Dispersion: Measures of central tendency: Arithmetic Mean, Geometric Mean, Harmonic Mean, Quartiles, Deciles, Percentiles. Median, Mode, Skewness, Kurtosis. Measures of dispersion: Range, Interquartile range, Variance and Standard Deviation.

RECOMMENDED BOOKS			
S. No	Name	Author(S)	Publisher
1	Higher Engineering Mathematics	Grewal, B.S.	Khanna Publishers, Delhi.
2	Advanced Engineering Mathematics	Jain, R.K and Iyengar, S.R.K.	Narosa Publishing Company
3	Statistical Methods	S P Gupta	Sultan Chand & sons Publisher

Course Code	**ECE101**
CourseTitle	**Basic Electronics and Communication Engineering**
Type of Course	ES
L T P	2 0 0
Credits	2
Course Prerequisite	Knowledge of Physics
Course Objectives	To introduce basic postulates of Electronics, Boolean algebra and basic gates, and Boolean expressions, To outline the formal procedures for the analysis and design of electronics and digital circuits. Introduction to basic fundamentals of communication engineering.
Course Outcome(CO)	The learner will be able to- 1. Predict the behavior of any electrical and magnetic circuits 2. Identify the type of electrical machine used for that particular application 3. Acquire knowledge about basics of digital electronics 4. Understand various methods of electrical generation 5. Identify schematic symbols and understand the working principles of electronic devices.

SYLLABUS

UNIT-I

Semiconductor Diodes and Applications: Introduction, Semiconductor materials, Extrinsic materials: n type and p type, Semiconductor diodes, Biasing of diodes, Breakdown mechanisms, Ideal diode, Transition and diffusion capacitance, Reverse recovery time, Diode testing, Zener diode, Light emitting diodes (LEDs). Load line analysis, Half wave rectifications, full wave rectification, Clippers, Clampers, Zener diode as a voltage regulator, Voltage multiplier.

UNIT-II

Digital Electronics Fundamentals: Digital and Analog Quantities, Binary digits, Logic levels, Basic logic operations, Overview of basic logic functions, Number system: Decimal numbers, Binary

numbers & its arithmetic operations, octal & Hexadecimal numbers, number system conversions, Logic gates: The inverter, The AND gate, The OR gate, The NAND gate, The NOR gate, The Exclusive OR and Exclusive NOR gates.

UNIT-III

Basic Signals & Systems: Introduction, Signals and classification of signals, Basic continuous time signals, Basic discrete time signals, System and classification of systems, Transducers.

UNIT-IV

Communication Systems: Introduction, Elements of a communication system, Classification of communication systems, Modulation and coding, Need of modulation, Multiplexing, Analog and Digital communication, Advantages of digital communication over analog communication, Microwave communication, Satellite communication, Optical communication, Cellular Mobile communication:1G, 2G, 3G, GSM. (Basic introduction to all communication systems).

RECOMMENDED BOOKS			
S. No	**Name**	**Author(S)**	**Publisher**
1	Electronics Devices & Circuits	Robert Boylested and Louise Nashelsky	Prentice Hall of India
2	Fundamental of Analog Circuits	Thomos L. Floyd and David buchla	Prentice Hall
3	Electronic Devices and Circuits	J.B Gupta	S K Kataria& Sons
4	Wireless Communications	T. L. Singal	Tata McGraw-Hill

Course Code	ENG121
Course Title	Communication Skills-I
Type of Course	HS
L T P	2 0 0
Credits	2
Course pre-requisite	NA
Course Objectives	The objective of this course is to : 1. Assist the students to acquire proficiency, both in spoken and written language **2.** To develop comprehension, improve writing skills, and enhance skills in spoken English.
Course Outcome (CO)	The learner will be able to- 1. Understand various types of communication, its channels, barriers to communication and role of communication in society 2. Describe process of listening, its types and barriers to effective listening. 3. Discuss and illustrate purpose of reading, its process, skills, models and approaches using comprehension passages. 4. Discuss purpose and types of effective speaking and writing skills **5.** Design business correspondence, memo writing and minutes of meeting using the knowledge gained.

SYLLABUS

UNIT-I

Basics of Communication Skills:

Communication, Process of Communication, Types of Communication-Verbal and Non verbal communication, Channels of Communication- Upward, Downward, Horizontal, Barriers to Communication, Role of Communication in society.

UNIT-II

Listening Skills:

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

Reading Skills:

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

UNIT-III

Writing Skills:

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

UNIT-IV

Speaking Skills:

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

RECOMMENDED BOOKS			
Sr No	**Author(s)**	**Title**	**Publisher**
1.	Bhupender Kour	Effectual Communication Skills	S.K. Kataria and Sons
2.	R. Datta Roy and K.K. Dheer	Communications Skills	Vishal Publishing Company
3	The Essence of Effective Communication	Ludlow and Panthon	Prentice Hall of India
4	Essentials of Business Comunication	Pal and Rorualling	S. Chand and Sons. New Delhi

Course Code	**ME103**
Course Title	Engineering Drawing
Type of Course	ES
L T P	1 0 6
Credits	4
Course Prerequisites	Basic Mathematics
Course Objectives	Main objective of the Engineering Drawing is to introduce the students to visual science in the form of technical graphics. General instructions related to Theory of Orthographic Projection of points, lines, planes and solids as per the BIS codes prevalent to drawing practice will be introduced initially. Section of solids, intersection and development of surfaces, isometric projection and orthographic projection of simple solids/blocks will further upgrade the basic understanding and visualization of geometrical objects and to certain extent the machine parts.
Course outcome (CO)	The learner will be able to- 1. Understand the conventions and the method of engineering drawing. 2. Interpret engineering drawings using fundamental technical mathematics. 3. Construct basic and intermediate geometry. 4. Improve their visualization skills so that they can apply these skill in developing new products. 5. Improve their technical communication skill in the form of communicative drawings. 6. Comprehend the theory of projection.

SYLLABUS

UNIT-I

Introduction: Introduction to drawing equipment and use of instruments. Symbols and conventions in drawing Practice. Types of lines and their use, BIS codes for lines, Technical lettering as per BIS codes, Introduction to Dimensioning. Basic Definition of geometrical objects: Points, lines, planes and solids.
Scales: Representative Fraction, Types of Scale, Plain and Diagonal Scale, Scale of chords

Projection: Introduction, Principle of Projection, Method of projection, Planes of projection, Four quadrant, First and Third angle projection, Reference line, symbols for methods of projection, Orthographic projection

UNIT-II

Projection of Point: Introduction, Projection of Point situated in first, second, third & fourth quadrant.

Projection of lines: Introduction , Line parallel to One or both the planes, Line contained by one or both the planes, Line perpendicular to one of the planes, Line inclined to one plane and parallel to other . Line inclined to both the planes, True length.

Projection of Planes: Introduction, Types of planes, Difference between plane and lamina, Projection of planes, Projection of planes perpendicular to both the reference planes, Perpendicular to one plane and parallel to other plane, Perpendicular to one plane and inclined to the other plane, Inclined to both planes.

UNIT-III

Projection of solids: Introduction, Type of solid, Projection of solids in first or third quadrant, with axis parallel to one and perpendicular to other, axis parallel to one inclined to other, axis inclined to both the principle plane, axis perpendicular to profile plane and parallel to both H P and V P. Visible and invisible details in the projection. Use rotation and auxiliary plane method to draw the projections.

Section of Solids: Definition of Sectioning and its purpose. Procedure of Sectioning, Types of sectional planes. Illustration through examples.

Development of Surfaces: Purpose of development, Parallel line, radial line and triangulation method. Development of prism, cylinder, cone and pyramid surface for both right angled and oblique solids, and development of surface of sphere.

UNIT-IV

Isometric Projection: Classification of pictorial views, Basic Principle of Isometric projection, Difference between isometric projection and isometric drawing. Isometric projection of solids such as cube, prism, pyramid and cylinder, and assignments on isometric projection of simple machine parts.

Orthographic Projection: Review of principle of Orthographic Projection, Sketch/drawing of blocks, and of simple machine parts.

Intersection of Surfaces/Solids: Purpose of intersection of surfaces, Intersection between the two cylinder, two prisms, prism and pyramid, pyramid and pyramid, cylinder and prism, cone and cylinder, sphere and cylinder etc., use of cutting plane and line method.

Recommended Books

S.No.	Name	Author(s)	Publisher
1.	Engineering Graphics	Narayana K L and Kanaiah P	Tata McGraw Hill Publishing Company Limited, New Delhi
2.	Engineering Graphics and Drafting	P S Gill	Katria and Sons, Delhi.
3.	Elementary Engineering Drawing-Plane and solid Geometry	ND Bhat	Chartotar Publishing House, Anand
4.	A Text Book of Engineering Drawing	R. K. Dhawan	S. Chand and Co. Ltd
5.	Engineering Graphics	K.L. Narayana and P.Kannaiah	Scitech Publications (India)

Course Code	**CHM107**
Course Title	Engineering Chemistry Laboratory
Type of course	BS
L T P	0 0 2
Credits	1
Course Objectives	The objective of the Engineering Chemistry is to acquaint the students with the basic phenomenon/concepts of chemistry, the student face during course of their study in the industry and Engineering field. The student with the knowledge of the basic chemistry, will understand and explain scientifically the various chemistry related problems in the industry/engineering field. The student will able to understand the new developments and breakthroughs efficiently in engineering and technology. The introduction of the latest (R&D oriented) topics will make the engineering student upgraded with the new technologies
Course Outcome (CO)	The learner will be able to 1. Analyze the need, design and perform a set of experiments. 2. Identify the structure of unknown/new compounds with the help of spectroscopy. 3. Differentiate hard and soft water, solve the related numerical problems on water purification and its significance in industry and daily life.

SYLLABUS

1. Analysis of Effluents

- Determination of hardness of water by EDTA method.
- Determination of C.O.D and B.O.D in water.
- Determination of Residual Chlorine.

2. Analysis of Fuels and Lubricants

- Determination of Moisture, Volatile and ash content by proximate analysis.
- Determination of acid value of oil
- Determination of the viscosity.

3. Instrumental Analysis

- Determination of surface –tension of given liquid
- Determination of the concentration of a solution conductometerically.

- Determination of the strength of a solution pH metrically.

4. Chromatography

- Determination of Rf value of amino acid by TLC and identification of the amino acid present.
- Separation of metallic ions by paper chromatography.
- Separation of Ions by using complexing agents

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5. Synthesis & Green Chemistry experiments

- Preparation of a polymer phenol/urea formaldehyde resin or
- Preparation of aspirin. Base catalyzed aldol condensation by Green Methodology Acetylation of primary amines using ecofriendly method.

Recommended books:-

S. No	Name	Author(S)	Publisher
1.	Engineering chemistry	J.C. Curiacose and J. Raja Ram,	Tata Mcgraw-Hill Co, New Delhi.
2.	Chemical applications of infrared spectroscopy	CNR.Rao.	Academic Pres, New York.

Course Code	**ECE103**
Course Title	Basic Electronics & Communication Engineering Laboratory
Type of Course	ES
L T P	0 0 2
Credits	1
Course Prerequisites	Basic knowledge of Electronics components
Course Objectives	The basic objective of the subject is to enable students to understand characteristics of DC machine, single phase transformer and three phase induction motor. They will be able to classify different types of FETs, Compute and characterize feedback amplifiers.
	The learner will be able to- 1. Demonstrate and characterize DC machine, single phase transformer and three phase induction motor. 2. Classify different types of FETs and demonstrate feedback amplifiers, OP-AMPs, and oscillator circuits. 3. Compute and characterization of feedback amplifiers, OP-AMPs, and oscillator circuits. 4. Employ the concept of positive feedback to design of an oscillator circuit. 5. Relate the characteristics of PN junction in the operation of FET. 6. Illustrate the basics of Boolean algebra and logic gates and their realization using discrete electronic components.

SYLLABUS

List of Experiments

1. Identification of Basic components of Electronics.
2. Introduction to Multimeter.
3. Introduction to working of CRO & Function Generator.
4. Component Testing: Resistance, Capacitor and Inductance.
5. Component Testing: Diode, BJTs.
6. LED testing.
7. Calculate and verify the Resistance and capacitance in series and parallel combination.
8. Verification of Basic Logic gates (AND, OR, NOT).
9. Verification of Universal Logic gates (NAND, NOR).
10. Basics practice on soldering and general-purpose PCB component installation

Course Code	**ENG123**
Course Title	Communication Skills-1 Laboratory
Type of Course	HS
L T P	0 0 2
Credits	1
Coursepre-requisite	NA
Course Objectives	The objective of this course is to provide the students sufficient practice for speaking and writing English efficiently.
Course outcome (CO)	The learner will be able to- 1. Listen to oral instructions in order to perform a given task. (The skills of Listening will be taught and tested through specially prepared materials) 2. The skills of Speaking will be developed conducting various communicative Activities- Role play, conversations, extempore etc. 3. The Reading Skills will be enhanced through comprehending and unseen texts. 4. The skills of Writing will be developed and assessed on Text based writing.

SYLLABUS

UNIT-I

Speaking and Discussion Skills:

Oral Presentation, Planning and organizing content for presentation, Use of audio /Visual Aids, Making Slides for presentation, Group Discussion, Debate, Extempore speaking, Interview Skills, Mock interview, Mock Dialogues(PairSpeaking),Cue Card Speaking,Meeting/Conferences.

UNIT-II

ListeningSkills:

Listening to any recorded material and asking oral/written questions for listening comprehension.

Reading Skills:

Active Reading of passages for Reading comprehensions, paraphrase, Summary writing.

UNIT-III

Writing Skills:

Guidelines of effective writing, Paragraph Writing, Email Writing.

UNIT-IV

Grammar and Vocabulary:

Parts of Speech, Tenses, GRE words (List of 50 Words).

Third Semester

Course Code	**CSE201**
Course Title	**Introduction to Data Structures**
Type of Course	PC
L T P	4 0 0
Credits	4
Course Prerequisites	Basic knowledge of C language and C++ language
Course Objectives	This course work provides the thorough understanding of the Linear and Non- Linear Data Structures in solving problems and to give the idea of the efficiency of various algorithms.
Course Outcome(CO)	The learner will be able to – 1. Understand data types, data structures, operations and differences between data types and data structures. 2. Represent arrays, linked list, queues and perform operations on them. 3. Discuss applications of stack and queue and perform operations on it. 4. Design and implement searching and sorting algorithms and also calculate the complexity involved.

SYLLABUS

UNIT-I

Introduction: Concept of data type, Brief description of various data structures, data structures versus data types, operations on data structures, algorithm complexity, Asymptotic Notations.

Arrays: Linear and multi-dimensional arrays and their representation, operations on arrays, sparse matrices and their storage.

Linked List: Linear linked list, operations on linear linked list, doubly linked list, operations on doubly linked list, and Variations of Linked Lists applications of linked lists.

UNIT-II

Stacks: Sequential and linked representations, operations on stacks, application of stacks such as parenthesis checker, evaluation of postfix expressions, conversion from infix to postfix representation, implementing recursive functions.

Queues: Sequential representation of queue, linear queue, circular queue, operations on linear and circular queue, linked representation of a queue and operations on it, dequeue, priority queue, applications of queues.

UNIT-III

Trees: Basic terminology, sequential and linked representations of trees, traversing a binary tree, BST, inserting a node, deleting a node, brief introduction to threaded binary trees, AVL trees and m-way tree, B-trees.

Heaps: Representing a heap in memory, operations on heaps, application of heap in implementing priority queue and heap sort algorithm.

Graphs: Basic terminology, representation of graphs (adjacency matrix, adjacency list), traversal of a graph (breadth-first search and depth-first search), and applications of graphs.

UNIT-IV

Hashing amd Hash Tables: Comparing direct address tables with hash tables, hash functions, concept of collision and its resolution using open addressing and separate chaining, double hashing, rehashing.

Searching & Sorting: Searching an element using linear search and binary search techniques, Sorting arrays using bubble sort, selection sort, insertion sort, quick sort, merge sort, heap sort, shell sort and radix sort, complexities of searching & sorting.

RECOMMENDED BOOKS

Name	Author(S)	Publisher
Data Structures	Seymour Lipschutz	Tata Mcgraw Hill
Data Structures, Algorithms and Applications in C++	Sartaj Sahni	Tata McGraw Hill
Data Structures using C and C++	Tenenbaum, Augenstein, & Langsam	Prentice Hall of India
Data Structures & Algorithms Using C++	R. S. Salaria	Khanna Book Publishing Co. (P) Ltd.

CourseCode	**CSE203**
Course Title	**Object Oriented Programming Systems**
Type of Course	PC
L T P	4 0 0
Credits	4
Course Prerequisites	Basic knowledge of Programming Language
Course Objectives	To understand the basic concepts of object-oriented programming languages and to learn the techniques of software development in C++.
Course Outcome (CO)	The learner will be able to- 1. Understand concepts of object-oriented programming. 2. Compare Object oriented programming with procedure-oriented programming. 3. Write object-oriented programs using classes, objects, overloading operators and member functions. 4. Apply constant keyword, friend class, constructors and destructors through programming. 5. Illustrate the process of data file manipulations using C++

SYLLABUS

UNIT-I

Object-Oriented Programming Concepts: Introduction, procedural programming paradigm and object-oriented programming paradigm, comparison, concepts of object-oriented programming — concepts of an object and a class, interface and implementation of a class, operations on objects, relationships among objects, abstraction, encapsulation, data hiding, inheritance, overloading, polymorphism, Messaging.

Standard Input/Output: Concept of streams, hierarchy of console stream classes, input/output using overloaded operators >> and << and member functions of i/o stream classes, formatting output, formatting using ios class functions and flags, formatting using manipulators.

UNIT-II

Classes and Objects: Specifying a class, creating class objects, accessing class members, access specifiers, and static members, use of*const* keyword, friends of a class, empty classes, nested classes, local classes, abstract classes, container classes, bit fields and classes**.**

Constructors and Destructors: Need for constructors and destructors, copy constructor, dynamic constructors, explicit constructors, destructors, constructors and destructors with static members, initialize lists.

UNIT-III

Inheritance: Introduction, defining derived classes, forms of inheritance, ambiguity in multiple and multipath inheritance, virtual base class, object slicing, overriding member functions, object composition and delegation , order of execution of constructors and destructors.

Virtual Functions & Polymorphism: Concept of binding - early binding and late binding, virtual functions, pure virtual functions, abstract classes, virtual destructors.

UNIT-IV

Exception Handling: Review of traditional error handling, basics of exception handling, exception handling mechanism, throwing mechanism, catching mechanism, rethrowing an exception, specifying exceptions.

Templates and Generic Programming: Template concepts, Function templates, class templates, illustrative examples.

Files: File streams, hierarchy of file stream classes, error handling during file operations, reading/ writing of files, accessing records randomly, updating files.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**Author(S)**	**Publisher**
1	Object Oriented Programming in C++	Robert Lafore	SAMS
2	Object Oriented Programming with C++	E. Balagurusamy	Tata McGraw Hill
3	Mastering Object-Oriented Programming with C++	R. S. Salaria	Salaria Publishing House
4	The C++ Programming Language	Bjarne Stroustrup	Addison Wesley
5	The Complete Reference to C++ Language	Herbert Schildt	McGraw Hill- Osborne.
6	C++ Primer	Lippman F. B	Addison Wesley
7	Object Oriented using C++	Farrell	Cengage Learning

Course Code	**MAT205**
Course Title	**Engineering Mathematics-III**
Type of Course	BS
L T P	4 1 0
Credits	5
Course Prerequisites	Engineering Mathematics I and II
Course Objectives	This course is an introduction to a broad range of mathematical techniqu for solving problems that arise in Science and Engineering. The goal is provide a basic understanding of the derivation, analysis and use of th techniques along with a detailed understanding of Transforms engineering applications.
Course Outcomes (CO)	The learner will be able to- 1. Understand Periodic functions, Euler's formula. Even and c functions and Point of Discontinuous Function. 2. Apply the fundamental concepts of Ordinary Differential Equatic and Partial Differential Equations and the basic numerical methods their resolution. 3. Solve the problems choosing the most suitable method. 4. Understand the difficulty of solving problems analytically and need to use numerical approximations for their resolution. 5.Use computational tools to solve problems and applications of Ordi Differential Equations and Partial Differential Equations.

SYLLABUS

UNIT-I

Fourier Series: Periodic functions, Euler's formula. Even and odd functions, Point of Discontinuous Function, Change of interval half range expansions, Fourier series of different wave forms.

Fourier Transforms: Fourier Integral Theorem (statement only), Fourier Transform of a function, Fourier Sine and Cosine Integral Theorem (statement only), Fourier Cosine & Sine Transforms. Fourier, Fourier Cosine & Sine Transforms of elementary functions. Properties of Fourier Transform: Linearity, Shifting, Change of scale, Modulation. Examples, Fourier Transform of Derivatives. Examples. Convolution Theorem (statement only), Inverse of Fourier Transform, Examples**.**

UNIT-II

Laplace Transforms: Laplace transforms of various standard functions, properties of Laplace transforms, inverse Laplace transforms, transform of derivatives and integrals, Laplace transform.
of unit step function, impulse function, periodic functions applications to solution of ordinary linear differential equations with constant coefficients, and simultaneous differential equations.

UNIT-III

Partial Differential Equations: Formation of partial differential equations, Linear partial differential equations, homogeneous partial differential equations with constant coefficients Applications: Wave equation and Heat conduction equation in one dimension. Two-dimensional Laplace equation, solution by the method of separation of variables. Laplacian in polar coordinates.

UNIT-IV

Functions of Complex Variable: Limits, continuity, derivative of complex functions, analytic function, Cauchy-Riemann equation, conjugate functions, harmonic functions; Conformal Mapping: Mapping of a complex function, conformal mapping, standard transforms, mapping of standard elementary transformations, complex potential, applications to fluid flow problems;

Complex Integration: Line integrals in the complex plane, Cauchy's theorem, Cauchy's integral Formula and derivatives of analytic function. Taylor's and Laurent's expansions, singular points, poles, residue, complex integration using the method of residues, evaluation of real integrals by contour integration

RECOMMENDED BOOKS			
Sr.no.	**Name**	**Author(s)**	**Publisher**
1	Higher Engineering Mathematics (Third Edition) Vol-II	Dr.K.R.Kachot.	Mahajan Pub. House, Ahmedabad.
2	Advanced Engineering Mathematics (Fifth Edition)	Erwin Kreyszig.	John Wiley
3	Higher Engineering Mathematics	Dr.B.S.Grewal.	Khanna, New Delhi.
4	Elementary Differential Equations	W.E. Boyce and R.Diprima	John Wiley
5	Fourier Series and Boundary Value Problems	R.V.Churchill and J.W.Brown	McGraw-Hill.

Course Code	**ECE207**
Course Title	**Digital Electronics**
Type of Course	ES
L T P	3 0 0
Credits	3
Course Prerequisites	Basic knowledge of computer and its components.
Course Objectives	This subject gives the basic knowledge to analyze architectures and computational designs and synthesize new and better architectures.
Course Outcome (CO)	The learner will be able to- 1. Understand and examine the structure of various number systems and its application in digital design. 2. Analyze and design various combinational and sequential circuits. 3. Identify basic requirements for a design application and propose a cost-effective solution. 4. Identify and prevent various hazards and timing problems in a digital design. 5. Develop skill to build, and troubleshoot digital circuits

SYLLABUS

UNIT-I

Introduction: Number system (Binary, Octal, Decimal and Hexadecimal), Signed and unsigned numbers, Binary operations: Addition, Subtraction, Multiplication and Division. Subtractions using 1's and 2's compliment. Weighted & Non-weighted codes, ASCII Code, BCD Code and Gray code.

Switching Algebra: Theorems of Boolean algebra. Minimization of logic functions. Logic gates. Sum of products and product of sums. Canonical form. Minimization using K-Map and Q-M Method.

UNIT-II

Design of Combinational Circuits: Introduction, Adders, Subtractors, Multiplexers, Demultiplexers, Decoders, Encoders, Parity generators and checkers, Magnitude comparators, Code converters. Implementation of combinational circuit using MUX.

Sequential Circuits: Basic Concepts, Flip Flops: S-R, J-K, D, Master Slave J-K (Truth Tables, Circuits, and Excitation Tables), and Conversion of Flip Flops. Triggered and Clocked Flip Flops. Registers and its types. Shift Register (types, circuit diagram, timing waveforms). Counter (types, counter design with state equation, state diagrams and timing waveforms).

UNIT-III

D/A and A/D Converters: Introduction. DAC (Principle, Types and Specifications).ADC (Principle, Types and Specifications).

UNIT-IV

Memory Elements: Introduction, ROM, PROM, SRAM, DRAM and Flash Memories.

Logic Families: TTL, ECL, I^2L, NMOS, CMOS, And Comparison of Logic Families.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**Author(S)**	**Publisher**
1	Digital Design	Mano, Morris	Prentice Hall of India
2	Digital Principle and Applications	Malvino	Tata McGraw Hill
3	Modern Digital Electronics	R. P. Jain	TMH

Course Code	**ENG205**
Course Title	**Professional Communication Skills**
Type of Course	HS
L T P	3 0 0
Credits	3
Course Prerequisites	Basic knowledge of English grammar and sentence making.
Course Objectives	The course is career oriented which aims to develop and improve the English language and proficiency of students in order to gain confidence in public and professional life and strengthen the abilities and skills pertinent to success.
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, fax, acceptance and rejection letters. 3. Analyze importance of LSRW skills in communication. 1. Enhance self-esteem and personality development.

SYLLABUS

UNIT-I

Language Skills: Parts of Speech, Vocabulary, Phrase, Clause, Sentence and its types, Punctuation.

UNIT-II

Business Correspondence: Meaning of Business correspondence – Importance of Business Correspondence, Essential qualities of a business letters, types of business letters – cover letter, thank you letters, message through email and Fax. Acceptance letters, rejection letters, and withdrawal letters.

UNIT- III

Principles of communication: LSRW in communication. What is meant by LSRW Skills – Why it is important – How it is useful – How to develop the skills? Non verbal communication: Body language- Kinesics, Proxemics, Para linguistic, Chronemics Signs and symbols, Territory/Zone Oral: Speaking words, articulation and pronunciation.

UNIT- IV

Enhancing self esteem and Personality development: Self theory and the Johari window:

Characteristics of fully functioning individuals, manifestations of low and high self-esteem, techniques for enhancing self-esteem, nurturance techniques.

Comprehension Skills: Collection of Short Stories: Khushwant Singh's *The Mark of Vishnu*

RECOMMENDED BOOKS			
Sr. no.	**Name**	**Author(s)**	**Publisher**
1	Communication Skills	Loveleen Kaur	Satya Prakashan
2	A course in Communication Skills and English Grammatr	Tanu Gupta, Titiksha Mittal	Ajay Publications Yamuna Nagar
3	Business Communication	Varinder Kumar, Bodh Raj	Kalyani Publishers

Course Code	**CSE205**
Course Title	IT Workshop
Type of Course	PC
L T P	1 0 0
Credits	1
Course Prerequisites	Nil
Course Objectives	1. Become familiar with additional MATLAB functions and looping/conditional statements 2. Learn how to create and use MATLAB m files. 3. Learn how to write and use MATLAB functions. 4. Use the MATLAB help facility, do simple (but large) calculations and print out graphs.
Course Outcome (CO)	The learner will be able to- 1. Understand functions, loops and statements used in Matlab. 2. Use **MATLAB** effectively to analyze and visualize data. 3. Demonstrate understanding and use of fundamental data structures

SYLLABUS

UNIT-I

Introduction to Matlab: Matlab as {best} calculator, Standard Matlab windows, Operations with variables- Naming, Checking existence, Clearing, Operations. Familiarize Command Window, History, Workspace, Current Directory, Figure window, Edit window, Shortcuts, Help files

Arrays: Columns and rows: creation and indexing, Size & length, Multiplication, division, Power, Operations.

Control Structures: For loops, While, If control structures, Switch, Break, Continue statements

UNIT-II

Data and data flow in Matlab: Data types- Data types, Constants and Variables, Character constants, operators, Assignment statements. Matrix, string, cell and structure, Creating, accessing elements and manipulating of data of different types. File Input-Output Functions.

UNIT-III

Function minimization and parameters search- Polynomial fit- 1D and 2D fits, Polynomial Evaluation, Roots of Polynomial, Arithmetic operations on Polynomials. Data windowing, Error bounds
Arbitrary function fit- Error function, fixing parameters, Goodness of fit- 2 criteria, Error in parameters.

UNIT-IV

Graphics- 2D plots, Printing labels, Grid & Axes box, Text in plot, Bar and Pie chart. Pre-defined dialogs, Handle graphics, Graphics objects, Properties of objects, Modifying properties of graphics objects.

RECOMMENDED BOOKS.

. Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	MATLAB and its Applications in Engineering	Bansal , Goel and Sharma.	Pearson Education
2	MATLAB-An Introduction with Applications	Amos Gilat	Wiley India

Course Code	**CSE207**
Course Title	**Introduction to Data Structures Laboratory**
Type of Course	PC
L T P	0 0 2
Credits	1
Course Prerequisites	Knowledge of C++ Programming Language
Course Objectives	Allows the students to understand the implementation of data structures.
Course Outcome (CO)	The learner will be able to- 1. Design and analyze the time and space efficiency of the data structure 2. Identity the appropriate data structure for given problem · 3. Gain practical knowledge on the applications of data structures

SYLLABUS

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 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 demonstration the implementation of various operations on a linear queue represented using a linear array.

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

3.4 : Program to demonstration 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.

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

Course Code	**CSE209**
Course Title	**Object Oriented Programming Systems Laboratory**
Type of Course	**PC**
L T P	**0 0 2**
Credits	**1**
Course Prerequisites	**Fundamentals of C language and Knowledge of computer**
Course Objectives	**This course is to help the students to give the practical implementation of the C++ programs**
Course Outcome (CO)	**The learner will be able to-** 1. Design a program using member function in and out of the class. 2. Write a program to demonstrate use of Constructors and Destructors. 3. Implement operator overloading through C++ programming 1. Demonstrate Inheritance and polymorphism in real world problems using C++

List of Practical

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 the multilevel inheritance.
5.2: Write a program to demonstrate the 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 the 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.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**Author(S)**	**Publisher**
1	Object Oriented Programming in C++	Lafore R.	Waite Group
2	Object Oriented Programming with C++	E. Balagurusamy	Tata McGraw Hill
3	Mastering Object-Oriented Programming with C++	R. S. Salaria	Salaria Publishing House

Course Code	**ECE211-19**
Course Title	**Digital Electronics Lab**
Type of Course	ES
L T P	0 0 2
Credits	1
Course Prerequisites	Basic knowledge of Electric circuits, Logic design
Course Objective	This course work is to help the students to give the practical implementation of the various digital electronics circuits.
Course Outcome (CO)	The learner will be able to- 1. Study and understand truth table 2. Design and Verify Adder and Subtractor 3. Implement encode and decoder using logic gates. 4. Verify flip flops: RS, JK, D and T.

SYLLABUS

1. To study and verify the truth table of various logic gates (NOT, AND, OR, NAND, NOR, EX-OR).
2. To design and verify the operation of Half Adder and Full Adder.
3. To design and verify the operation of Half Subtractor and Full Subtractor.
4. Design a 4-bit binary to gray and gray to binary code convertor.
5. Design a 4-bit magnitude comparator using logic gates.
6. Truth table verification of Multiplexer (MUX).
7. Truth table verification of De-Multiplexer (DE-MUX).
8. Implementation and Verification of Encoder and Decoder using Logic Gates.
9. Truth table verification of flip-flops: RS, JK, D & T FLIP FLOPS.
10. Shift registers: study of SISO, SIPO, PISO, PIPO shift registers.

RECOMMENDED BOOKS

Sr. no.	Name	Author(S)	Publisher
1	Lab Manual for Digital Electronics: A Practical Approach	Vance Venable , Michael Wiesner	Prentice Hall
2	Digital Electronics	Green	Pearson Education India
3	Lab Experiments--Digital Electronics, a Practical Approach	Vance Venable , Michael Wiesner	Prentice Hall

Course Code	**CSE211**
Course Title	IT Workshop Lab
Type of Course	PC
L T P	0 0 4
Credits	2
Course Prerequisites	Basic programming
Course Objectives	1. Become familiar with additional MATLAB functions and looping/ conditional statements 2. Learn how to create and use MATLAB m files. 3. Learn how to write and use MATLAB functions. At the end of the workshop student will be able to use the MATLAB help facility, do simple (but large) calculations and print out graphs.
Course Outcome (CO)	The learner will be able to- 1. Understand MATLAB functions, loops and statements 2. Analyze input and output functions, for reading and writing data 3. Implement arithmetic operations on Matrices.

SYLLABUS

List of Practical's

1. Practicing MATLAB environment with simple exercises to familiarize Command Window, History, Workspace, Current Directory, Figure window, Edit window, Shortcuts, Help files.
2. Data types, Constants and Variables, Character constants, operators, Assignment statements.
3. Control Structures: For loops, While, If control structures, Switch, Break, Continue statements.
4. Input-Output functions, Reading and Storing Data.
5. Vectors and Matrices, commands to operate on vectors and matrices, matrix Manipulations.
6. Arithmetic operations on Matrices, Relational operations on Matrices, Logical operations on Matrices.
7. Polynomial Evaluation, Roots of Polynomial, Arithmetic operations on Polynomials.
8. Graphics: 2D plots, Printing labels, Grid & Axes box, Text in plot, Bar and Pie chart.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	MATLAB and its Applications in Engineering	Bansal , Goel and Sharma.	Pearson Education
2	MATLAB-An Introduction with Applications	Amos Gilat	Wiley India

Fourth Semester

CourseCode	**MAT212**
Course Title	**Discrete Structures**
Type of Course	PC
L T P	4 0 0
Credits	4
Course Prerequisites	Basic Mathematics
Course Objectives	Mathematics is really a great tool to understand the things correctly. The aim of the course is to enable students: (1) To understand the theory knowledge as well as practical knowledge of different formulas. (2) To inculcate the skills to use different methods to solve the applied problems. (3) To check the accuracy of every formula by using different strategies. (4) To give them a sound foundation that eventually will help them in their coming technical futures.
Course Outcome (CO)	The learner will be able to- 1. Apply mathematical induction and other techniques to prove mathematical results. 2. Examine the logical validity of arguments and proofs as they apply to Boolean expressions. 3. Illustrate the basic terminology and properties of graphs and trees. 4. Perform binary and hexadecimal conversions of numbers. 5. Perform computations using recursively defined functions and structures.

SYLLABUS

UNIT-I

Graph theory: Graph- Directed and undirected, Eulerian chains and cycles, Hamiltonian chains and cycles, Trees, Chromatic number Connectivity, Graph coloring, Plane and connected graphs, Isomorphism and Homomorphism. Applications.

UNIT-II

Sets and functions: Introduction, Combination of Sets, ordered pairs, proofs of general identities of sets, relations, operations on relations, properties of relations and functions, Hashing Functions, equivalence relations, compatibility relations, and partial order relations.

Monoids and groups: Groups Semigroups and monoids Cyclic semigraphs and submonoids, Subgroups and Cosets, Congruence relations on semigroups, Morphisms. Normal subgroups, Structure of cyclic groups.

UNIT-III

Boolean algebra: Boolean algebra, direct product, morphisms Boolean, sub-algebra Boolean Rings Application of Boolean algebra (Logic Implications, Logic Gates, Karnaughmap).

UNIT-IV

Probability: Sample spaces, events and probability functions, Examples using counting methods, sampling with and without replacement, Algebra of events, Conditional probability, partitions of sample space theorem of total probability. Bayes theorem, independence, Random variables, Probability mass functions. Discrete distributions, Bernoulli binomial, Poison, geometric Expectation mean and variance independence for discrete random variables.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**Author(S)**	**Publisher**
1	Discrete Mathematics	Schaum series by Lipschutz	McGraw Hill
2	Applied Discrete Structures for Computer Science	Alan Doerr and Kenneth Levarseur.	Science Research Associates
3	Discrete Mathematics	N Ch SN Iyengar, VM Chandrasekaran.	Vikas Publishing
4	Discrete Mathematics and Graph Theory	Sartha	Cengage Learning
5	Discrete Mathematics and its Applications.	Kenneth H Rosen	McGraw Hill

CourseCode	**CSE204**
Course Title	**Computer Organization and Design**
Type of Course	PC
L T P	3 0 0
Credits	3
Course Prerequisites	Basic knowledge of computer and its components.
Course Objectives	This subject gives the basic knowledge to analyse architectures and computational designs and synthesize new and better architectures.
Course Outcome (CO)	The learner will be able to- 1. Describe basic organization of computer and the architecture of 8086 microprocessor. 2. Implement assembly language program for given task for 8086 microprocessors. 3. Demonstrate control unit operations and conceptualize instruction level parallelism. 4. Demonstrate and perform computer arithmetic operations on integer and real numbers. 1. Categorize memory organization and explain the function of each element of a memory hierarchy

SYLLABUS

UNIT-I

Introduction: Introduction to computer system and its sub-modules, Number System and Representation of information.

Register Transfer and Micro operations: Register transfer language & operations, arithmetic micro operations, logic micro operations, shift micro operations, arithmetic logic shift unit. Design of a complete basic computer and it's working.

UNIT-II

Basic Computer Organisation and Design: Instruction codes, Computer registers, Computer Instructions, Timing and control, Instruction Cycle, Memory reference instructions, Input/ Output and Interrupt, Design of basic Computer, Design of Accumulator Logic.

Design of Control Unit: Control memory, Hardwired control CPU design, Micro-programmed control CPU design and their comparative study.

UNIT-III

Central Processing Unit: General Register Organisation, Stack Organisation, Instruction formats, Addressing Modes, Data transfer and manipulations, Program control, RISC and CISC architecture.

Input-Output Organisation: Peripheral devices, I/O Interface, asynchronous data transfer, modes of transfer, priority interrupt, DMA, I/O processor, serial communication.

Memory Organisation: Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory, memory management hardware.

UNIT-IV

Pipelining: Introduction to pipelining and pipeline hazards, design issues of pipeline architecture.

Introduction to Parallel Processing: Inter-process or communication & synchronization. Cache in multiprocessor systems and related problems, Cache coherence protocols.

RECOMMENDED BOOKS

Sr. no.	**Name**	**Author(S)**	**Publisher**
1	Advanced Computer Architecture	Kai Hawang	Tata McGraw Hill
2	Computer Organization and Design	P. PalChoudhary	PHI
3	Computer System Architecture	M.Moris Mano	Pearson
4	Computer Organization and Architecture	William Stallings	Pearson

CourseCode	**CSE206**
Course Title	**Operating Systems**
Type of Course	PC
L T P	3 0 0
Credits	3
Course Prerequisites	Overview of Computer Architecture
Course Objectives	This course provides the knowledge about the role of an operating system, issues in the management of resources like processor, memory and input-output, design of an operating system.
Course Outcome (CO)	The learner will be able to- 1. Describe the important computer system resources and the role of operating system in their management policies and algorithms. 2. Understand the process management policies and scheduling of processes by CPU 3. Evaluate the requirement for process synchronization and coordination handled by operating system 4. Describe and analyze the memory management and its allocation policies.

SYLLABUS

UNIT-I

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

UNIT-II

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

Process Management: Process states, Process Scheduling, Process hierarchy, Threads, Threading issues, Multi-threading models, Non-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 Systems Concepts	A Silberschatz, P.B. Galvin, G. Gagne	John Wiley Publications
2	Operating Systems: A Modern Perspective	G. Nutt	Pearson Education
3	Modern Operating Systems	A.S. Tanenbaum	Pearson Education

Course Code	**CSE208**
Course Title	**Database Design and Management**
Type of Course	PC
L T P	3 0 0
Credits	3
Course Prerequisites	Elementary knowledge about computers including some experience using Windows. Basic knowledge about programming in some common programming language.
Course Objectives	This subject assesses new developments in database technology. It Interpret and explain the impact of emerging database standards and Evaluate the contribution of database theory to practical implementations of database management systems
Course Outcome (CO)	The learner will be able to- 1. Understand and analyze the features of database management systems and Relational database. 2. Design database model using ER modeling for real life applications and also construct queries in Relational Algebra. 3. Implement real world problems using the concept of relational database management system, constraints and keys. 4. Evaluate and formulate complex queries in SQL. 5. Consider the concept of locking, concurrency control and security issues during implementation of database.

SYLLABUS

UNIT-I

Introduction to Databases and Transactions: database system, purpose of database system, File based 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 database Model: Logical view of data, keys, integrity rules. Relational Database design: features of good relational database design, atomic domain and Normalization.

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, computational capabilities.

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, nested sub queries, Joined relations.

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, Introduction to Statistical Database Security.

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

RECOMMENDED BOOKS			
Sr. no.	**Name**	**Author(S)**	**Publisher**
1	Fundamentals of Database Systems, Third Edition	Elmasri/Navathe	Addison Wesley
2	Database Concepts	Korth and Silberschatz Abraham	McGraw Hall
3	An introduction to Database Systems	C.J.Date.	Addison Wesley
4	An introduction to Database Systems	Bipin C. Desai.	West Publishing
5	SQL,PL/SQL ,The programming language of oracle	Ivan Bayross	BPB Publication

Course Code	**EVS101**
Course Title	Environmental Science
Type of course	MC
L T P	3 0 0
Credits	NC
Course prerequisite	Nil
Course Objective	To make students aware about environment and need of maintaining it with best possible knowledge.
Course Outcome (CO)	The learner will be able to- CO1: Acquire fundamental knowledge of different aspects of environment and local, regional and global environmental problems. CO2: Develop environmental monitoring skills, including conduct of experiments and data analysis. CO3: Obtain exposure to the environmental pollution control technologies. CO4: Acquire the knowledge and skills needed for the environmental design and management. CO5: Acquire skills in the preparation, planning and implementation of environmental projects.

SYLLABUS

UNIT-I

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

UNIT-II

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

UNIT-III

Social Issues and the Environment :From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns. Case studies. Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies. Wasteland reclamation. Consumerism and waste products. Environment Protection

Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of pollution) Act. Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation

UNIT-IV

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

Case studies

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

RECOMMENDED BOOKS

S. No	Name	Author(S)	Publisher
1	A Textbook for Environmental Studies	Erach Bharucha	Orient BlackSwan
2	Environmental Biology,	Agarwal, K.C. 2001	Nidi Publ. Ltd. Bikaner.
3	Environmental Science,	Miller T.G. Jr.	Wadsworth

Course Code	**ECE212**
Course Title	**Microprocessor**
Type of Course	ES
L T P	4 0 0
Credits	4
Course Prerequisites	Digital Electronics
Course Objectives	To introduce the students with the basics of microprocessor and its needs, develop the capability to write assembly language programs and understand how the hardware and software components of microprocessor work together to develop microprocessor based system.
Course Outcome (CO)	The learner will be able to- 1. Describe the Intel 8085/8086 architecture with explanation of internal organization of some popular microprocessors. 2. Construction of a maintainable assembly language program for an algorithm. 3. Conclude the Intel 8085/8086 real mode memory addressing. 4. Describe the functioning of different peripheral ICs

SYLLABUS

UNIT-I

8085 Microprocessor: Introduction to Microprocessor, Difference between Microprocessor and CPU, Evolution & history of microprocessors, application areas of microprocessors, 8085 architecture, pin diagram, demultiplexing of address and data bus, addressing modes, 8085 instruction set, programming of 8085, stack and subroutines, interrupts of 8085.

UNIT-II

8086 Microprocessor: 8086 internal architecture, 8086 pin configuration and timing, memory segmentation, minimum and maximum mode configuration, interrupts, instruction set of 8086, programming of 8086

UNIT-III

Microprocessor system peripheral and interface : Introduction to interfacing, memory mapped I/O and I/O mapped I/O, block diagram and modes of operation of interfacing devices like 8255,8254,8259,USART .

UNIT-IV

Microprocessor applications: Interfacing of single and multiple digit seven-segment LED output display.

Interfacing of DAC & ADC. Applications like Temperature measurement and control system.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**Author(S)**	**Publisher**
1	Microprocessor Architecture, Programming and Applications with the 8085	Ramesh S. Gaonkar	Penram International
2	Advanced Microprocessors interfacing	Badri Ram	Tata MC Graw Hill
3	Microprocessor Principles and Applications	Charles M. Gilmore	Tata MC Graw Hill
4	Microprocessors and Interfacing programming and Hardware	Douglas V. Hall	Tata MC Graw Hill

CourseCode	**CSE210**
Course Title	**Operating System Lab**
Type of Course	PC
L T P	0 0 2
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- (CO)	The learner will be able to- 1. Understand and execute basic commands of shell script. 2. Apply basic operations in shell scripts which are required for different applications. 3. Identify and understand concept of file systems in shell script 4. Apply concept of creating new process from parent process.

SYLLABUS

List of Practicals

1.Simulation of the CPU scheduling algorithms:

a) Round Robin

b) SJF

c) FCFS

d) Priority

2. Simulation of continuous memory management allocation techniques :

a) First Fit

b)Best Fit

c) Worst Fit

3. Simulation of page Replacement Algorithms:

a) FIFO

b) LRU

c) OPT

4. Simulation of file allocation Strategies:

a) Sequential

b) Indexed

c) Linked

5. Simulation of file organization techniques:

a) Single Level Directory

b) Two Level

6: Unix Commands

6.Reading from a file, Writing into a file , File Creation

RECOMMENDED BOOKS			
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	Mark G. Sobell	Pearson Education
3	A Practical Guide to UNIX System V Release 4	M. G. Sobell	Benjamin/Cummings Publishing Company
4	100 Shell Programs in Unix	Sarika Jain	Pinnacle Technology

Course Code	**CSE212**
Course Title	**Database Design and Management Lab**
Type of Course	PC
L T P	0 0 2
Credits	1
Course Prerequisites	Knowledge of Program Development Constructs
Course Objectives (CO)	This practical course work allows the students to efficiently design a working software model.
Course Outcome (CO)	The learner will be able to- 1. Understand, appreciate and effectively explain the underlying concepts of database technologies 2. Design and implement a database schema for a given problem-domain 3. Normalize a database 4. Populate and query a database using SQL DML/DDL commands. 5. Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS 6. Programming PL/SQL including stored procedures, stored functions, cursors, packages. 7. Design and build a GUI application using a 4GL

SYLLABUS

List of Practical's

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 function- 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 grants and revoke commands, commit and rollback commands.

5.2 : program to write a pl/sql block which inserts a record in the table and applies rollback and commit in it.

6: Joins And Sequences

6.1 : program to illustrate use of join.

6.2 : program to illustrate use of sequence.

7: View And Indexes

7.1: create a view.

7.2: create an index.

8: Introduction To PL/SQL

8.1 : introduction to PL/SQL, basic code structure, difference b/w SQL and PL/SQL

8.2: study PL/SQL control structure

- Conditional control-if and case statements
- Iterative control-loop and exit statements
- Sequential control-goto and null statements

9: Programs

- Program to find greatest of two numbers
- Program to find greatest of three numbers
- Program to perform addition, subtraction, multiplication, division according to user's choice
- Program to print first n natural numbers.
- Program to print first n natural numbers using for loop.
- Program to print table of a number entered by user
- Program to show the use of goto statement

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RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	DBMS – Complete Practical Approach	Sharad Maheshwari, Ruchin Jain	Firewall Media
2	Database Systems: A Practical Approach To Design, Implementation And Management	Connolly	Pearson Education India
3	Fundamentals of Database Systems	Ramez Elmasri	Pearson Education India

Course Code	**ECE214**
Course Title	Microprocessor Laboratory
Type of Course	ES
L T P	0 0 2
Credits	1
Course Prerequisites	Familiar with Binary Code and mnemonic code in microprocessor
Course Objectives	Introduce to the students to assembly language and functioning of microprocessors
Course Outcome (CO)	Then learner will be able to CO1: Study 8085, 8086 CO2: Perform operations on numbers CO3: Analyze and Predict the largest 8 bit number CO4: Evaluate results of various of 8 bit and 6 bit operations

SYLLABUS

List of Practical

1. Introduction to 8085 kit.

2. Addition of two 8 bit numbers, sum 8 bit.

3. Subtraction of two 8 bit numbers.

4. Find 1's complement of 8 bit number.

5. Find 2's complement of 8 bit number.

6. Shift an 8 bit no. by one bit.

7. Find Largest of two 8 bit numbers.

8. Find Largest among an array of ten numbers (8 bit).

9. Sum of series of 8 bit numbers.

10. Introduction to 8086 kit.

11. Addition of two 16 bit numbers, sum 16 bit.

12. Subtraction of two 16 bit numbers.

13. Find 1's complement of 16 bit number.

14. Find 2's complement of 16 bit number.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	8085 Microprocessor	Ramesh Gaonkar	PHI Publications
2	Microprocessors and Interfacing: Programming and Hardware	Douglas V. Hall	Tata McGraw Hill Edition,1986
3	Microprocessors: Principles and Applications	Charles M.Gilmore	McGraw Hill
4	The 8086 Microprocessor Programming and Interfacing	Ayala Kenneth	Cengage Learning
5	Microprocessor, Architecture, Programming, & Applications with the 8085	Ramesh Gaonkar	Penram Intl. Publishing (India) Pvt.

Fifth Semester

Course Code	**CSE301**
Course Title	**Principles of Software Engineering and Design**
Type of Course	PC
L T P	3 0 0
Credits	3
Course Prerequisites	Overview of Structure and Software Analysis and Design
Course Objectives	This Course Work provides the thorough understanding of the software engineering concepts and it also gives the ideas of handling the projects in the organizations and in institutes
Course Outcome (CO)	The learner will be able to- 1. Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics 2. Communicate effectively with a range of audiences 3. Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors 1. 4. Analyze, design, verify, validate, implement, apply, and maintain software systems

SYLLABUS

UNIT-I

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

Software Development Life-cycle: 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

System Design: Problem partitioning, abstraction, top-down and bottom-up design, Structured approach. Functional versus object-oriented approach, design specification and verification metrics, monitoring and control, UML.

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 plane, 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	**CSE303**
Course Title	**Design and Analysis of Algorithms**
Type of Course	PC
L T P	3 1 0
Credits	3
Course Prerequisites	Data Structures, C, C++ Programming language
Course Objectives (CO)	This course provides the ability to understanding the computational problem. To be able to devise fast and practical algorithms for real- life problems using the algorithm design techniques and principles learned in this course.
Course Outcome (CO)	The learner will be able to- CO1: Analyze worst-case running times of algorithms using asymptotic analysis. CO2: Pick an appropriate data structure for a design situation. CO3: Explain what an approximation algorithm is, and the benefit of using approximation algorithms. Be familiar with some approximation algorithms, including algorithms that are PTAS or FPTAS. Analyze the approximation factor of an algorithm. CO4: Analyze randomized algorithms. Employ indicator random variables and linearity of expectation to perform the analyses. Recite analyses of algorithms that employ this method of analysis.

SYLLABUS

UNIT-I

Introduction: Introduction to algorithm. Review of elementary data structures, Time and space complexity of an algorithm. Performance Analysis. Different orders of growth. Asymptotic notations. Polynomial and Exponential running time of an algorithm. Recurrence relations, Concept of hashing. MAXMIN algorithms.

Algorithm Design Techniques: Divide-and-conquer, Sorting, Median Finding, Greedy approach, Randomization, and Dynamic Programming, Branch and Bound, Backtracking. Knapsack problems and algorithms illustrating the use of these techniques.

UNIT-II

Sorting and Searching: Binary search in an ordered array. Sorting algorithms such as Merge sort, Quick sort, Heap sort, Radix Sort, and Bubble sort with analysis of their running times. Lower bound on sorting. Median and order statistics.

Graph: Graph traversal algorithms: breadth-first search (BFS) and depth-first search (DFS). Applications of BFS and DFS. Topological sort. Shortest path algorithms in graph: Dijkstra and Bellman-Ford. Minimum spanning trees, Travelling salesman problem, Kruskal's algorithm, Prim's algorithm, single source shortest paths, Relaxation, Floyd-Warshall algorithm, Johnsons algorithm.

UNIT-III

NP-Completeness: Definition of class NP. NP-hard and NP-complete problems. SAT, 3SAT is NP-complete. Proving a problem to be NP-complete using polynomial-time reductions. Examples of NP-complete problems. Approximation algorithms for various NP-complete problems.

UNIT-IV

Pattern Matching Algorithms: Knuth-Morris-Pratt algorithm. Algorithms in Computational Geometry: Convex hulls. Fast Fourier Transform (FFT) and its applications. Integer and polynomial arithmetic. Matrix multiplication: Strassen's algorithm.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**Author(s)**	**Publisher**
1	Design and Analysis of Algorithms	Sartaj Sahni	Silicon PR.
2	Let Us C	Yashwant Kanitkar	BPB Publications
3	Object Oriented Programming Using C++	E.Balagurusamy	Tata McGraw Hill Education

Course Code	**CSE305**
Course Title	**Computer Graphics**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Computer graphics(basics), linear algebra, programming
Course Objectives	The main objective of this course is to give the student a comprehensive understanding of computer graphics and its applications. In particular participants will have the ability to understand the process of generating virtual images from virtual scenes, typically identified as a pipeline of generate, compute andstore/display.
Course Outcome (CO)	The learner will be able to- 1. Understand the fundamental graphical operations and the implementation on computer. 2. Get a glimpse of recent advances in computer graphics. 3. Describe user interface issues that make the computer easy for the novice to use. 4. Discuss interface issues that make the computer easy for the no vice to use.

SYLLABUS

UNIT-I

Introduction: Computer Graphics and its applications, Elements of a Graphics, Graphics Systems: Video Display Devices, Raster Scan Systems, Random Scan Systems, Input devices. Basic Raster Graphics: Scan conversion-Point plot technique, Line drawing, Circle Generating and Ellipse generating algorithms.

UNIT-II

Two-dimensional Geometric Transformations: Basic Transformations-Translation, Rotation and Scaling, Matrix Representationand Homogeneous Coordinates, Composite transformation, Clipping Operations- Point Clipping, Line Clipping, Polygon Clipping andTextClipping.

UNIT-III

Filling Techniques: Scan line algorithms, Boundary-fill algorithm, Flood-fill algorithm, Edgefill and fence fill algorithms, 6. Elementary 3D Graphics: Plane projections and its types,Vanishingpoints,Specification ofa3D view.

UNIT-IV

Visibility: Image and object precision, Hidden edge/surface removal or visible edge/surface determination techniques; zbufferalgorithms

RECOMMENDEDBOOKS

Sr.no.	Name	Author(s)	Publisher
1	Computer Graphics	Donald Hearn and Pauline Baker	PHI/Pearson Education
2	Computer Graphics	Zhigandxiang, RoyPlastock, Schaum'soutlines	Tata McGraw hill edition SAMS
3	Computer Graphics using OpenGL	F. S. Hill Jr. and S.M. Kelley	Prentice Hall
4	Computer Graphics (firstedition)	Peter Shirley and SteveMarschner	A.K.Peters

Course Code	**SSC303**
Course Title	**Human Values and Professional Ethics**
Type of Course	HS
L T P	3 0 0
Credits	3
Course Prerequisites	Nil
Course Objectives (CO)	1. To help the students to discriminate between valuable and superficial in the life. 2. To help students develop sensitivity and awareness; leading to commitment and courage to act on their own belief. 3. This Course will encourage the students to discover what they consider valuable. Accordingly, they should be able to discriminate between valuable and the superficial in real situations in their life. This course is an effort to fulfil our responsibility to provide our students significant input about understanding
Course Outcome (CO)	The learner will be able to- 1. Understand the significance of value inputs in a classroom and start applying them in their life and profession. 2. Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body etc. 3. Understand the value of harmonious relationship based on trust and respect in their life and profession. 4. Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

SYLLABUS

UNIT-I

Course Introduction- Need, Basic Guidelines, Content and Process for Value Education : Understanding the need, basic guidelines, content and process for Value Education, Understanding Happiness and Prosperity correctly.

Understanding Harmony in the Human Being : Understanding the harmony with self and the Body: Sanyam and Swasthya.

UNIT-II

Harmony in Human Relationship: Understanding harmony in the Family- the basic unit of human

interaction, visualizing a universal harmonious order in society

U n d e r s t a n d i n g Harmony in the Nature and Existence: Understanding the harmony in the Nature, Holistic perception of harmony at all levels of existence

UNIT-III

Understanding of Harmony on Professional Ethics: Ability to utilize the professional competence for augmenting universal human order, Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems.

UNIT-IV

Strategy for transition from the present state to Universal Human Order: At the level of individual,

at the level of society.

Case studies: Typical Holistic Technologies, Management models and production systems

RECOMMENDED BOOKS			
Sr. no.	**Name**	**Author(s)**	**Publisher**
1	A Foundation Course in Value Education	R R Gaur, R Sangal, G P Bagaria	Excel Books Publishers
2	Energy & Equity	Ivan Illich	The Trinity Press, Worcester, and HarperCollins, USA
3	Human Values and Professional Ethics	Rishabh Anand	Satya Prakashan, New Delhi
4	Jeevan Vidya ek Parichay.	A Nagraj	Divya Path Sansthan, Amarkantak

Course Code	**PLS303**
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 them about roots of Indian constitution and its relevance in present scenario. 5. To acquaint the learners with various posts and procedure for election.
Course Outcome (CO)	The learner will be able to- 1. Study and understand the basics of Indian Constitutions 2. Aware the learners about the duties of Citizens. 3. Acquaint the learners with political vocabulary. 4. Aware about roots of Indian constitution and its relevance in present scenario.

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			
Sr. 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, New Delhi.

Course Code	**CSE307**
Course Title	**Principles of Software Engineering and Design Laboratory**
Type of Course	PC
L T P	0 0 2
Credits	1
Course Prerequisites	Knowledge of Program Development Constructs
Course Objectives	This practical course work allows the students to efficiently design a working software model.
Course outcome (CO)	The learner will be able to- 1. Develop software comprising all phases of SDLC. 2. Perform software testing using test cases. 3. Implement real world applications using various software paradigms. 4. Perform software testing using test cases.

SYLLABUS

1: 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.

2: UML Diagrams

2.1: Identify the business activities and develop an UML Activity diagram.

2.2: Identity the conceptual classes and develop a domain model with UML Class diagram.

2.3: Using the identified scenarios find the interaction between objects and represent them using UML Interaction diagrams.

2.4 : Draw the State Chart diagram.

2.5 : Identify the User Interface, Domain objects, and Technical services. Draw the partial layered, logical architecture diagram with UML package diagram notation.

3: Implementations of Layers

3.1: Implement the Technical services layer.
3.2: Implement the Domain objects layer.
3.3: Implement the User Interface layer.
3.4: Draw Component and Deployment diagrams.

4: Mini- Projects Using UML

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

Course Code	**CSE309**
Course Title	**Design and Analysis of Algorithms Lab**
Type of Course	PC
L T P	0 0 4
Credits	2
Course Prerequisites	Knowledge of C++ Programming Language Concepts
Course Objectives	Makes the students proficient in implementing algorithms using the algorithm design techniques.
Course outcome	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 the efficient algorithms for the new problem with suitable designing techniques.

SYLLABUS

1. **Array**

1.1 : WAP. Two code and analyze to compute greatest common divisor of two numbers.

1.2: WAP two code and analyze to find the mid element in an array.

1.3: WAP. To code to analyze to find maximum and minimum element (without MAXMIN algorithm) in array.

1.4 : WAP. To code and analyze to find the largest element in an array.

1.5: WAP. To code to 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 short an array of integer using HEAP Sort.

3.2: WAP. To code and analyze to short an array of integer using Merge Sort. **4: Pattern Matching**

4.1: WAP. To code and array analyze to find all occurrence of pattern in a given 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 characters 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 S Skiena	Springer Science & Business Media
2	Object Oriented Programming with C++	Balagurusamy	Tata McGraw-Hill Education
3	Object Oriented Programming Using C++	Jaspreet Singh, Mrs. Pinki Parampreet Kaur	Technical Publications

CourseCode	**CSE311**
CourseTitle	**Industrial Training (undertaken after 4th semester)**
TypeofCourse	Proj/Trg
L T P	0 0 6
Credits	3
Course Prerequisites	Basic knowledge of softwares
Course Objectives	To get hands on skills in developing real time projects and able to work in coordination
Course Outcome (CO)	1. Able to develop team spirit 2. Develop projects in given deadline 3. Get employed by attaining market relevant skills

The student will undertake 4 weeks of training after 4th semester, during vacations and project evaluation will be done in 5th semester via project reports, project presentations and viva -voce.

CourseCode	**CSE313**
Course Title	**Mobile Application Development**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Students are expected to have basic knowledge of JAVA, HTML, JavaScript and CSS
Course Objectives	Students will learn the basics of the programming language, designing mobile interfaces, using libraries t o 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

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 Wifi, Integration with social media applications.

UNIT-IV

Technology II - iOS
Introduction to Objective C ,iOS features , UI implementation , Touch frameworks , Data ersistence using Core Data and SQLite , Location aware applications using Core Location and Map Kit , Integrating calendar and address book with social media application , Using Wifi iPhone marketplace.

Mobile Device Security
Mobile malware, Device protections, iOS "Jailbreaking", Android "rooting" and Windows' "defenestration".

RECOMMENDED BOOKS

Sr. no.	Name	Author(s)	Publisher
1	Professional Mobile Application Development	Jeff McWherter and Scott Gowell	Wrox
2	Android in Practice	Charlie Collins, Michael Galpin and Matthias Kappler	DreamTech
3	Beginning iOS 6 Development: Exploring the iOS SDK	David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson	Apress

CourseCode	**CSE315**
Course Title	Programming in Java
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Knowledge of OOPs
Course Objectives	1. Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc. 2. Be aware of the important topics and principles of software development. 3. Be able to use the Java SDK environment to create, debug and run simple Java programs. 4. Understand the principles of inheritance, packages and interfaces
Course Outcome	The learner will be able to- 1. Use an integrated development environment to write, compile, run, and test simple object- oriented Java programs. 2. Read and make elementary modifications to Java programs that solve real-world problems. 3. Validate input in a Java program. 4. Identify and fix defects and common security issues in code.

SYLLABUS

UNIT-I

Object oriented programming concepts, objects, classes, methods and messages, abstraction and encapsulation, inheritance, abstract classes, polymorphism, Objects and classes in Java, defining classes, methods, access specifiers, static members, constructors, finalize method.

UNIT-II

Arrays, Strings, Packages, Java-Doc comments, Inheritance, class hierarchy, polymorphism, dynamic binding, final keyword, abstract classes

UNIT-III

The Object class, Reflection, interfaces, object cloning, inner classes, proxies, I/O Streams, Graphics programming, Frame, Components, working with 2D shapes.

UNIT-IV

Basics of event handling, event handlers, adapter classes, actions, mouse events – AWT event hierarchy, introduction to Swing, Model-View-Controller design pattern – buttons, layout management,

Swing Components, exception handling, exception hierarchy, throwing and catching exceptions.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Core Java: Volume I – Fundamentals	Cay S. Horstmann and Gary Cornell.	Sun Microsystems Press
2	The JAVA programming language	K. Arnold and J. Gosling	Pearson Education

CourseCode	**CSE347**
Course Title	**Introduction to Internet of Things**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	This course has no prerequisite other than basic knowledge of internet And its protocols
Course Objectives	The main objective of this course is to provide learner with the Knowledge of IoT, its design, various aspects of network and communication. It also helps the learner to understand various tools and challenges involved in IoT design.
Course Outcome (CO)	At the end ofthe 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 designof IoT, Functional blocks of IoT, Communication models & APIs

UNIT-II

IoT and M2M Machine to Machine, Difference between IoT and M2M, Software define Network, Network & 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 systemplatform, ImplementingIoTconcepts with python

RECOMMENDEDBOOKS

Sr.no.	Name	AUTHOR(S)	PUBLISHER
1	Designing the Internet of things	AdrianMcEwenand HakimCassimally	Amazon
2	The Internet of Things – The Next Industrial Revolution Has Begun: How IoT, big data, predictive analytics, machine learning and AI will change our lives forever	MagnusUnemyr	Potscapes.com

Course Code	**CSE371**
CourseTitle	**Artificial Intelligence**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Nil
Course Objectives	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. 3To familiarize with knowledge processing in expert systems.
Course Outcome(CO)	The learner will be able to- 1. Understand the informed and uninformed problem types and apply search strategies to solve them. 2. Apply difficult real life problems in a state space representation so as to solve them using AI techniques like searching and game playing. 3. Design and evaluate intelligent expert models for perception and Prediction from intelligent environment.

SYLLABUS

UNIT-I

Introduction: Meaning and definition of artificial intelligence, Physical Symbol System Hypothesis, production systems, Characteristics of production systems; Breadth first search and depth first searchtechniques. Heuristic search Techniques: Hill Climbing, Iterative deepening DFS, bidirectional search. Analysis of search methods. A*algorithm, and their analysis. Introduction to GeneticAlgorithms.

UNIT-II

Knowledge Representation, Problems in representing knowledge, knowledge representation using propositional and predicate logic, logical consequences, syntax and semantics of an expression,. Forward and backward reasoning. Proof methods, substitution and unification, conversion to clausalform, normal forms, resolution, refutation, deduction, theorem proving, in fencing, monotonic and no monotonic reasoning.

UNIT-III

Network-based representation and reasoning, Semantic networks, Conceptual Graphs, frames. Description logic (DL), concept language, reasoning using DL. Conceptual dependencies (CD), scripts, reasoning using CD. Introduction to natural language processing.

Adversarial search and Game theory, classification of games, game playing strategies,prisoner'sDilemma.

Game playing techniques, mini max procedure, alpha-beta cut-offs. Complexity of alpha-betasearch.

UNIT-IV

Reasoning in uncertain environments, Fuzzy logic, fuzzy composition relation, operations on fuzzy sets. Probabilistic reasoning, Bayes theorem, construction of Bayesian networks, belief propagation.

RECOMMENDEDBOOKS

Sr.no.	Name	AUTHOR(S)	PUBLISHER
1	ArtificialIntelligence	E. Rich	McGrawHill
2	IntroductiontoArtificialIntelligence	E. Charniak and D.McDermott	AddisonWesley

Course Code	**CSE363**
Course Title	**Theory of Automata and Computation**
Type of Course	PC
L T P	3 1 0
Credits	4
Course Prerequisites	Basic knowledge of Discrete mathematics and System programming
Course Objectives	This course provides the basic knowledge of concepts in automata theory and theory of computation. Allows the students to design grammars and recognizers for different formal languages.
Course Outcome (CO)	The learner will be able to- 1. Understand, design, construct, analyze and interpret Regular languages, Expression and Grammars. 2. Design different types ofFinite Automata and Machines as Acceptor,Verifier and Translator. 3. Design,analyze and interpret Context Freelanguages, Expression and Grammars. 4. Design different types ofPush down Automata as Simple Parser.

SYLLABUS

UNIT-I

Basic Theory of Automata: Sets, Relation, 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 b) Regular Expression: Definition, Algebraic Laws, Conversion of R.E to F.A, F.A to R.E , Applications, Regular grammar for F.A.

UNIT-II

Regular Sets and Context Free Grammars: Properties of regular sets, Context-Free Grammars

– Derivation trees, Chomsky Normal Forms and Greibach Normal Forms, 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 in finite control.

Variations of TMs: Variations of TMs – Recursive and Recursive enumerable languages, Recursive Function, Partial and Total Recursive Function, Primitive Recursive Function.

UNIT-IV

Introduction to Computational Complexity: Time and Space complexity of TMs –Complexity classes – Introduction to NP-Hardness and NP-Completeness, PCP Problem, Concept of decidability & undecidability. Unit 7: Cellular Automata:- DNA computing, Membrane computing.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**Author(s)**	**Publisher**
1	Introduction to Automata Theory, Languages and Computation	John E. Hopcroft and Jeffrey D. Ullman	Narosa Publishers
2	Theory of Computer Sc. (Automata, Languages &Computation)	K.L..P. Mishra & N. Chandershekaran	PHI
3	Introduction to the Theory of Computations	Michael Sipser	Brooks/Cole, Thomson Learning,
4	Introduction to Languages and the Theory of Computation	John C. Martin	Tata McGraw-Hill

Sixth Semester

CourseCode	**CSE302**
Course Title	**Internet Web Programming**
Type of Course	PE
L T P	3 0 0
Credits	3
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 web sites. Students will create web pages that utilize the most current advances in web development.
Course outcome (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

UNIT-I

Internet and WWW: Introduction to internet and its applications, Email, telnet, FTP, e-commerce, video conferencing, e-business. Internet service providers, domain name server, internet address World Wide Web (WWW) : World Wide Web and its evolution, uniform resource locator (URL), browsers - internet explorer, netscape navigator, opera, firefox, chrome, mozilla. Search engine, web saver - apache, IIS, proxy server, HTTP protocol.

HTML and Graphics: HTML Tag Reference, Global Attributes, Event Handlers, Document Structure Tags, Formatting Tags, Text Level formatting, Block Level formatting, List Tags, Hyperlink tags, Image and Image maps, Table tags, Form Tags, Frame Tags, Executable content tags.

Image maps: Client-side Imagemaps, Server-side Imagemaps, Using Server-side and Client-side Imagempas together, alternative text for Imagemaps,

Tables: Introduction to HTML tables and their structure, The table tags, Alignment, Aligning Entire Table, Alignment within a row, Alignment within a cell, Attributes, Content Summary, Background color, Adding a Caption, Setting the width, Adding a border, Spacing within a cell, Spacing between the cells, spanning multiple rows or columns, Elements that can be placed in a table, Table Sections and column properties, Tables as a design tool

UNIT-II

Frames : Introduction to Frames, Applications, Frames document, The <FRAMESET> tag, Nesting <FRAMESET> tag, Placing content in frames with the <FRAME> tag, Targeting named frames, Creating floating frames, Using Hidden frames,

Forms : Creating Forms, The <FORM> tag, Named Input fields, The <INPUT> tag, Multiple lines text windows, Drop down and list boxes, Hidden, Text, Text Area, Password, File Upload, Button, Submit, Reset, Radio, Checkbox, Select, Option, Forms and Scripting, Action Buttons, handlers, Passing form data

Style Sheets: What are style sheets? Why are style sheets valuable? Different approaches to style sheets, Using Multiple approaches, Linking to style information in separate file, Setting up style information, Using the <LINK> tag, embedded style information, Using <STYLE> tag, Inline style information.

UNIT-III

Java Script: Introduction, Client-Side JavaScript, Server-Side JavaScript, JavaScript Objects, JavaScript Security, Operators: Assignment Operators, Comparison Operators, Arithmetic Operators, % (Modulus), ++ (Increment), -- (Decrement), -(Unary Negation), Logical Operators, Short-Circuit Evaluation, String Operators, Special Operators, ? (Conditional operator),(Comma operator), delete, new, this, void.

Statements: Break, comment, continue, delete, do … while, export, for, for…in, function, if…else, import, labelled, return, switch, var, while, with,
Core JavaScript (Properties and Methods of Each) : Array, Boolean, Date, Function, Math, Number, Object, String, regExp

Document and its associated objects: document, Link, Area, Anchor, Image, Applet, Layer
Events and Event Handlers: General Information about Events, Defining Event Handlers, event, onAbort, onBlur, onChange, onClick, onDblClick, onDragDrop, onError, onFocus, onKeyDown,

onKeyPress, onKeyUp, onLoad, onMouseDown, onMouseMove, onMouseOut, onMouseOver, onMouseUp, onMove, onReset, onResize, onSelect, onSubmit, onUnload

Labelling input files, Grouping related fields, Disabled and read-only fields, Form field event

UNIT-IV

XML: Introduction to XML, Anatomy of an XML, document, Creating XML Documents, Creating XML DTDs, XML Schemas, XSL

PHP: Why PHP and MySQL?, Server-side web scripting, Installing PHP, Adding PHP to HTML, Syntax and Variables, Passing information between pages, Strings, Arrays and Array Functions, Numbers, Basic PHP errors / problems.

Advanced PHP and MySQL: PHP/MySQL Functions, Displaying queries in tables, Building Forms from queries, String and Regular Expressions, Sessions, Cookies and HTTP, Type and Type Conversions, E-Mail.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**Author(s)**	**Publisher**
1	HTML 5 in simple steps	Kogent Learning Solutions Inc.	Dreamtech press
2	HTML :Beginner's guide	Wendy Willard	Mc Graw Hill
3	HTML,XHTML, and CSS Bible, 5ed.	Steven M. Schafer	Wiley India
4	Beginning HTML,XHTML, CSS and JavaScript	John Duckett	Wiley India
5	Beginning CSS: Cascading Style Sheets for web design	Ian Pouncey, Richard York	Wiley India
6	HTML 5 in simple steps	Kogent Learning Solutions Inc.	Dreamtech press

CourseCode	**CSE304**
Course Title	**Data Communication and Networks**
Type of Course	PC
L T P	3 0 0
Credits	3
Course Prerequisites	Basic knowledge of Computer, Digital Circuits and Network Arrangement.
Course Objectives (CO)	To be familiar with various computer network architectures and to identify the infrastructure components, design infrastructure including devices, topologies and protocols.
Course outcome	The learner will be able to- 1. Independently understand basic computer network technology. 2. Understand and explain Data Communications System and its components. 3. Identify the different types of network topologies and protocols. 4. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer. 5. Identify the different types of network devices and their functions within a network.

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: Concept of Analog & Digital Signal, Bandwidth, Transmission Impairments: Attenuation, Distortion, Noise, Data rate limits : Nyquist formula, Shannon Formula, Multiplexing : Frequency Division, Time Division, Wavelength Division, 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, 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 and Presentation Layer

RECOMMENDED BOOKS			
Sr. no.	**Name**	**Author(S)**	**Publisher**
1	Communication Networks: Fundamentals and Concepts and Key Architectures	Leon Garrcia and IndraWidjaja	TMH
2	Computer Networks.	A.S. Tanenbaum	PHI
3	Introduction to Data Communication and Networks	Forouzan, Coombs and Fagan	TMH
4	Data and Communication	William Stallings	PHI

Course Code	**CSE306**
Course Title	**Internet Web Programming Laboratory**
Type of Course	PC
L T P	0 0 4
Credits	2
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 stateof 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 Outcome (CO)	The learner will be able to- 1. Implement interactive webpage(s) using HTML, CSS and JavaScript. 2. Design a responsive website using HTML5 and CSS3. 3. Describe and differentiate different Web Extensions and Web Services. 4. Build Dynamic website using server side PHP Programming and Database connectivity.

SYLLABUS

List of Practicals

1. Configuration and administration ApacheWebServer.

2. Develop an HTML page to demonstrate the use of basic HTMLtags,

3. Develop an HTML page to demonstrate Link to different HTML page and also link within a page, Insertion of images.

4. Implement HTML Listtags

5. Implement HTML tabletags.

6. Develop a registration form by using various form elements like input box, text area, radio buttons, Check boxesetc.

7. **125** | P a g e Develop HTMLwebpage for implementation of Frames.

8. Design an HTML page by using the concept of internal, inline, external style sheets.

9. Create an HTML file to implement the styles related to text, fonts, links using cascading stylesheets

10. Create an HTMLfile to implement the concept of document object model using JavaScript

11. Create an HTMLpage including JavaScript that takes a given set of integer numbers and shows them after sorting in descending order.

12. Create a PHP file to print any text usingvariable.

13. Demonstrate the use of Loops and arrays in PHP

14. Create a PHP file using GET and POST methods.

15. A simple calculator web application that takes two numbers and an operator(+,-/,*and%) from an HTML page and returns the result page with the operation performed on the operands.

16. Demonstrate the use of website designing tools such as Joomla,Word Press.

17. Implement at least one minor project using different technologies mentioned in theory of the subject.

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(s)**	**Publisher**
1	HTML5 in simple steps	Kogent Learning Solutions Inc.	Dream tech press
2	HTML:Beginner's guide	Wendy Willard	McGrawHill
3	HTML,XHTML,and CSS Bible, 5ed.	Steven M.Schafer	Wiley India
4	Beginning HTML, XHTML, CSS and JavaScript	John Duckett	Wiley India
5	Beginning CSS: Cascading Style Sheets for web design	Ian Pouncey, Richard York	Wiley India
6	HTML5 in simple steps	Kogent Learning Solutions Inc.	Dream techpress

CourseCode	**CSE308**
CourseTitle	**Data Communication and Networks Laboratory**
TypeofCourse	PC
L T P	0 0 4
Credits	2
Course Prerequisites	Basic Knowledge of infrastructure components, design infrastructure including devices, topologies and protocols.
Course Objectives	To make students proficient in understanding Network components, Topologies and implementing Network protocols.
Course outcome (CO)	Thelearner willbe ableto- 1. Detect and rectify networking problems 2. Set Client server architecture

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, Coaxial cable, UTP Cable.

2.2: Preparing straight cable & cross cable.

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

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

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

4: Addressing, File & Printer sharing.

4.1 : Implementation of file & printer sharing.

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

5: Subnet planning, FTP Server, TCP/UDP

5.1: Subnet planning & implementation.

5.2: Installation of FTP server & client.

5.3: Study of TCP/UDP performance.

RECOMMENDED BOOKS			
Sr.no.	**Name**	**Author(s)**	**Publisher**
1	A+ Guide to PC Hardware Maintenance and Repair, Volume 1	Michael W. Graves	CengageLearning
2	Practical TCP/IP and Ethernet Networking	Deon Reynders, Edwin Wright	Newnes
3	Data Communication and Networking: A Practical Approach	Massoud Moussavi	CengageLearning
4	A Practical Guide to Advanced Networking	Jeffrey S. Beasley, Piyasat Nilkaew	Pearson

Course Code	**CSE366**
Course Title	**Digital Image Processing**
Type of Course	**PE**
L T P	3 0 0
Credits	3
Course Prerequisites	Computer fundamentals
Course Objectives(CO)	To make students familiar with the various fundamentals and processes involved in the processing of an image.
Course Outcome	The learner will be able to- 1. Understand basic concepts of digital image processing 2. Describe image enhancement techniques 3. Explain image restoration and compression using degradation models

SYLLABUS

UNIT -I

Digital Image Fundamentals & Transforms: Introduction, Background, Digital Image Representation, Fundamental Steps in Image Processing, Elements of a Digital Image Processing System. Elements ofVisual Perception, Sampling and Quantization, Basic Relationships between Pixels, Imagining Geometry. Introduction to the Fourier Transform, The Discrete Fourier Transform, Some Properties of the Two-Dimensional Fourier Transform.

UNIT-II

Image Enhancement: Spatial Domain Methods, Frequency Domain Methods, Some Simple Intensity Transformations, Histogram Processing, Image Subtraction, Image Averaging, Smoothing Filters, Sharpening Filters, Low pass Filtering, High pass Filtering.

UNIT-III

Image Restoration & Compression: Degradations Model - Definitions, Degradation Model for Continuous, Restoration in the Spatial Domain, Geometric Transformation. Error free compression, Variable-Length Coding, Bit-Plane Coding, Lossless Predictive Coding. Lossy Compression – Lossy Predictive Coding, Transform Coding.

UNIT-IV

Image Segmentation &Representation: Edge Detection, Thresholding, Region-Based Segmentation. Image Representation, Boundary and Regional Descriptors, Relational Descriptors. Object Recognition: Pattern and pattern classes, recognition based on Decision Theoretic Methods, StructuralMethods.

RECOMMENDED BOOKS			
S. No	**Name**	**Author(S)**	**Publisher**
1	Digital Image Processing	Rafael. C. Gonzalez & Richard E.Woods	Pearson Education
2	Digital Image Processing	W.K.Pratt.	John Wiley & sons
3	Image Processing Analysis and Machine Vision	M. Sonka	Thomson Learning

Course Code	**CSE314**
Course Title	**Computer Vision**
Type of Course	**PE**
L T P	**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 their invariances in pattern recognition and classification**.**
Course Outcome (CO)	**The learner will be able to-** 1. Identify basic concepts, terminology, theories, models and methods in the field of computer vision 2. Describe basic methods of computer vision related to multi-scale representation, edge detection and detection of other primitives, stereo, motion and object recognition. 3. Assess which methods to use for solving a given problem. **4.** Analyze the accuracy of the methods**.**

SYLLABUS

UNIT-I

Digital Image Formation and low-level processing: Overview and State-of-the-art, Fundamentals of Image Formation, Transformation: Orthogonal, Euclidean, Affine, Projective, etc; Fourier Transform, Convolution and Filtering, Image Enhancement, Restoration, Histogram Processing.

Depth estimation and Multi-camera views: Perspective, Binocular Stereopsis: Camera and Epipolar Geometry; Homography, Rectification, DLT, RANSAC, 3-D reconstruction framework; Auto-calibration.

UNIT-II

Feare Extraction: Edges - Canny, LOG, DOG; Line detectors (Hough Transform), Corners - Harris and Hessian Affine, Orientation Histogram, SIFT, SURF, HOG, GLOH, Scale-Space Analysis- Image Pyramids and Gaussian derivative filters, Gabor Filters and DWT.

Image Segmentation: Region Growing, Edge Based approaches to segmentation, Graph-Cut, Mean-Shift, MRFs, Texture Segmentation; Object detection.
Pattern Analysis: Clustering: K-Means, K-Medoids, Mixture of Gaussians, Classification: Discriminant Function, Supervised, Un-supervised, Semi-supervised; Classifiers: Bayes, KNN, ANN models;

Dimensionality Reduction: PCA, LDA, ICA; Non-parametric methods.

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.

UNIT-IV

Model estimation: Machine learning and statistical methods in vision. Applications of machine Learning 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

RECOMMENDED BOOKS			
Sr. no.	**Name**	**Author(s)**	**Publisher**
1	Computer Vision: Algorithms and Applications	Richard Szeliski	Springer
2	Computer Vision: A Modern Approach	D. A. Forsyth, J. Ponce	Prentice Hall
3	Introductory Techniques for 3D Computer Vision	Trucco and Verri	Prentice Hall
4	Computer vision	Shapiro, L. & Stockman, G	Prentice Hall
5	Three-dimensional Computer Vision: A geometric approach	Olivier Faugeras	Olivier Faugeras

CourseCode	**CSE362**
Course Title	**Compiler Construction**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Basic understanding of Programming Languages, Data structures and machine architecture
Course Objectives	This course provides the student with the techniques used in design and construction of a working compiler. The course emphasizes connections between compilers and formal languages, data structures, and computer architecture.
Course Outcome (CO)	The learner will be able to 1. Implement a lexical analyser. 2. Implement a parser. 3. Implement a type checker. 4. Implement activation record generation. 5. Implement translation to intermediate code.

SYLLABUS

UNIT-I

Introduction to Compilers: The role of language translation in the programming process; Comparison of interpreters and compilers, language translation phases, machine-dependent and machine-independent aspects of translation, language translation as a software engineering activity

Lexical Analysis: Application of regular expressions in lexical scanners, hand coded scanner vs. automatically generated scanners, formal definition of tokens, and implementation of finite state automata.

UNIT-II

Syntax Analysis: Revision of formal definition of grammars, Ambiguity, BNF and EBNF; bottom-up vs. top-down parsing, tabular vs. recursive-descent parsers.

Syntax-Directed Translation: Syntax-directed definitions, Bottom-up evaluation of S-attributed definitions, L-attributed definitions, Top-down and Bottom-up evaluation of inherited attributes, Analysis of syntax-directed definitions

Type Checking: Data type as set of values with set of operations, Type systems, Specification of a simple type checker, Equivalence of type expressions, Type conversions, Overloading of functions and operators, Polymorphic functions, An algorithm for unification

UNIT-III

Run-Time Environments: Source language issues, Storage organization, Storage-allocation strategies, Access to nonlocal names, parameter passing, Symbol tables, Language facilities for dynamic storage allocation, Dynamic storage allocation techniques, Storage allocation in Fortran

Parsers Implementation: automatic generation of tabular parsers, symbol table management, the use of tools in support of the translation process.

UNIT-IV

Intermediate code Representation: Intermediate and object code, intermediate representations, implementation of code generators.

Code generation, code optimization: code generation by treewalking; context sensitive translation, register use. Machine-independent optimization; data-flow analysis; loop optimizations; machine-dependent optimization, Error Detection and Recovery, Error Repair, Compiler Implementation.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**Author(s)**	**Publisher**
1	Compilers Principles, Techniques, & Tools	A.V.Aho, R.Sethi&J.D.Ullman	Pearson Education
2	Engineering a Compiler	Keith Cooper and Linda Torczon,	Morgan-Kaufman Publishers
3	Crafting a compiler	C. Fischer and R. LeBlanc	Benjamin Cummings
4	Modern Compiler Implementation in Java	Andrew W. Appel	Cambridge University Press
5	Compiler Construction Principles and Practice	Kenneth C. Louden	Kenneth C. Louden

Course Code	**CSE348**
Course Title	**Digital Marketing**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Nil
Course Objective	The main objective of this course is to provide learners with the knowledgeof business advantages of the digital marketing and its importance formarketing success; to develop a digital marketing plan; to make SWOTanalysis; to define a target group; to get introduced to various digital channels, their advantages and ways of integration;
Course Outcomes	The learner will be able to- 1. Identify the importance of the digital marketing for marketing success, 2. Manage customer relationships across all digital channels and build better customer relationships, 3. Create a digital marketing plan, starting from the SWOT analysis and defining a target group, then identifying digital channels, their advantages and limitations. 4. Perceiving ways of their integration taking into consideration the available budget.

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SYLLABUS

UNITI

Introduction: Marketing and its definition, Digital Marketing, How we do Marketing, Benefits of Digitalmarketing, Digital marketing platforms and Strategies, Defining Marketing Goals, Latest Digital marketingtrends, 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, Componentsof Search Engines. Keyword Research and Competition: Introduction to Keyword Research, Types of Keywords, Keyword Research Methodology, Business Analysis and Categorization, Google Keyword

Plannerr, Market Research and Analysis, New Keyword Ideas, Competition Analysis, Finalizing the KeywordsList.

UNIT III

Onpage Optimization: Introduction to Onpage ,What is Webmaster Tools, Selecting Target Location,Onpage 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 SiteURL, Redirecting Techniques,Canonical Links,RichSnippets.

UNIT IV

Offpage Optimization : What is Link Building , Types of Linking Methods , DoFollow Vs. NoFollow Linkbuilding Guidelines , Linking Building Methodology , Links Analysis Tools , Directory Submissions ,Local Business Directories , Social Bookmarking , Using Classifieds for Inbound traffic ,Question andAnswers , Blogging & Commenting , Guest Blogging Local SEO:What is LocalSEO, Importance ofLocal SEO , Submission to Google My Business , Completing the Profile , Local SEO Ranking Signals ,Local SEO Negative Signals , Citations and Local Submissions

RECOMMENDEDBOOKS		
Name	Author(s)	Publisher
Digital Marketing For Dummies	Ryan Deiss and Russ Henneberry	JohnWiley and Sons,Inc.,

Course Code	**CSE318**
Course Title	**Computational Intelligence**
TypeofCourse	PE
L T P	3 0 0
Credits	3
CoursePrerequisites	NIL
Course Objectives	In this course the learner will be able to understand the techniques ofcomputational intelligence, especially evolutionary computation andneuralnetworks.
Course Outcomes(CO)	Thelearner willbe ableto- 1. Illustrate fundamental understanding of artificial intelligence(AI) and its applications. 2. Learner will capable to apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning 3. Learner acquires the knowledge of real-world Knowledge representation. 4. Illustrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, artificial neural networks and other machine learning models. 5. AI increases efficiency and refocuses daily tasks and effortswith an emphasis on creationand creativity

SYLLABUS

UNIT-I

Introduction to Computational Intelligence, Fundamental concepts, Introduction to Evolutionary Computing, Evolutionary computation terms, Canonical genetic algorithm, Evolutionary computation variations, Evolutionary programming and Evolution strategies, Implementation of Evolutionary Computing.

UNIT-II

Swarm Intelligence, Particle Swarm Optimization, Classification, Learning, and Adaptation, Supervised, Unsupervised, Reinforcement Learning, Data partitioning and Cross Validation, Error metrics: Mean squared error, receiver operating characteristic curves, Neural Networks and Evolutionary Computation: Explanation and Sensitivity Analysis, Neural Networks Implementation.

UNIT-III

Fuzzy sets, Fuzzy Logic, Fuzzy set operators, Fuzzy rule-based systems, Fuzzification, defuzzification, Fuzzy control, Evolving fuzzy rule systems, Neuro-fuzzy systems, Fuzzy-GA systems.

UNIT-IV

Probabilistic reasoning: Bayesian reasoning and Dempster-Shafer theory,Bayesian belief networks, Fuzzy belief networks Evolving belief networks, Artificial Immune Systems.

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(s)**	**Publisher**
1	ComputationalIntelligence:An Introduction	A.P.Engelbrecht	JohnWiley&Sons.
1	Computational Intelligence: An Introduction	A. P. Engelbrecht	John Wiley & Sons.
2	Introduction to Evolutionary Algorithms	X.YuandM.Gen	Springer Verlag.
3	Computational Intelligence: Concepts to Implementations	RussellEberhart andYuhuiShi	Morgan Kaufmann Publishers
4	Soft Computing and Intelligent Systems Design	Fakhreddine Karray andClarencede Silva	Addison Wesley Publishi
5	-Computational Intelligence: an Introduction	Andries Engelbrecht	Wiley & Sons, Second Edition, (ISBN: 978-0-470-03561-0)
6	Computational Intelligence: Principles, Techniques, and Applications	Amit Konar	Springer, ISBN: 978-3-540-27335-6

CourseCode	**CSE320**
Course Title	**Machine Learning**
Type of Course	**PE**
L T P	3 0 0
Credits	3
Course Prerequisites	Discrete mathematics
Course Objectives	1.Recognize the characteristics of machine learning that make it useful to real-world problems. 2. Characterize machine learning algorithms as supervised, semi-supervised, and unsupervised. 3. Effectively use machine learning toolboxes. 4. Use support vector machines.
Course Outcomes (CO)	The learner will be able to- 1.Recognize the characteristics of machine learning that make it useful to real-world problems. 2. Characterize machine learning algorithms as supervised, semi-supervised, and unsupervised. 3. Effectively use machine learning toolboxes. 4. Use support vector machines.

SYLLABUS

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, and pruning

RECOMMENDED BOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Pattern Recognition and Machine Learning	Bishop, C.	Berlin: Springer-Verlag.
2	Elements of Statistical Learning	Hastie, Tibshirani, and Friedman	Springer
3	Machine Learning	Tom Mitchell	Mc-Graw Hill

CourseCode	**CSE322**
Course Title	**Distributed System**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Basic knowledge of object oriented programming, data structures, threads, operating system concepts.
Course Objectives	This Course work provides the complete understanding of distributed system and its various applications in the field of computer Science.
Course Outcome (CO)	The learner will be able to- 1. Identify distributed system characteristics. 2. Student will be able to explain the models or distributed processing and communication. 3. Student will be able to develop a simple distributed system. 4. Student will be able to analyze distributed algorithms.

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 & vectors logical clocks, Causal ordering of messages, global state, and termination detection.

UNIT-II

Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms, 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 Problem- Interactive consistency Problem, Applications of Agreement algorithms.

Distributed Objects and Remote Invocation: Communication between distributed objects, Remote procedure call, 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	Tata McGraw Hill
2	Distributed System: Concepts and Design	Coulouris, Dollimore, Kindberg	Pearson Education
3	Distributed Operating Systems	Tanenbaum S.	Pearson Education
4	Distributed System: Concepts and Design	P K Sinha	PHI

CourseCode	**CSE324**
Course Title	**Wireless Communications**
Type of Course	PE
L T P	3 0 0
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. Students will be able to examine state-of-the-art distributed systems, such as Google File System. 3. Students will be able to learn the principles, architectures, algorithms and programming models used in distributed systems

SYLLABUS

UNIT-I

Introduction: A basic cellular system, performance criteria, operation of cellular systems, planning a cellular system, analog & digital cellular systems. Examples of Wireless Communication Systems: Paging Systems, Cordless Telephone Systems, Cellular Telephone Systems.

GSM system: Architecture and features; GSM Services; Authentication; Incoming & outgoing call flow ; 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 type of channels: Control & Traffic channels.

BTS hardware: Introduction of BTS 3900 series ; Baseband unit (BBU); Radio Frequency unit (RFU); Description of Cards; Login to BTS 3900

UNIT-III

Multiple Access Techniques for Wireless Communications: Introduction, Frequency Division Multiple Access(FDMA), Time Division Multiple Access (TDMA), Spread Spectrum Multiple Access, CDMA (code division multiple access),Space Division Multiple Access. WCDMA (wideband CDMA) features and architecture, handoff and its types.

UNIT-IV

Wireless Systems & Standards: GPRS/EDGE specification features and architecture, 3G systems: Applicationof3G&UMTS & CDMA 2000 standards, specifications and architecture of UMTS , Forward CDMA Channel, Reverse CDMA Channel. BSC Hardware: Introduction to 6900 series; MPR & EPR; Description of Cards; Login to BSC 6900. Future trends: Blue Tooth technology, 4G mobile techniques, Wi-Fi Technology, LTE advance system, ZigBee.

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(s)**	**Publisher**
1	Wireless Communications	T.S.Rappaport,	Principles Edition, and Practice, 2nd Pearson Education Asia, 2010.
2	Mobile Cellular Telecommunications	William C Y Lee	2nd Edition, MGH.
3	Mobile and Personal Communication systems and services	Raj Pandya	Prentice Hall of India.
4	Wireless and Digital Communications	Dr. Kamilo Feher	TMH

CourseCode	**CSE326**
Course Title	**Block Chain**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	This course has no prerequisite other than knowledge of probability and statistics, and programming skills.
Course Objectives	The objective of this course is to teach students the architecture of blockchain. By taking this course, the students are expected to understand the basic algorithms, and be able to apply these techniques to financial service, supplychain.
Course Outcome (CO)	The learner will be ableto- CO1: Understand the basic architecture of blockchain. CO2: Understand theory of bitcoin. CO3: Describe components of blockchain. CO4: Explain applications of blockchain in financial service, supply chain.

SYLLABUS

Unit-I

Introduction to Blockchain–I (Basics, History, Architecture, onceptualization), Bitcoin basics.

Unit- II

Consensus in Bitcoin–I(The Basics, PoW and Beyond,TheMiners) ,Permissioned Blockchain (Basics,Consensus)

Unit-III

Block chain for Enterprise–Overview, Blockcha in Components and Concepts, Hyperledger Fabric

–Transaction Flow, Hyperledger Fabric Details.Fabric–Membership and Identity Management

Unit-IV

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

RECOMMENDEDBOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
2	Blockchain	Melanie Swa, O'Reilly	O'Reilly
3	Zero to Blockchain, An IBM Red books course	Bob Dill, DavidSmits	https://www.redbooks.ibm.com/Redbooks.nsf/RedbookAbstracts/crse0401.html

Course Code	**CSE376**
Course Title	**Advanced Database Management System**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Basic knowledge of Database and relational database management system
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 database administration.
Course Outcome (CO)	The learner will be able to- CO1: Explain the features of database management systems and Relational database. 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 of Concurrent transactions and locking and explain their types, advantages and disadvantages CO4: Formulate query, using SQL, solutions to a broad range of query and data update problems. CO5: Explain Spatial and Multimedia databases

SYLLABUS

UNIT I

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.

Database 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.

UNIT III

Data warehousing Concepts: Architecture, Dataflows, Tools & Technologies, Data Marts, Data Mining and

Online Analytical Processing.

UNIT IV

Emerging Database Technologies: Spatial & Multimedia databases, Mobile Computing & Mobile Databases

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Advanced database management system	Rini Chakrabarti, Shilbhadra Das gupta	Wiley India Pvt. Ltd.
2	Distributed Databases	Ozsu and Valduriez	Pearson Education
3	Advanced Database Management System	Vaishali P.Yadav	Pearson Education India
4	Database System Concepts	Abraham Silberschatz, Henry F. Korth, S. Sudarshan	Tata McGraw-Hill
5	Database Management Systems	Raghu Ramakrishnan	Mc-Graw Hill

New Topics and Applications: (a) Information Retrieval (b) Bioinformatics (c) Incomplete and Uncertain Databases (d) Non-relational Databases, (e) Data Stream Management

Seventh Semester

CourseCode	**MGT401**
Course Title	Organization Behaviour
Type of Course	HS
L T P	4 0 0
Credits	4
Course Prerequisites	Nil
Course Objectives	The aim is to enable the student to know about the behavior of Individual in the organization.
Course Outcome (CO)	The learner will be able to- 1. Understand the main theories of Organisational Behavior; 2. Analyze how these theories and empirical evidence can help to understand contemporary organizational issues; 3. To apply theories to practical problems in organizations in a critical manner.

SYLLABUS

UNIT-I

Organization Behavior: its Concepts, Features and Importance, Challenges and Opportunities for OB. Foundations of Individual Behavior. Learning, Concept, Theories and Principles of learning, Reinforcement. Perception**,** Concept, Perceptual Process, Factors in Interpersonal perception. Attitude**,** Concept, Components, Attitude formation, Values & Beliefs.

Unit II

Leadership, Concept, Theories and Leadership Styles in Management.
Transactional Analysis: Life positions, Levels of Self Awareness-Johari window Model, Ego States. Motivation: Nature, importance, process, Theories of Motivation, Application of Motivation Perception: Concept, Theories of Personality, Determinants of Personality

Unit-III

Group Dynamics: Concept and nature of group formation, Models of Group formation, Theories of group formation. Group decision making techniques. Difference between group and team, Types of Teams, Power and Politics: Concept, Bases of power, Tactics to gain Power, Techniques of politics. Stress Management: Meaning, Concept, Causes of Organization Stress, Stress Management.

Unit-IV

Organization Change: Concept, Change Agents, Resistance to change, Overcoming resistance to change, Organization Culture: Concept, functions of Organization Culture, Development and implications of Organization Culture, Creating and sustaining Organization Culture.

Organization Development: Concept, Interventions of Organization Development

RECOMMENDEDBOOKS

Sr.no.	Name	AUTHOR(S)	PUBLISHER
1	Organizational Behavior	Luthans,F	McGraw –Hill Inc.
2	Understanding Organizational Behaviour	Pareek, U	Oxford University Press, Delhi.

CourseCode	**CSE403**
Course Title	**Cryptography and Security**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Basic Knowledge of complexity theory, algorithms, game theory, machine learning
Course Objectives	This course work provides the thorough understanding of the network security and various cryptography techniques to obtain the security on network and a computer.
Course outcome (CO)	The learner will be able to- 1. Understand concepts related to security attacks, encryption, decryption techniques, substitution and transposition techniques. 2. Describe principles of public key cryptography, RSA algorithm. 3. Explain authentication requirements and use of hash function

SYLLABUS

UNIT-I

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

UNIT-II

Modern Encryption Techniques: Simplified Data Encryption Standard, Block Cipher Principles.

The Data Encryption Standard, Strength of DES. Encryption Algorithms: Triple DES, International Data Encryption Algorithm, Blowfish.

UNIT-III

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

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

UNIT-IV

Message Authentication and Hash Functions: Authentication Requirements, Authentication Functions,

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

RECOMMENDED BOOKS			
Sr. no.	**Name**	**Author(s)**	**Publisher**
1	Cryptography and Network Security: Principles and Practice	William Stallings	Pearson Education
2	Computer Networks	A.S. Tanenbaum	Pearson Education
3	Network Security	C. Kaufman, R. Perlman, M. Speciner	Pearson Education

Course Code	**CSE405**
Course Title	**Multimedia and Animation**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Basic knowledge of Computer Graphics and Image Processing.
Course Objectives	The main objective of the subject is to impart the knowledge about Animation execution, workflow and post-production
Course Outcomes(CO)	The learner willbe ableto- CO1: Understand fundamentals of animation. CO2: Get knowledge of 3DModeling tools CO3: Compare between Polygon Modeling and NURBS modeling

SYLLABUS

UNIT-I

Fundamentals of Animation: Animation Drawings/Cels, Rough Drawings , Clean ups, Colorreference drawings, Layout, Model Sheet, Key Drawing, Master Background, Concept Piece,Character drawing,Story Board.

ModelingConcepts: Introduction to Maya,Types of 3D Modeling,Advantages and Disadvantages,Difference between Polygon Modelingand NURBS modeling

Texturing - Assigning Materials To Models: UV texturing: Texturing of Characters and Props, Shading: Different MayaShaders.

UNIT-II

Lighting and Shadows: Sources of light: Natural and artificial Lights, Types of lights in Maya, Types of Shadowsin Maya.

Rigging and Skinning of a Model: Joints, Inverse Kinematics, Forward Kinematics. Types of Skinning.

UNIT-III

Animation Types: Types of Animation.Stop motion vs.motion graphics.

Editing Clips: Process,Tools used for editing process.

UNIT-IV

Output and Formats: Types of Output formats, lossless and lossy compression techniques

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(s)**	**Publisher**
1	3D Animation for the Raw Beginner Using Maya	RogerKing	Chapman and Hall
2	Editing Digital Video – The Complete Creative and Technical Guide	RobertGoodman	McGraw-Hill
3	Maya Documentation	https://knowledge.autodesk.com	Autodesk

Course Code	**CSE407**
Course Title	**Data Science using python**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Basics of data analysis
Course Objectives	The course will help the learner to understand concepts in Data Science and data visualization
Course Outcomes (CO)	The learner will be able to- CO1: Understand concepts of data science and its theory CO2: Describe basic machine learning algorithms CO3: Explain data visualization CO4: Demonstrate ethical issues related to data science

SYLLABUS

UNIT-I

Introduction: What is Data Science? - Big Data and Data Science hype – and getting past the hype - Whynow? – Datafication - Current landscape of perspectives - Skill sets needed Statistical Inference - Populations and samples -Statistical modeling, probability distributions

UNIT-II

Three Basic Machine Learning Algorithms -Linear Regression-k-NearestNeighbors(k-NN) -k-means. Recommendation Systems: Building a User-Facing Data Product - Algorithmic ingredients of a Recommendation Engine - Dimensionality Reduction - Singular Value Decomposition – Principal Component Analysis-Exercise: build your own recommendation system

UNIT-III

Data Visualization - Basic principles, ideas and tools for data visualization 3 - Examples of inspiring (industry) projects -Exercise: create your own visualization of a complex dataset.

UNIT-IV

Data Science and Ethical Issues - Discussions on privacy, security, ethics - A look back at Data Science -Next-generationdata scientists

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(s)**	**Publisher**
1	Doing Data Science, StraightTalk from the Frontline	CathyO'Neil and RachelSchutt	O'Reilly
2	Data Mining: Concepts and Techniques	Jiawei Han,Micheline KamberandJian Pei	Third edition
3	Elements of InformationTheory	ThomasM.Cover, J.A.Thomas	Wiley-Interscience Publication
4	Error Correction Coding Mathematical Methods and Algorithms	Todd K.Moon	Wiley-IndiaEdition.
5	Cryptography and Network Security	Williamstallings	McGrawHill.

CourseCode	**CSE457**
Course Title	**Advanced Communication Network**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Computer Networks
Course Objectives	The student will be able to understand TCP/IP reference model. Thde student will also nunderstand routing algorithms, network devices, various protocols and networking technologies
Course Outcomes (CO)	**At the end of the course the learner will be able to-** 1. Define various network devices 2. Explain various routing algorithms 3. Explain various protocols used 4.Compare and Contrast TCP/IP reference model and ATM reference model

SYLLABUS

Unit-I

Introduction: Internet architecture and performance modeling: Review of Basic Network Architectures: OSI reference model, TCP/IP reference model, ATM reference model. Physical Layer: Different types of transmission media, and errors in transmission: attenuation, noise. Repeaters. Traffic Characterization (CBR, VBR) Switching Paradigms; Multiplexing. Error Control, Flow Control, FTH, DTH, PON, ISDN, DSL, CATV, SONET, Optical Networks.

Unit-II

Network Device, Routing algorithms, BGP, Advanced routing concepts, Router architectures, internetworking: Interdomain Routing, BGP, IPv6, Multicast Routing Protocols, Multi-Protocol Label Switching, and Virtual Networks. Transport layer Transport protocols, TCP mechanics, congestion control, resource allocation UDP mechanics. Socket Programming

Unit-III

High speed transport protocols, Quality of Service Mechanisms, Improving QoS in Internet, DiffServ and IntServ Architectures, RSVP. Distributed Systems: Naming, DNS, DDNS, Paradigms for Communication in Internet, Caching, Issues of Scaling in Internet and Distributed Systems, Caching Techniques for Web, Protocols to Support Streaming Media, Multimedia Transport Protocols, Content Delivery Networks, Overlay and P2P

Networks.

Unit-IV

Applications: architectures and examples. Network virtualization, software defined networking Applications and Other Networking Technologies: RTP, RTSP, SIP, VoIP, Security Systems, SSH, PGP, TLS, IPSEC, DoS Attack, Mitigation in Internet, Security in MPLS

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Internetworking with TCP/IP: Principles, Protocols, and Architecture	Douglas E. Commer	Prentice Hall
2	Computer Networks	Andrew S. Tanenbaum, David J.Wetherall	Prentice-Hall
3	SDN: Software Defined Networks	Thomas D. Nadeau, Ken Gray	Kindle Ed., O'Reilly

Course Code	CSE411
Course Title	Digital Signal Processing
Type of Course	PE
L:T:P	3:0:0
Credits	3
Course Pre-requisites	Signals and Systems
Course Objectives	1. To make students conversant about representation of signals in thefrequency, continuous and discrete time domain. 2. To acquaint the student with the use of the z-transform to analysediscrete-time systems. 3. To familiarize students with Discrete-Fourier Transform (DFT) andFFT techniques. 4. To know how to create digital filters for a variety of uses. 5. To educate students on the use of digital signal processing toanalyze real-world signals.
Course Outcomes(COs)	The learner will be able to- 1. Represent signals mathematically in continuous and discrete-time, andin the frequency domain. 2. Analyse discrete-time systems using z-transform. 3. Understand the Discrete-Fourier Transform (DFT) and the FFT algorithms. 4. Design digital filters for various applications. 5. Apply digital signal processing for the analysis of real-life signals.

SYLLABUS

UNIT I

Discrete-time signals and systems: Discrete time signals and systems: Sequences; representation of signals on orthogonal basis; Representation of discrete systems using difference equations, Sampling and reconstruction of signals - aliasing; Sampling theorem and Nyquist rate.

UNIT II

Z-transform: z-Transform, Region of Convergence, Analysis of Linear Shift Invariant systems using z transform, Properties of z-transform for causal signals, Interpretation of stability in z-domain, Inverse z-transforms

UNIT III

Discrete Fourier Transform: Frequency Domain Analysis, Discrete Fourier Transform (DFT), Properties of DFT, Connvolution of signals, Fast Fourier Transform Algorithm, Parseval's Identity, Implementation of Discrete Time Systems.

UNIT IV

Design of Digital filters: Design of FIR Digital filters: Window method, Park-McClellan's method. Design of IIR Digital Filters: Butterworth, Chebyshev and Elliptic Approximations; Low-pass, Band- pass, Band stop and High-pass filters. Effect of finite register length in FIR filter design. Parametric and non-parametric

spectral estimation. Introduction to multi-rate signal processing.

Applications of Digital Signal Processing: Correlation Functions and Power Spectra, Stationary Processes, Optimal filtering using ARMA Model, Linear Mean-Square Estimation, Wiener Filter.

RECOMMENDED BOOKS			
S. No.	**Name of the Book**	**Author(s)**	**Publisher**
1.	Digital Signal Processing: A computer based approach	S. K. Mitra	McGraw Hill, 2011
2.	Discrete Time Signal Processing	A.V. Oppenheim and R. W. Schafer	Prentice Hall, 1989
3.	Digital Signal Processing: Principles, Algorithms and Applications	J.G. and D.G. Proakis Manolakis	Prentice Hall, 1997
4.	Theory and Application of Digital Signal Processing	L. R. Rabiner and B. Gold	Prentice Hall, 1992
5.	Introduction to Digital Signal Processing	J. R. Johnson	Prentice Hall, 1992
6.	Digital Signal Processing	D. J. DeFatta, J. G. Lucas And W. S. Hodgkiss	John Wiley & Sons, 1988

CourseCode	**CSE413**
Course Title	**Graph Theory**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Discrete Structures, Data Structures, Data Analysis and Interpretation.
Course Objectives	In computer science, graph theory is used extensively. The intension of this course is to introduce the subject of graph theory to computer science students in a thorough way .While the course will cover all elementary concepts such as coloring, covering,hamiltonicity, planarity, connectivity and so on, it will also introduce the students to some advanced concepts.
Course Outcomes(CO)	The learner will be able to- 1. Understand basic concepts of graph 2. Apply Kruskal and Dijkstra algorithms 3. Describe matrix representation of graph 4. Solve chromatic polynomial

SYLLABUS

UNIT-I

Graphs, Sub graphs, some basic properties, various example of graphs & their sub graphs, walks, path & circuits, connected graphs, disconnected graphs and component, euler graphs, various operation on graphs, Hamiltonian paths and circuits, the traveling sales man problem.

UNIT-II

Trees and fundamental circuits, distance diameters, radius and pendent vertices, rooted and binary trees, on counting trees, spanning trees, fundamental circuits, finding all spanning treesof a graph and a weighted graph, algorithms of primes, Kruskal and Dijkstra Algorithms.

UNIT-III

Cuts sets and cut vertices, some properties, all cut sets in a graph, fundamental circuits and cut sets, connectivity and separability, network flows Planer graphs, combinatorial andgeometric dual: Kuratowski graphs, detection of planarity, geometric dual, Discussion on criterion of planarity, thickness and crossings.

UNIT-IV

Vector space of a graph and vectors, basis vector, cut set vector, circuit vector, circuit and cutset subspaces, Matrix representation of graph – Basic concepts; Incidence matrix, Circuit matrix, Path matrix, Cut-set matrix and Adjacency matrix. Coloring, covering and partitioningof a graph, chromatic number, chromatic partitioning, chromatic polynomials, matching, covering, four color problem

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Graph theory with applications to Engineering and Computer Science	Deo, N	PHI
2	Introduction to Graph Theory	Gary Chartrand and Ping Zhang	TMH
3	Introduction to Graph Theory	Robin J. Wilson	Pearson Education
4	Graph theory and application	Bondy and Murthy	Elsevier Science Ltd/North-Holland

CourseCode	**CSE417**
Course Title	**Cloud Computing**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Distributed System, Operating Systems and Networking
Course Objectives (CO)	This Course work provides the complete understanding of Cloud system, its implementation techniques and its various applications in the field of computer Science.
Course Outcome	The learner will be able to- 1. Understand characteristics and types of cloud computing 2. Describe architecture of cloud computing 3. Explain applications of cloud 4. Demonstrate their knowledge of cloud computing to real world examples

SYLLABUS

UNIT-I

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

UNIT-II

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

UNIT-III

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

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

UNIT-IV

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

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(s)**	**Publisher**
1	Cloud Computing–A Practical Approach	Anthony T.Velte,Toby J.Velte and RobertE	TMH
2	CloudComputing –Webbased Applications	MichaelMiller	PearsonPublishing

CourseCode	**CSE419**
CourseTitle	**R Programming**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Distributed System, Operating Systems and Networking
Course Objectives (CO)	This Course work provides the complete understanding of Cloud system, its implementation techniques and its various applications in the field of computer Science.
CourseOutcomes	Thelearner willbe ableto- 1. ExplaincriticalRprogrammingconcepts 2. DemonstratehowtoinstallandconfigureRStudio 3. ApplyOOPconceptsin Rprogramming 4. Explaintheuseofdata structure and loopfunctions

SYLLABUS

UNIT-I

Introduction:

Introducing to R- R Data Structures, Help functions in R, Vectors, Scalars ,Declarations ,recycling ,Common Vector operations ,Using all and any ,Vectorized operations ,NA and NULL values ,Filtering ,Vectorised if-then else ,Vector Equality ,Vector Element names

UNIT-II

Matrices, Arrays And Lists:

Creating matrices, Matrix operations ,Applying Functions to Matrix Rows and Columns ,Adding and deleting rows and columns ,Vector/Matrix Distinction ,Avoiding Dimension Reduction ,Higher Dimensional arrays ,lists ,Creating lists ,General list operations ,Accessing list components and values ,applying functions to lists ,recursive lists

UNIT_III

Data Frames:

Creating Data Frames ,Matrix-like operations in frames ,Merging Data Frames ,Applying functions to Data frames ,Factors and Tables ,factors and levels ,Common functions used with factors ,Working with tables -

Other factors and table related functions - Control statements ,Arithmetic and Boolean operators and values ,Default values for arguments - Returning Boolean values ,functions are objects ,Environment and Scope issues ,Writing Upstairs - Recursion ,Replacement functions ,Tools for composing function code ,Math and Simulations in R

UNIT-IV

OOP:

S3 Classes, S4 Classes, Managing your objects, Input/Output ,accessing keyboard and monitor ,reading and writing files ,accessing the internet ,String Manipulation ,Graphics ,Creating Graphs ,Customizing Graphs ,Saving graphs to files ,Creating three-dimensional plots

Interfacing:

Interfacing R to other languages, Parallel R, Basic Statistics ,Linear Model ,Generalized Linear models ,Non-linear models ,Time Series and Auto-correlation ,Clustering

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(s)**	**Publisher**
1	The Art of R Programming: A Tour of Statistical Software Design	Norman Matloff	No Starch Press, 2011.
2	Beginning R ,The Statistical Programming Language	Mark Gardener	Wiley, 2013

CourseCode	**CSE408**
Course Title	**Ad-Hoc Wireless Networks**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Computer networks
Course Objectives	This subject provides the knowledge of Adhoc and sensor networks.
Course Outcomes- (CO)	The learner will be able to- 1. Understand concepts of adhoc networks 2. Describe and understand MAC protocols and its issues 3. Explain WSN routing and QIOS in WSN 4. Examine necessity for mesh network

SYLLABUS

UNIT I

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

Ad-Hoc MAC
Introduction, Issues in Ad-Hoc Wireless Networks. MAC Protocols, Issues, Classifications of MAC protocols, Multi channel MAC& Power control MAC protocol.

UNIT II

Ad-Hoc Network Routing & TCP
Issue, Classifications of routing protocols, Hierarchical and Power aware. Multicast routing, Classifications, Tree based, Mesh based. Ad Hoc Transport Layer Issues. TCP Over Ad Hoc, Feedback based, TCP with explicit link, TCP-BuS, Ad Hoc TCP, and Split TCP.

UNIT III

WSN -MAC
Introduction, Sensor Network Architecture, Data dissemination, Gathering. MAC Protocols, self- organizing, Hybrid TDMA/FDMA and CSMA based MAC.

WSN Routing, Localization & QOS
Issues in WSN routing , OLSR, AODV. Localization, Indoor and Sensor Network Localization. QoS in WSN.

UNIT IV

Wireless Systems & Standards: GPRS/EDGE specification features and architecture, 3G systems: Application of 3G& UMTS & CDMA 2000 standards

Mesh Networks
Necessity for Mesh Networks, MAC enhancements, IEEE 802.11s Architecture, Opportunistic routing, Self-configuration and Autoconfiguration, Capacity Models, Fairness, Heterogeneous Mesh Networks, Vehicular Mesh Networks

RECOMMENDED BOOKS

Sr.no.	Name	AUTHOR(S)	PUBLISHER
1	Ad Hoc Wireless Networks– Architectures and Protocols	C.Siva Ram Murthy and B.Smanoj	Pearson Education.
2	Wireless Sensor Networks	Feng Zhao and Leonidas Guibas,	Morgan Kaufman Publishers.
3	Ad Hoc Mobile Wireless Networks	C.K. Toh	Pearson Education.
4	Wireless Mesh Networking	Thomas Krag and Sebastin Buettrich	O'Reilly Publishers.

Course Code	**CSE469**
Course Title	**Neural Network**
Type of Course	PE
L T P	3 0 0
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 ANNs; Feedforward & feedback networks; learning rules; Hebbian learning rule, perception learning rule, delta learning rule, Widrow-Hoff learning rule, correction learning rule, Winner –lake all learning rule, etc.

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

Classification model, Features & Decision regions; training & classification using discrete perceptron, algorithm, single layer continuous perceptron networks for linearly separable classifications, linearly non-separable pattern classification, Delta learning rule for multi-perceptron layer, Generalized delta learning rule, Error back-propagation training, learning factors, 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.

RECOMMENDEDBOOKS

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

CourseCode	**CSE477**
Course Title	**Data Mining in Business Intelligence**
Type of Course	**PE**
L T P	3 0 0
Credits	3
Course Prerequisites	Database Systems
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 clustering techniques 4. Explain applications of data mining

SYLLABUS

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

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

Course Code	**CSE462**
Course Title	**Image and Speech recognition**
Type of Course	PE
L T P	4 0 0
Credits	4
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 key algorithms in speech processing. By taking this course, the students are expected to understand the basic algorithms, and be able to apply these techniques to various speech applications.
Course Outcome (CO)	The learner will be able to- 1. Record, analyze, characterize, modify, and synthesize signals. 2. Use speech analysis and synthesis technologies, explain how they work, and discuss their strengths and limitations. 3. Design, execute, interpret, and evaluate simple studies that utilize speech processing methods. 4. Present and discuss research, both orally and in writing, to other students and scientists. 5. Locate, interpret, and synthesize scientific literature

SYLLABUS

UNIT I

Speech Processing Basic Concepts

Speech Fundamentals: Articulatory Phonetics, Production and Classification of Speech Sounds; Acoustic Phonetics, acoustics of speech production; Review of Digital Signal Processing concepts; Short-Time Fourier Transform, Filter-Bank and LPC Methods.

Speech Analysis

Features, Feature Extraction and Pattern Comparison Techniques: Speech distortion measures, mathematical and perceptual, Log Spectral Distance, Cepstral Distances, Weighted Cepstral Distances and Filtering, Likelihood Distortions, Spectral Distortion using a Warped Frequency Scale, LPC, PLP and MFCC Coefficients, Time Alignment and Normalization, Dynamic Time Warping, Multiple Time, Alignment Paths.

UNIT II

Speech Modeling

Hidden Markov Models: Markov Processes, HMMs – Evaluation, Optimal State Sequence,

UNIT III

Speech Synthesis:

Text-to-Speech Synthesis: Concatenative and waveform synthesis methods, subword units for TTS, intelligibility and naturalness, role of prosody, Basic Speech Generation Techniques: Formant synthesis, basic diphone synthesis; signal processing for synthesis. Intonation and F0 control, Applications and present status.

UNIT IV

Advanced Techniques for Speech Recognition Systems

Introduction and review of speech recognition components, Large vocabulary speech recognition search & generation of multiple hypotheses, Lattices, confusion networks & confidence estimation, Discriminative training, Feature Selection and Extraction: PCA, LDA, Audio segmentation and speaker clustering, Adaptation & Robustness: MAP, linear transforms, MLLR, noise robustness, Speech Recognition system examples and applications.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Fundamentals of Speech Recognition	Lawrence Rabiner and Biing-Hwang Juang	Pearson Education.
2	Speech and Language Processing – An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition	Daniel Jurafsky and James H Martin	Pearson Education
3	The Scientist and Engineer's Guide to Digital Signal Processing	Steven W. Smith	California Technical Publishing
4	Discrete-Time Speech Signal Processing – Principles and Practice	Thomas F Quatieri	Pearson Education
5	Speech Recognition	Claudio Becchetti and LucioPrinaRicotti	John Wiley and Sons.
6	Speech and audio signal processing", processing and perception of speech and music	Ben gold and Nelson Morgan	Wiley- India Edition.

Course Code	**CSE464**
Course Title	**Introduction to Natural Language Processing**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	To be a knowledge of Grammar Rules and Artificial Intelligence concepts
Course Objectives	NLP attempts to interact with humans and human texts via language. Problems in the domain include analyzing texts to discover structures and to make decisions. Translating from one language to another. Interacting with humans in dialogue systems or cooperative tasks.
Course Outcome (CO)	The learner will be able to- 1. Understand basic concepts of Natural language processing 2. Explain Machine translation and speech recognition

SYLLABUS

UNIT I

Introduction and Overview: concepts of Natural Language Processing, Ambiguity and uncertainty in language. The Turing test.

Regular Expressions: Chomsky hierarchy, regular languages, and their limitations. Finite-state automata. Practical regular expressions for finding and counting language phenomena. A little morphology.

Programming in Python: An introduction to programming in Python, Variables, numbers, strings, arrays, dictionaries, conditionals, and iteration. The NLTK (Natural Language Toolkit)

String Edit Distance and Alignment: Key algorithmic tool: dynamic programming, first a simple example, then its use in optimal alignment of sequences. String edit operations, edit distance, and examples of use in spelling correction, and machine translation

UNIT II

Context Free Grammars: Constituency, CFG definition, use and limitations. Chomsky Normal Form. Top-down parsing, bottom-up parsing, and the problems with each

Non-probabilistic Parsing: Efficient CFG parsing with CYK, another dynamic programming algorithm. Also, perhaps, the Earley parser. Designing a little grammar, and parsing

Probability: Introduction to probability theory--the backbone of modern natural language processing. Events, and counting. Joint and conditional probability, marginals, independence, Bayes rule, combining evidence. Examples of applications in natural language

UNIT III

Information Theory: meaning, Measuring it in bits. The "noisy channel model." The "Shannon game"--motivated by language! Entropy, cross-entropy, information gain, applications

Language modeling and Naive Bayes: Probabilistic language modeling and its applications. Markov models. N-grams. Estimating the probability of a word, and smoothing. Generative models of language.

UNIT IV

Part of Speech Tagging and Hidden Markov Models: The concept of parts-of-speech, examples, usage. The Penn Treebank and Brown Corpus. Probabilistic (weighted) finite state automata. Hidden Markov models (HMMs), definition and use

Viterbi Algorithm for Finding Most Likely HMM Path: Dynamic programming with Hidden Markov Models, and its use for part-of-speech tagging

Parsing with PCFGs: Treebank, The probabilistic version of CYK., humans parsing process, Experiments with eye-tracking. Modern parsers.

Machine Learning Tool: Machine Translation and MT Tools - GIZA++ and Moses

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

Course Code	**CSE468**
Course Title	**Design and Management of Big Data**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Design and Management of Data
Course Objectives	Study the requirements of non-traditional large-scale dataapplications
Course Outcome (CO)	The learner will be able to- 1. Identify the characteristics of datasets and compare thetrivial data and big data for various applications. 2. Understand and apply Hadoop architecture and associated computing techniques and technologies. 3. Select and implement computing environment, Hadoop,Hive that are suitable for the applications under consideration. 4. Recognize and implement Hadoop ecosystem components YARN,HIVE and PIG.

UNIT-I

INTRODUCTION TO BIG DATA: Introduction – distributed file system – Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms usingmap reduce, Matrix-Vector Multiplication by Map Reduce

UNIT-II

INTRODUCTION HADOOP: Big Data – Apache Hadoop & Hadoop EcoSystem – Moving Datain and outof Hadoop – Understanding inputs and outputs of MapReduce - Data Serialization

UNIT-III

HADOOP ARCHITECTURE: Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands , Anatomy of File Write and Read., NameNode, Secondary NameNode, and DataNode, Hadoop Map Reduce paradigm, Map and Reduce tasks, Job, Task trackers - Cluster Setup – SSH & Hadoop Configuration – HDFS Administering –Monitoring & Maintenance

UNIT-IV

HADOOP ECOSYSTEM, YARN, HIVE & PIG: Hadoop ecosystem components - Schedulers - Fair and Capacity, Hadoop 2.0 New Features NameNode High Availability, HDFS Federation, MRv2, YARN, RunningMRv1 in YARN. Hive Architecture and Installation, Comparison with Traditional Database, HiveQL – Querying Data - Sorting And Aggregating, Map Reduce Scripts, Advance Indexing

Text/ReferenceBooks

Sr.No.	NAME	AUTHOS(S)	PUBLISHER
1	Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data	Chris Eaton, Paul Zikopoulos	McGraw-Hill
2	Big Data Analytics: TurningBig Data into Big Money	Frank J. Ohlhorst	John Wiley & Sons
3	Ethics of Big Data	Kord Davis	O'Reilly Media
4	Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends	Michael Minelli, Michele Chambers, Ambiga Dhiraj	Wiley

Course Code	**CSE470**
Course Title	**Advanced Parallel Computing**
Type of Course	PE
L T P	4 0 0
Credits	4
Course Prerequisites	Basic knowledge of Computer System Architecture
Course Objectives	Students become familiar with parallel computer architecture and algorithms.
Course Outcome (CO)	The learner will be able to- 1. Understand basic terms used in parallel computing 2. Classify parallel computers 3. Describe parallel computer architecture 4. Analyze parallel algorithms

SYLLABUS

UNIT-I

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

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

UNIT-II

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

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

UNIT-III

Parallel Algorithm & 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

Recent Trends: Multicompontent CPU; Apex architecture IA 64; Hyperthreading

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

Eighth Semester

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

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

Open Electives

ourseCode	**CSE371**
Course Title	**Basics Of Database Design**
Type of Course	**OE**
L T P	3 0 0
Credits	3
Course Prerequisites	Elementary knowledge about computers including someexperience using Windows. Basic knowledge about programmingin some common programming language.
Course Objectives	This subject assesses new developments in database technology. ItInterpret and explain the impact of emerging database standards and Evaluate the contribution of database theory to practical implementations of database management systems
Course Outcome(CO)	The learner will be able to- 1. Understand basic concepts of database 2. Develop and Design ER diagram 3. Develop Relational database management system using constraints and normalization concepts 4. Implement security issues on the developed databases

SYLLABUS

UNIT-I

Introduction to Databases and Transactions: Basic concepts **of** database, Need of databasesystem, File based 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 database Model: Logical view of data, keys, integrity rules. Relational Databasedesign: features of good relational database design, atomic domain and Normalization.

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, computational capabilities.

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.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**Author(S)**	**Publisher**
1	Fundamentals of Database Systems, Third Edition	Elmasri/Navathe	Addison Wesley
2	Database Concepts	Korth and Silberschatz Abraham,	McGraw Hall
3	An introduction to Database Systems	C.J. Date.	Addison Wesley
4	An introduction to Database Systems	Bipin C. Desai.	West Publishing
5	SQL,PL/SQL ,The programming language of oracle	Ivan Bayross	BPB Publication

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CourseCode	**CSE373**
Course Title	**Fuzzy logic**
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Basic knowledge about programming in some common programming language.
Course Objectives	To use Fuzzy logic in Design and Manufacture.
Course Outcomes(CO)	Thelearnerwill beableto 1. Understand concepts of Fuzzy logic and fuzzyset operations. 2. Understand and describe operationsonfuzzyrelations. 3. Explain features of the membership function 4. Implement conversion of fuzzy to crisp using fuzzy arithmetic

SYLLABUS

UNIT-I

Introduction, Classical Sets and Fuzzy Sets

Background, Uncertainty and Imprecision, Statistics and Random Processes, Uncertainty inInformation, Fuzzy Sets and Membership, Chance versus Ambiguity. Classical Sets - Operations on Classical Sets, Properties of Classical (Crisp) Sets, Mapping of Classical Setsto Functions Fuzzy Sets - Fuzzy Set operations, Properties of Fuzzy Sets. Sets as Points in Hypercubes

UNIT-II

Classical Relations and Fuzzy Relations

Cartesian Product, Crisp Relations- Cardinality of Crisp Relations, Operations on Crisp Relations, Properties of Crisp Relations, Composition. Fuzzy Relations - Cardinality of Fuzzy Relations, Operations on Fuzzy Relations, Properties of Fuzzy Relations, Fuzzy Cartesian Product and Composition.

UNIT-III

Membership Functions

Features of the Membership Function, Standard Forms and Boundaries, Fuzzification, Membership Value Assignments – Intuition, Inference, Rank Ordering, Angular Fuzzy Sets,Neural Networks, Genetic Algorithms, Inductive Reasoning.

UNIT-IV

Fuzzy-to-Crisp Conversions, Fuzzy Arithmetic, Defuzzification Methods Extension Principle - Crisp Functions, Mapping and Relations, Functions of fuzzy Sets.

Fuzzy Rule- Based Systems
Rule-Based Systems - Canonical Rule Forms, Decomposition of Compound Rules, Likelihood and Truth Qualification, Aggregation of Fuzzy Rules, Graphical Techniques of Inference

Fuzzy Classification
Classification by Equivalence Relations - Crisp Relations, Fuzzy Relations. Cluster Analysis, Cluster Validity, c-Means Clustering - Hard c-Means (HCM), Fuzzy c-Means (FCM). Classification Metric, Hardening the Fuzzy c-Partition.

RECOMMENDEDBOOKS			
S.No.	**Name**	**Author(s)**	**Publisher**
1	Fuzzy Sets And Fuzzy Logic	Klir.G, YuanB.B	Prentice Hall Of India Private Limited,1997
2	Fundamentals Of Neural Networks	LauranceFausett	PrenticeHall

CourseCode	**ME371**
CourseTitle	**Total Quality Management**
type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Nil
Course Objectives	This subject provides students with the knowledge to understand the philosophy and core values of Total Quality Management (TQM), determining the voice of the customer and the impact of quality on economic performance and long- term business success of an organization; apply and evaluate best practices for the attainment of total quality.
Course Outcomes(CO)	The learner willbe able to- 1. Develop an understanding on quality management philosophies and frameworks. 2. Adopt TQM methodologies for continuous improvement of quality. 3. Determine the set of indicators to evaluate performance excellence of an organization 1.

SYLLABUS

UNIT-I

Quality and Total Quality Management: Excellence in manufacturing/service, factors of excellence, relevance of TQM.
Concept and definition of quality: Total quality control (TQC) and Total Quality Management (TQM), salient features of TQC and TQM. Total Quality Management Models, benefits of TQM.
Just-in-time (JIT): Definition: Elements, benefits, equipment layout for JIT system, Kanban system MRP (Material Requirement planning) vs JIT system, Waste elimination, workers involvement through JIT: JIT cause and effect chain, JIT implementation.

UNIT-II

Customer: Satisfaction, data collection and complaint, redressal mechanism.
Planning Process: Policy development and implementation; plan formulation and implementation.

Process Management: Factors affecting process management, Quality function development (QFD), and quality assurance system.

UNIT-III

Total Employees Involvement (TEI): Empowering employees: team building; quality circles; reward and Recognition; education and training, Suggestion schemes.
Problems solving: Defining problem, Problem identification and solving process, QC tools. **Benchmarking:** Definition, concept, process and types of benchmarking.

UNIT-IV

Quality Systems: Concept of quality system standards: relevance and origin of ISO 9000; Benefits; Elements of ISO 9001, ISO 9002, ISO 9003.

Advanced techniques of TQM: Design of experiments: failure mode effect analysis: Taguchi methods.

RECOMMENDED BOOKS			
S.No.	**Name**	**Author(s)**	**Publisher**
1	Total Quality Management	Sunder Raju	Tata McGraw Hill.
2	TQM for engineers	M.Zairi	Aditya Books.
3	Total Quality Management Handbook	J.L. Hradeskym	McGraw Hill.
4	Total Quality Key terms and concepts	William L.Duncan	Amacom
5	Total Quality Management and Operational Excellence Text with Cases	John S. Oakland	Routledge

CourseCode	**ME373**
Course Title	**Production Planning & Control**
Type of Course	**OE**
L T P	3 0 0
Credits	3
Course pre-requisite	NA
Course Objectives	The objective of this course is to Assist the students to acquire proficiency concept of planning and control of production.
Course Outcomes(Cos)	Thelearner willbe ableto-
	Understand the role Production Planning and control activities inManufacturingandServices
	Understand and perform various Inventory Management techniques ainrealmanufacturingscenario
	DemonstratevariousSchedulingprocedures

Syllabus

UNIT-I

Production Planning & Control: Importance, Objectives, and Functions Types of Production Systems. Production Procedure: Production Cycle, Planning & Control in the Production Procedure. Production Organization: Organization Structure, Sections of Planning & Control Department. Product Selection, Process Selection, Plant Location, Plant Layout, Operations Capacity Planning.

UNIT-II

Production Order: Process Charts, Production Master Programmes, Operation & Route Sheets, Breakdown of the Production Order & preparation of various Cards. Production Planning: Operations Planning and Scheduling Systems, Aggregate Planning Process, Strategies for Aggregate Planning, Disaggregation of Aggregate Plans, Master Production Schedule (MPS), Material Requirement Planning (MRP), Rough Cut Capacity Planning.

UNIT-III

Production Control: Machine Loading; Infinite and Finite Loading, Gantt Load Chart, Visual Load Profiles; Detailed Scheduling: Gantt Scheduling Chart, Forward and Backward Scheduling, Forms Schedules, Inputs

of Schedule, Drawing a Job Schedule, Factors influencing Scheduling, Procedure Scheduling, Reducing Scheduling Problems; Dispatching; Expediting; recording Progress; Input / Output Control.

UNIT-IV

Production Control for Mass Production: Design of Production Line, Assembly Line Balancing. Production Control for Batch production: Inventory Control for Single and Multiple Products, Line of Balance. Production control for Job Shop Production: Jumbled Flow in a Job Shop, Job

Sequencing for Machine Limited Scheduling Systems, Job Sequencing for Men and Machine Limited Scheduling Systems.

RECOMMENDEDBOOKS			
SrNo	**Author(s)**	**Title**	**Publisher**
1.	Bhupender Kour	Effectual Communication Skills	S.K. Kataria and Sons
2.	R. Datta Roy and K.K. Dheer	Communications Skills	Vishal Publishing Company
3	The Essence of Effective Communication	Ludlow and Panthon	Ludlow and Panthon

CourseCode	**EE371**
Course Title	**Electrical Energy Conservation and Auditing**
Type of Course	**OE**
L T P	3 0 0
Credits	3
Course Prerequisites	Basic electrical.
Course Objectives (CO)	To understand the current energy scenario and importance of energy conservation, the concepts of energy management, the methods of improving energy efficiency in different electrical systems and the concepts of different energy efficient devices.

SYLLABUS

UNIT-I

Energy Scenario Commercial and Non-commercial energy, primary energy resources, commercialenergy production, final energy consumption, energy needs of growing economy, long term energyscenario, energy pricing, energy sector reforms, energy and environment, energy security, energyconservation and its importance, restructuring of the energy supply sector, energy strategy for thefuture,air pollution,climatechange. EnergyConservation Act-2001anditsfeatures.

UNIT-II

Basics of Energy and its various forms. Electricity tariff, load management and maximum demandcontrol, power factor improvement, selection & location of capacitors, Thermal Basics-fuels, thermalenergy contents of fuel, temperature & pressure, heat capacity, sensible and latent heat, evaporation, condensation,steam, moistairand humidity &heat transfer, unitsand conversion.

UNIT-III

Energy Management & Audit Definition, energy audit, need, types of energy audit. Energy management (audit) approach-understanding energy costs, bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies, optimizing the input energy requirements, fuel & energy substitution, energy audit instruments. Material and Energy balance: Facility as an energy system, methods for preparing process flow, material and energy balance diagrams.

UNIT-IV

Energy Efficiency in Electrical Systems -Electrical system: Electricity billing, electrical load management and maximum demand control, power factor improvement and its benefit, selection and location of capacitors, performance assessment of PF capacitors, distribution and transformer losses. Electric motors: Types, losses in induction motors, motor efficiency, factors affecting motor performance, rewinding and motor replacement issues, energy saving opportunities with energy efficient motors.

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RECOMMENDEDBOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Guide books for National Certification Examination for Energy	Manager Energy Auditors Book-1	General Aspects
2	Utilization of Electrical Energy and Conservation	S. C. Tripathy,	McGraw Hill, 1991.
3	Success stories of Energy Conservation	BEE	BEE New Delhi

CourseCode	**EE373**
Course Title	**Elements of Power System**
Type of Course	**OE**
L T P	3 0 0
Credits	3
Course Prerequisites	Basic electrical.
Course Objectives (CO)	To familiarize with concept of power system transmission and distribution.

SYLLABUS

UNIT-I

Power System Components: Single line Diagram of Power system, Brief description of power system Elements: Synchronous machine, transformer, transmission line, bus bar, circuit breaker and isolator Supply System Different kinds of supply system and their comparison, choice of transmission voltage

Transmission Lines: Configurations, types of conductors, resistance of line, skin effect, Kelvin's law. Proximity effect.

UNIT-II

Over Head Transmission Lines:-Calculation of inductance and capacitance of single phase, three phase, single circuit and double circuit transmission lines, Representation and performance of short, medium and long transmission lines, Ferranti effect. Surge impedance loading **Overhead line Insulators:** Type of insulators and their applications, potential distribution over a string of insulators, methods of equalizing the potential, string efficiency

UNIT-III

Mechanical Design of transmission line: Catenary curve, calculation of sag & tension, effects of wind and ice loading, sag template, vibration dampers Insulated cables: Type of cables and their construction, dielectric stress, grading of cables, insulation resistance, capacitance of single phase and three phase cables, dielectric loss, heating of cables

UNIT-IV

EHV AC and HVDC Transmission: Introduction to EHV AC and HVDC transmission and their comparison, use of bundle conductors, kinds of DC links, and incorporation of HVDC into AC system.

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Electrical Power Systems.	WadhwaC. L.	New age international Ltd.
2	Power System Analysis and Design.	GuptaB. R.	S. Chand & Co
3	Electric Power	Uppal S. L.	Khanna Publishers

CourseCode	**ECE371**
CourseTitle	**Signals and Systems**
Type of Course	**OE**
L T P	**3 0 0**
Credits	3
Course Prerequisites	NA
Course Objectives(CO)	Projectsare non-recurring activities requiring a different set ofskill for planning as compared to regular and operative activities.The course is aimed at developing the understanding of projectactivitiesand relevantskills.

SYLLABUS

UNIT-I

Introduction to Signals and Systems : Basic definitions, Classification of signals and systems. Signal operations and properties. Basic continuous time signals, signal sampling and quantization, discretization of continuous time signals, discrete time signals. Basic system properties, Representation of digital signals.

UNIT-II

Impulse response of CT and DT LTI Systems: characterization and convolution integral for CT- LTI system, signal responses to CT-LTI system, properties of convolution, LTI system response properties from impulse response. Impulse response characterization and convolution sum, Impulse response of DT-LTI system. System analysis from difference equation model .

UNIT-III

Representation of periodic functions: Fourier series, Frequency spectrum of aperiodic signals, Fourier Transform, Relation between Laplace Transform and Fourier Transform and its properties.

UNIT-IV

Z-Transform & its Properties: The z-Transform, Convergence of z-Transform, Basic z- Transform, Properties of z-Transform, Inverse z-Transform and Solving difference equation using z-Transform .

RECOMMENDED BOOKS			
S.No	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Signals and Systems	A.V. Oppenheim, A.S. Willsky and I.T. Young,	Prentice Hall
2	Introduction to Signals and Systems	Douglas K. Lindner	McGraw Hill International
3	Signals and Systems - Continuous and Discrete	R.F. Ziemer, W.H. Tranter and D.R. Fannin	Prentice Hall
4	Circuits and Systems: A Modern Approach	Papoulis	HRW
5	Signal Processing and Linear Systems	B.P. Lathi	Oxford University Press

CourseCode	**ECE373**
Course Title	**Microcontroller and Applications**
Type of Course	**OE**
L T P	3 0 0
Credits	3
Course Prerequisites	Microprocessor
Course Objectives (CO)	The course has been planned to know the architecture, instruction sets and various techniques for the interfacing of 8051 with different real world I/O devices to accomplish certain tasks.

SYLLABUS

UNIT-I

Introductionto8051 Microcontrollers: Basicdifferencesand similarities betweenMicroprocessorand Microcontroller, Overview of 8051 family. : Intel 8051 history, Pin diagram of 8051, 8051-Architecture,Additionalfeaturesin8052.

UNIT-II

8051 Assembly Language Programming: Introduction to 8051 Assembly programming, Assemblingand running an 8051 program, Data Types and directives, 8051 flag bits and PSW register. Registerbanksand stack.

UNIT-III

Instruction Set of 8051: Addressing modes and accessing memory using various addressing modes,Jump, Loop and Callinstructions, Arithmetic instructions and programs, Logic instructions andprograms, Single bitinstructions and programming, Timer/counter programming in the 8051, Interruptprogramming.

UNIT-IV

Serial Communication: 8051 connection to RS 232, 8051 serial communication programming. Hardware interfacing: I/O Port programming, Bit manipulation. Interfacing to a LED, LCD, Keyboard, ADC, DAC , Stepper Motors and sensors. Introduction to latest microcontroller: PIC microcontroller- Architecture, PIN Diagram.

RECOMMENDEDBOOKS			
S.No	**Name**	**Author(S)**	**Publisher**
1	The 8051 Microcontroller and embedded Systems	Ali Mazidi	PearsonEducation
2	The PIC Microcontroller and Embedded Systems	Ali Mazidi	AliMazidi
3	An Embedded Software Primer	David e Simon	PearsonEducation

CouseCode	**CE371**
Course Title	**Renewable Energy Resources**
Type of Course	**OE**
L T P	3 0 0
Credits	3
Course Prerequisites	NA
Course Objectives (CO)	The class will explore society's present needs and future energy demands, examine conventional energy sources and systems, including fossil fuels and nuclearenergy, and then focus on alternate, renewable energy sources such as solar, biomass (conversions), wind power, geothermal, and hydro.
Course Outcomes(CO)	The learner willbe ableto-
	1.Makeinterpretationabouttheenergysources,comprehendthe energyandenergytypes.
	2.Makeinterpretationabouttheesolar energy,explainthesolarenergy power plants.
	3.Makeinterpretationabouttheegeothermal energy, explaintheproduction ofelectricity from geothermalfluid.

SYLLABUS

UNIT-I

Principles of solar radiation: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT-II

Solar energy collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.
Solar energy storage and applications: Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

UNIT III

Wind energy: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria
Bio-mass: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.

UNIT-IV

Geothermal energy: Resources, types of wells, methods of harnessing the energy, potential in India.
Ocean energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.
Direct energy conversion: Need for DEC, Carnot cycle, limitations, principles of DEC

RecommendedBooks			
S.No.	**Name**	**Author(s)**	**Publisher**
1	Non-ConventionalSources	Energy	G.D.Rai
2	RenewableEnergyResources	Twidell&Wier	CRCPress(Taylor&Francis)
3	Renewableenergyresources	TiwariandGhosal	Narosa.
4	RenewableTechnologies	Energy	KMittal

CourseCode	CE373
CourseTitle	**Architecture&TownPlanning**
TypeofCourse	OE
L T P	30 0
Credits	3
CoursePrerequisites	
CourseObjectives	Toenablethestudentstorelatethearchitecturalprojectsincontextofplanningin rural, urbanand regional context.
CourseOutcomes (CO)	Thelearner willbe ableto-
	1. To understand the human factors in traffic engineeringdesign.
	2. Todesignthecross-sectionandalignmentofhighway.
	3. To use an appropriate traffic flow theory for trafficcharacteristics.

SYLLABUS

UNIT-I

ElementsofDesign:

Linedirection.Shape,size,texture,valueandcolour,balance,scaleandproportion.

PrinciplesofDesign:

Repetition,gradation,harmony,contrastandunity,creationof2Dand3D compositions.

UNIT-II

TheIndustrialRevolution:

The age of revivals, the emergence of engineer, new materials and techniques and the evolutionofballoon frameand steel frame.

OriginofModernArchitecture:

Definitionandconceptofmodernarchitecture,variouspioneersofmodernarchitecture.

UNIT-III

TownPlanning:

Definition and meaning, age of planning, scope and motives of planning, brief history of townplanning – its origin and growth, historically development of town planning in ancient valleycivilizations. Indus Nile Tigris and Euphrates, Greek Roman, Medieval and Renaissance townplanning

NewConcepts:

Garden city movement, Linear city and concentric city concepts, Neighbourhood and Radburm,La-citeindustrial, Radiant city to present day planning.

UNIT-IV

PlanningPrinciples:

Types of town and their functions, types of town planning – Grid Iron, Radial, Spider webs,Irregularand Mixed, their advantagesand disadvantages.

Planning Practice and Techniques:Zoning–

itsdefinition,procedureanddistricts,heightandbulkzoning,F.A.R.,MasterPlan–

Meaning, preparation andrealization, the scope of cityplanning– city rehabilitationandslum clearance.

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(s)**	**Publisher**
1	UrbanPlanningProblems	Cherry,Gordon	BoardHill,London
2	Urban and Regional Planning inIndia	Sundaram,KV	VikasPublishing house(P)Ltd.,New Delhi
3	TheUrbanPattern	GallionAB,EisnerS,	VanNostrandreinhold, New York

CourseCode	**CSE372**
CourseTitle	**CommunicationNetworks**
TypeofCourse	**OE**
L T P	3 0 0
Credits	3
CoursePrerequisites	BasicknowledgeofComputer,DigitalCircuitsandNetworkArrangement.
CourseObjectives (CO)	Tobefamiliarwithvariouscomputernetwork architecturesandto identify the infrastructure components, design infrastructureincludingdevices,topologiesandprotocols.
CourseOutcome (CO)	Thelearner willbe ableto- 1. Understandbasicsofcomputernetwork 2. DescribeISO-OSIreferencemodel 3. Explainvariouslayersof OSImodel 4. Implementanddemonstratenetworking

SYLLABUS

UNIT-I

Introduction to Computer Networks: Computer network and its goals, Types of computernetworks:LAN,MAN,WAN,Wirelessandwirednetworks,broadcastandpointtopointnetworks, Network topologies, Network software: concept of layers, protocols, interfaces andservices,ISO-OSIreferencemodel, TCP/IP referencemodel.

UNIT-II

Physical Layer: Concept of Analog & Digital Signal, Bandwidth, Transmission Impairments:Attenuation,Distortion,Noise,Datarate limits:Nyquistformula,ShannonFormula,Multiplexing:FrequencyDivision,TimeDivision,WavelengthDivision,IntroductiontoTransmission Media : Twisted pair, Coaxial cable, Fiber optics, Wireless transmission (radio,microwave,infrared),Switching:CircuitSwitching,MessageSwitching,PacketSwitching& theircomparisons.

Data Link Layer: Design issues, Framing, Error detection and correction codes: checksum,CRC, hamming code, Data link protocols for noisy and noiseless channels, Sliding WindowProtocols: Stop & Wait ARQ, Go-back-N ARQ, Selective repeat ARQ, Data link protocols:HDLCand PPP.

Medium Access Sub-Layer: Static and dynamic channel allocation, Random Access: ALOHA,CSMAprotocols,ControlledAccess:Polling,TokenPassing,IEEE802.3frameformat,Ethernetcabling, Manchester encoding, collision detection in 802.3, Binary exponential back offalgorithm

UNIT-III

NetworkLayer: Design issues,IPv4classfulandclasslessaddressing,subnetting,Routingalgorithms: distance vector and link state routing, Congestion control: Principles of CongestionControl,Congestion preventionpolicies, Leaky bucketand token bucketalgorithms.

TransportLayer:Elementsoftransportprotocols:addressing,connectionestablishmentand

release, flowcontrolandbuffering, multiple introduction to TCP/UDP protocols andtheircomparison.

UNIT-IV

Application Layer: World Wide Web (WWW), Domain Name System (DNS), E-mail,FileTransfer Protocol (FTP), Networksecurity.

Session& PresentationLayeringandde-multiplexing,crashrecovery,

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(S)**	**Publisher**
1	Communication Networks: FundamentalsandConceptsandKeyArchitectures	LeonGarrciaandIndraWidjaja	TMH
2	ComputerNetworks.	A.S.Tanenbaum	PHI
3	Introduction to DataCommunicationandNetworks	Forouzan,Coombs andFagan	TMH
4	DataandCommunication	WilliamStallings	PHI

Course Code	**CSE374**
Course Title	**Computer Organization**
Type of Course	**OE**
L T P	3 0 0
Credits	3
Course Prerequisites	Basic knowledge of computer and its components.
Course Outcomes (CO)	The learner willbe ableto- 1. Understand number system and representation of information 2. Describe basic computer organization and design 3. Explain control unit and register organization 4. Design issues of pipeline architecture.

SYLLABUS

UNIT-I

Introduction: Introduction to Number System and Representation of information.
Register Transfer and Micro operations: Register transfer language & operations, arithmetic micro operations, logic micro operations, shift micro operations, arithmetic logic shift unit. Design of a complete basic computer and it's working.

UNIT-II

Basic Computer Organisation and Design: Instruction codes, Computer registers, Computer Instructions, Timing and control, Instruction Cycle, Memory reference instructions, Input/ Output and Interrupt, Design of basic Computer, Design of Accumulator Logic.
Design of Control Unit: Control memory, Hardwired control CPU design, Micro-programmed control CPU design and their comparative study.

UNIT-III

Central Processing Unit: General Register Organisation, Stack Organisation, Instruction formats, Addressing Modes, Data transfer and manipulations, Program control, RISC and CISC architecture.

Input-Output Organisation: Peripheral devices, I/O Interface, asynchronous data transfer, modes of transfer, priority interrupt, DMA, I/O processor, serial communication.
Memory Organisation: Memory hierarchy, main memory, auxiliary memory, associative memory, cache

memory, virtual memory, memory management hardware.

UNIT-IV

Pipelining: Introduction to pipelining and pipeline hazards, design issues of pipeline architecture.

Introduction to Parallel Processing: Inter-process or communication & synchronization.

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(S)**	**Publisher**
1	Advanced Computer Architecture	Kai Hawang	Tata McGraw Hill
2	Computer Organization and Design	P.Pal Choudhary	PHI
3	Computer System Architecture	M.Moris Mano	Pearson
4	Computer Organization and Architecture	WilliamStallings	Pearson

Course Code	**ME372**
Course Title	**Industrial Engineering Management**
Type of Course	OE
L T P	3 0 0
Credits	3
Course pre-requisite	None
Course Objectives	To familiarize the students with management of industrial resources and production operations
CourseOutcomes-	The learner will be able to- 1) Describe basic concepts and theories withinthe area of industrial management 2)Student shall be able to present organization alanalysis, 3)Student shall also be able to use simple project planning technique

Syllabus

UNIT-1

Introduction: Definition and scope of industrial engineering Role of an industrial engineeringRole of an industrial engineer in industry, Functions of industrial engineering department and itsorganization, Qualities of an industrial engineer. Plant Layout and Material Handling: Differenttypes of layouts viz. Product, process and combination layouts, Introduction to layouts based onthe GT, JIT and cellular manufacturing systems, Development of plant layout. Types of materialhandlingequipment, relationship ofmaterial handling withplantlayouts.

UNIT-2

Work-study: Areas of application of work study in industry; Method study and work measurements and their inter-relationship. Reaction of management and labour to work study; Role of work study in improving plant productivity and safety. Method Study: Objectives and procedure for methods analysis: Select, Record,

Examine, Develop, Define, Install and Maintain. Recording techniques, Micromotion and macro-motion study: Principles of motion economy, Normal work areas and work place design.

UNIT-3

Work Measurement: Objectives, Work measurement techniques - time study, work sampling, pre-determined motion time standards (PMTS) Determination of time standards. Observed time,

basic time, normal time, rating factors, allowances, standard time. Value Engineering: Types of values, concept of value engineering, phases of value engineering studies, application of value engineering.

UNIT-4

Work Design: Concepts of job enlargement, job enrichment and job rotation. Effective job design considering technological and behavior factors. Ergonomics: Introduction to ergonomic considerations in designing man-machine systems with special reference to design of displays and controls.

S.No	Author	Title	Publisher
1	Gayler Shotbolt	Introduction to Work study	Tata McGraw Hill
2	H.S. Shan	Work Study and Ergonomics	Dhanpat Rai and Co. Ltd
3	R. Bernes	Motion and time study by	John-Wiley
4	D.J. Oborne	Ergonomics at work	John Wiley
5	D. Miles	Techniques of Value Analysis and Engineering	McGraw Hill

Course Code	**ME374**
Course Title	**Lean Manufacturing**
Type of Course	**OE**
L T P	3 0 0
Credits	3
Course pre-requisite	NA
Course Objectives	Implement lean manufacturing concepts in the factories.

Syllabus

UNIT-I

INTRODUCTION: The mass production system – Origin of lean production system – Necessity – Lean revolution in Toyota – Systems and systems thinking – Basic image of lean production – Customer focus – Muda (waste).

UNIT-II

STABILITY OF LEAN SYSTEM: Standards in the lean system – 5S system – Total Productive Maintenance – standardized work – Elements of standardized work – Charts to define standardized work – Man power reduction – Overall efficiency - standardized work and Kaizen – Common layouts.

UNIT-III

JUST IN TIME: Principles of JIT – JIT system – Kanban – Kanban rules – Expanded role of conveyance – Production leveling – Pull systems – Value stream mapping

UNIT-IV

JIDOKA (AUTOMATION WITH A HUMAN TOUCH): Jidoka concept – Poka-Yoke (mistake proofing) systems – Inspection systems and zone control – Types and use of Poka-Yoke systems – Implementation of Jidoka.

WORKER INVOLVEMENT AND SYSTEMATIC PLANNING METHODOLOGY:
Involvement – Activities to support involvement – Quality circle activity – Kaizen training - Suggestion Programmes – Hoshin Planning System (systematic planning methodology) – Phases of Hoshin Planning – Lean culture

RECOMMENDED BOOKS

Sr.no.	Name	AUTHOR(S)	PUBLISHER
1.	How to implement lean manufacturing	Lonnie Wilson	Toyota Production
2.	Lean thinking: banish Waste and create wealth in your corporation	Daniel T. Jones and James P.Womack.	McGraw Hill
3	Statistics for six sigma	Warren Brussee	Made Easy

CourseCode	**EE372**
Course Title	**Industrial Electrical System**
Type of Course	**OE**
L T P	3 0 0
Credits	3
Course Prerequisites	Basic electrical engineering
Course Objectives (CO)	Understand the electrical wiring systems for residential, commercial and industrial consumers, representing the systems with standard symbols and drawings, SLD. Understand various components of industrial electrical systems. Analyze and select the proper size of various electrical system components.

SYLLABUS

UNIT-I

LT system wiring components, selection of cables, wires, switches, distribution box, metering system, Tariff structure, protection components- Fuse, MCB, MCCB, ELCB, inverse current characteristics, symbols, single line diagram (SLD) of a wiring system, Contactor, Isolator, Relays, MPCB, Electric shock and Electrical safety practices.

UNIT-II

Types of residential and commercial wiring systems, general rules and guidelines for installation, load calculation and sizing of wire, rating of main switch, distribution board and protection devices, earthing system calculations, requirements of commercial installation, deciding lighting scheme and number of lamps, earthing of commercial installation, selection and sizing of components.

UNIT-III

Understanding various terms regarding light, lumen, intensity, candle power, lamp efficiency, specific consumption, glare, space to height ratio, waste light factor, depreciation factor, various illumination schemes, Incandescent lamps and modern luminaries like CFL, LED and their operation, energy saving in illumination systems, design of a lighting scheme for a residential and commercial premise, flood lighting.

UNIT-IV

DG Systems, UPS System, Electrical Systems for the elevators, Battery banks, Sizing the DG, UPS and Battery Banks, Selection of UPS and Battery Banks. Study of basic PLC, Role of in automation, advantages of process automation, PLC based control system design, Panel Metering and Introduction to SCADA system for distribution automation.

RECOMMENDED BOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Electrical Power Systems.	WadhwaC. L.	New age international Ltd.
2	Power System Analysis and Design.	GuptaB. R.	S. Chand & Co
3	Electric Power	Uppal S. L.	Khanna Publishers

Course Code	**EE374**
Course Title	**Fundamentals of Electrical Machines**
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Basic electrical.
Course Objectives (CO)	To became familiar with single phase and three phase transformer, DC and AC machines, parallel operation of machines& to calculate the efficiency of machines.

SYLLABUS

UNIT-I

Introduction

Basic Principle, Types and constructional features of electrical machines, torque, and torque angle, basic electromagnetic laws, Induced EMF.

UNIT-II

Transformers

Basic principle, turns ratio, types and parts of a transformer, ideal transformer, transformer on no-load and on-load, phasor diagram, transformer reactance and equivalent circuit, losses, efficiency, all day efficiency, regulation, basic concept of three-phase transformer and auto transformer (excluding analysis).

UNIT-III

Direct Current (DC) Machines

Principle, Constructional features, Types of direct current (DC) machines, Electromotive force (EMF) and torque equations, circuit model, armature reaction, commutation, Types of armature winding(no detailed diagram), characteristics of dc motors, characteristics of dc generators, starting (three point and four point starters), speed control methods, efficiency and applications.

UNIT-IV

A.C MOTORS

Three-phase Induction Machines: Concept of rotating magnetic field in three phase, Construction and principle of operation. slip frequency, rotor currents, rotor Magneto motive force (MMF) and torque production, equivalent circuit; torque slip characteristics, power output, starting;

Single-phase Induction Motors: Principle of single phase induction motors, double field revolving theory, types of single phase induction motors.

Synchronous Machines: Construction and types, Electromotive force (EMF) equation, synchronous reactance.

Principle of Special Motors: Alternating current (AC) series motor, universal motor, reluctance motor, hysteresis motor, stepper motor, Brushless Motors, Switched reluctance motor and their Applications

RECOMMENDED BOOKS

Sr.no.	Name	Author(s)	Publisher
1	Electrical Machines, VOL II	Thareja B.L	S.Chand
2	Bimbhra P.S.	Electrical Machinery,	Khanna Publishers
3	Electrical Machines	Nagrath I.J. and Kothari D.P	Tata McGraw Hill

Course Code	**ECE372**
Course Title	Analog and Digital Communication
Type of Course	OE
L T P	3-0-0
Credits	3
Course Prerequisites	Electronics Devices
Course Objectives (CO)	To study the fundamentals, mathematical analysis, generation, reception and considerations for various types of modulation techniques and impart practical knowledge of different communication systems.

SYLLABUS

UNIT-I

Review of Fundamental Concepts and Mathematical preliminaries: Elements of an electrical communication system; Characteristics of communication channel and their mathematical modeling; Signal models: deterministic and random; signal classification; Convolution Integral and response of LTI system; Fourier series representation, Parseval's theorem; Fourier transform; Hilbert transform.

UNIT-II

Analog communication systems: Concept of modulation and demodulation, Continuous wave (CW) modulation: amplitude modulation (AM) - double sideband (DSB); double sideband suppressed carrier (DSBSC); single sideband suppressed carrier (SSBSC) and vestigial sideband (VSB) modulation, angle modulation - phase modulation (PM) & frequency modulation (FM); narrow and wideband FM. Representation of narrowband noise; receiver model, signal to noise ratio (SNR), noise figure, noise temperature, noise in DSB-SC, SSB, AM & FM receivers, pre-emphasis and de- emphasis.

UNIT-III

Pulse Modulation: Sampling process, sampling theorem for band limited signals; pulse amplitude modulation (PAM); pulse width modulation (PWM); pulse position modulation (PPM) ; pulse code modulation (PCM); line coding; differential pulse code modulation; delta modulation and adaptive delta modulation, Basics of time division multiplexing, noise consideration in PAM and PCM systems..

UNIT-IV

Basic digital modulation schemes: Overview of geometric representation of signals, Gram-Schmidt Orthogonalization procedure; Basic digital modulations schemes: Phase shift keying (PSK), amplitude shift keying (ASK), frequency shift keying (FSK) and Quadrature amplitude modulation (QAM); coherent demodulation and detection; probability of error.

RECOMMENDED BOOKS			
S. No	**Name**	**Author(S)**	**Publisher**
1	Communication Systems	Simon Haykin	Wiley India
2	Modern Digital and Analog Communication Systems	B P Lathi, Zhi Ding	Oxford University Press
3	Principles of Communication Systems	H. Taub, D. L. Schilling, G. Saha	Tata McGraw-Hill
4	Digital Communications	Bernard Sklar	Prentice Hall of India
5	Principles of Communication Systems	Taub and Schilling	Tata McGraw-Hill

Course Code	**ECE374**
Course Title	**Analog Circuits**
Type of Course	**OE**
L T P	3 0 0
Credits	3
Course Prerequisites	Circuit models of CMOS, and BJT, Electronic circuit analysis
Course Objectives (CO)	The course has been planned to Introduce the principles of analog circuits and apply the techniques for the design of analog integrated circuit (Analog IC's).

SYLLABUS

UNIT-I

Low Frequency Transistor Amplifier : Equivalent circuit of BJT using h-parameter for CB, CE and CC & configuration, calculation of transistor parameter for CB, CE & CC using h-parameters, comparison of transistor amplifier configuration.

UNIT-II

Multistage and Large Signal Amplifiers: General cascaded system, RC coupled amplifier and its frequency response, merits and demerits, cascade amplifier, Darlington compound configuration, multistage frequency effect. Large Signal Amplifier Analysis and design of class A, B, AB, C amplifiers, push pull amplifiers, transformer less output stages, distortion calculations.

UNIT-III

Feedback Amplifier Feedback concept, characteristics of negative and positive feedback. Effect of negative and positive feedback on input impedance, output impedance, gain, and noise and frequency response..

UNIT-IV

Oscillators Classification of Oscillators, frequency and frequency stability of oscillatory circuits, Tuned based Oscillators, Hartley Oscillator, Colpitts Oscillators Clapp Oscillator, Crystal Oscillator, Phase Shift Oscillator, Wein Bridge Oscillator

RECOMMENDED BOOKS			
S. No	**Name**	**Author(S)**	**Publisher**
1	Analysis and Design of Analog Integrated Circuits	P.R. Gray and R.G. Meyer	John Wiley and Sons
2	Integrated Electronics	Millman & Halkias	Tata McGraw Hill.
3	Electronic Circuit: Discrete & Integrated	Schilling & Belone	Tata McGraw Hill.
4	OpAmps and Linear IC's	Gayakwad R.A	PHI

CourseCode	**CE372**
Course Title	**Construction of Metro System**
Type of Course	**OE**
L T P	3 0 0
Credits	3
Course Prerequisites	Transport & Railway Engineering
Course Objectives	Study of metro systems
Course Outcome (CO)	The learner willbe able to- 1. Understand overview of Metro system 2. Explain Planning and financials of construction planning and management

SYLLABUS

UNIT-I

Overview of Metro System, Need for metro.

UNIT-II

Routing Studies, Basic Planning and Financials, Intial Surveys and investigations, Basics Of construction planning and management

UNIT-III

Construction Methods for elevated and underground stations, via duct spans & bridges , underground tunnels , Depots commercial and service buildings

UNIT-IV

Construction quality and safety systems , traffic integration , multi modal transfers and pedestrians facilities , environment and social safeguards

Track system – permanent way, facilities management

RECOMMENDED BOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Metro rail projects in INDIA	M.Ramachandran	Oxford University Press
2	Underground Infrastructures	RK Goel, Bhawani Singh and Jian Zhao	**Imprint:** Butterworth-Heinemann, Elsevier Inc.
3	Construction Safety activity book(METRO)	Crenshaw and LAX Transit	Metro

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CourseCode	**CE374**
Course Title	Traffic Engineering
Type of Course	0E
L T P	3 0 0
Credits	3
Course Prerequisites	Transportation Engineering-I,II
Course Objectives	The objective of the course is to give knowledge about the design of flexible and rigid pavements and basic knowledge of docks, harbor & tunnels.
Course Outcomes (CO)	**The learner will be able to have-**
	Knowledge about the design of flexible and rigid pavements
	Basic knowledge of docks, harbor and tunnels.
	Design of Bituminous Mixes, selection of alignment of tunnel, Problems in Tunnelling

SYLLABUS

UNIT-I

Introduction:
Types of pavement structure. Importance and functions of various components of pavement structures, design factors, Factors affecting pavement design, Design wheel load, equivalent single wheel load, repetition of loads climate variation.

UNIT-II

Design of Flexible Pavements:
Flexible pavement design methods: CBR method, group index method , IRC method of design of flexible pavement.

Design of Rigid Pavements:
General design considerations, Wheel load stresses, Westergard's stress equation for wheel load, evaluation of wheel load stress, temperature stresses, design of joints, design of dowel and tie bars, IRC method of design of rigid pavements, CRCP(Continuously Reinforced concrete pavements) FRC (Fibre reinforced concrete pavements), pre stressed concrete pavements

UNIT-III

Design of Bituminous Mixes:
Requirements of bituminous mixes, Marshall Method of Bituminous Mix Design

Harbor and Docks
Harbours and ports, water transportation, natural phenomenon: tides, wind & waves, classification, facilities at major port, protection facilities: wall type and special break waters, planning & layout of ports, classification

of docks, docking facilities, repairing facilities-fixed form & movable form , approach facilities, loading and unloading facilities, guiding facilities- light house & signal, storing facilities.

UNIT-IV

Tunnels
General, basic definition, merits & demerits of tunnels & open cuts, selection of alignment of tunnel, classification of tunnels, unnel approaches.

Problems in Tunneling
Introduction to various stages in tunnel construction, methods of tunneling in soft soil & rock, tunnel lining necessity and material used, drainage in tunnels, health protection in tunnels.

RECOMMENDED BOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Docks and harbor engineering	Bindra S.P	Dhanpat rai
2	Principles, practices and design highway engineering	Sharma S.K	S chand & company ltd 1995
3	Highway engineering	Khanna S.K & Justo CEG	Nem chand and brother roorkee

CourseCode	**CSE471**
Course Title	**Concepts of Operating Systems**
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Overview of Computer Architecture
Course Objectives	This course provides the knowledge about the role of an operating system, issues in the management of resources like processor, memory and input-output, design of an operating system.
Course outcomes (CO)	The learner will be able to- 1. Get knowledge of operating system 2. Understand Operating system architecture and its functions 3. Explain memory and process management. 4. Implement security issues and remove security breaches

SYLLABUS

UNIT-I

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

UNIT-II

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

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

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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 Systems Concepts	A Silberschatz, P.B. Galvin, G. Gagne	John Wiley Publications
2	Operating Systems: A Modern Perspective	G. Nutt	Pearson Education
3	Modern Operating Systems	A.S. Tanenbaum	Pearson Education
4	Operating Systems, Internals and Design Principles	W. Stallings	Prentice Hall of India

CourseCode	**CSE473**
Course Title	**Data Warehousing And Data Mining**
Type of Course	**OE**
L T P	3 0 0
Credits	3
Course Prerequisites	Database Systems
Course Objectives	Students will be enabled to understand and implement classical models and algorithms in data warehousing and data mining.
Course Outcomes (CO)	The learner will be able to- 1. Understand difference between database and datawarehouse 2. Identify Need of Data warehouse 3. Describe architecture of datawarehouse 4. Explain OLAP and OLTP models 5. Implement clustering and classification techniques

SYLLABUS

UNIT-I

Differences between OLTP Systems and Data Warehouse: Characteristics of Data Warehouse; Functionality of Data Warehouse: Advantages and Applications of Data Warehouse;

Data Warehouse Architecture: Introductions, Components of Data warehouse Architecture: Technical Architectures; Data warehouse architectures 1: Data warehouse architecture 2: Data warehouse architecture 3: Tool selection: Federated Data Warehouse Architecture:

UNIT-II

Data Warehouse & OLAP: Introduction: What is OLAP?; Characteristics of OLAP, Steps in the OLAP Creation Process, Advantageous of OLAP: What is Multidimensional Data: OLAP Architectures; MOLAP, ROLAP, HOLAP: Data Warehouse and OLAP: Hypercube & Multicubes

Meta data Management in Data Warehouse: Introductions to Metadata: Categorizing Meta data: Meta data management in practice; Meta data requirements gathering, Meta data classification, Meta data collection strategies: Meta Data Management in Oracle and SAS: Tools for Meta data management

UNIT-III

Introduction to Data Mining: Introduction: Scope of Data Mining: What is Data Mining; How does Data Mining Works, Predictive Modeling: Data Mining and Data Warehousing: Architecture for Data Mining: Profitable Applications: Data Mining Tools: Data Preprocessing: Introduction, Data

Preprocessing Overview, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

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

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

UNIT-IV

Web Mining: Introduction, Terminologies, Categories of Web Mining – Web Content Mining, Web Structure Mining, Web Usage Mining, Applications of Web Mining, and Agent based and Data base approaches, Web mining Software.

Applications of Data mining: Introduction, Business Applications Using Data Mining- Risk management and targeted marketing, Customer profiles and feature [illegible] ical applications (diabetic screening), Scientific Applications using Data Mining, Other Applications.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Data Warehousing And Data Mining	Varsha V. Bhosale	Wiley India
2	Data Warehousing: OLAP and Data Mining	Amos Gilat	Wiley India
3	Introduction to Data Mining	Pang-Ning Tan, Michael Steinbach, Vipin Kumar	**Pearson Education India**
4	Data Mining	Pieter Adrians, Dolf zantinge	**Pearson Education India**
5	Database Management Systems	R. Ramakrishnan, J. Gehrke,	McGraw Hill

Course Code	**ME471-19**
Course Title	**Material Management**
Type of Course	**OE**
L T P	3 0 0
Credits	3
Course pre-requisite	NA
Course Objectives	To introduce to the students the various concepts of materials management

Syllabus

UNIT I

Introduction to materials management – Objectives – Functions – Operating Cycle – Value analysis – Make or buy decisions.

UNIT II

Management of purchase: Purchasing policies and procedures – Selection of sources of supply – Vendor development – Vendor evaluation and rating – Methods of purchasing – Imports – Buyer – Seller relationship – Negotiations.

UNIT III

Management of stores and logistics 12 Stores function – Location – Layout – Stock taking – Materials handling – Transportation – Insurance – Codification – Inventory pricing – stores management – safety – warehousing – Distribution linear programming – Traveling Salesman problems – Network analysis – Logistics Management.

UNIT IV

Materials plan for forecasting – Materials requirements planning – Quantity – Periodic – Deterministic models – Finite production. Inventory management 10 ABC analysis – Aggregate planning – Lot size under constraints – Just in Time (JIT) system.

RECOMMENDED BOOKS			
Sr No	**Name**	**AUTHOR(S)**	**PUBLISHER**
1.	Engineering Management	Dr. R. Kesavan, C.Elanchezian and T.SundarSelwyn.	Eswar Press
2.	Purchasing and Material Management,	Lamer Lee and Donald W. Dobler	Tata McGraw Hill, 200
3	Handbook of Materials Management	Gopalakrishnan.P	Prentice Hall of India.

Course Code	**ME473-19**
Course Title	**Maintenance and Reliability Engineering**
Type of Course	**OE**
L T P	**3 0 0**
Credits	3
Course pre-requisite	NA
Course Objectives	To understand the structure of microprocessors and their applications in mechanical devices, the principle of automatic control and real time motion control systems, with the help of electrical drives and actuators, use of micro-sensors and their applications in various fields .
Course outcome	The learner will be able to- 1, Understand objective and characteristics of maintenance function 2. Analyze cost of machine breakdown 3. Design a system which is reliable

Syllabus

UNIT-I

Introduction: Objective and characteristics of maintenance function, Organization of the maintenance system, Operating practices in maintenance, Maintenance record keeping.

Cost Aspect of Maintenance: Costs of machine breakdown, estimation of life cycle costs, Application of work measurement in maintenance, Manpower planning and training, Incentive payments for maintenance.

UNIT-II

Planning of Maintenance Activities: Evaluation of alternative maintenance policies breakdown, preventive and predictive maintenance, fault diagnosis and condition monitoring techniques, simulation of alternative practices, Development of preventive maintenance schedule, Housekeeping practices, total productive maintenance.

Maintenance Engineering: Maintenance requirements of mechanical, electrical, process and service equipment, Safety aspect in maintenance, Aspect of lubrication; chemical control of corrosion, Computerized maintenance information systems.

UNIT-III

Reliability: Concept and definition, configuration of failure data, various terms used in failure data analysis in mathematical forms, component and system failures, uses of reliability concepts in design and maintenance of different system.

Reliability and Availability of Engineering systems: Quantitative estimation of reliability of parts,

Reliability of parallel and series elements, Accuracy and confidence of reliability estimation, Statistical estimation of reliability indices, Machine failure pattern, Breakdown time distribution.

UNIT-IV

Reliability improvement: Reliability in design, reliability in engineering, systems, systems with spares, reliability simulation, redundant and stand by systems, confidence levels, component improvement element, unit and standby redundancy optimization and reliability-cost trade off.

Fault Tree Analysis: Introduction and importance, fault tree construction, reliability calculations from fault tree, tie set and cut set methods, event tree and numerical problems.

Course Code	**EE471-19**
Course Title	**Wind and Solar energy system**
Type of Course	**OE**
L T P	3 0 0
Credits	3
Course Prerequisites	NA
Course Objectives (CO)	The class will explore society's present needs and future energy demands, examine conventional energy sources and systems, then focus on alternate, renewable energy sources such as solar and wind power.

SYLLABUS

UNIT-I

History of wind power, Indian and Global statistics, Wind physics, Betz limit, Tip speed ratio, stall and pitch control, Wind speed statistics-probability distributions, Wind speed and power- cumulative distribution functions.

UNIT-II

Review of modern wind turbine technologies, Fixed and Variable speed wind turbines, Induction Generators, Doubly-Fed Induction Generators and their characteristics, Permanent- Magnet Synchronous Generators, Power electronics converters. Generator-Converter configurations, Converter Control.

UNIT-III

Introduction, solar radiation spectra, solar geometry, Earth Sun angles, observer Sun angles, solar day length, Estimation of solar energy availability.

UNIT-IV

Technologies-Amorphous, monocrystalline, polycrystalline; V-I characteristics of a PV cell, PV module, array, Power Electronic Converters for Solar Systems

Course Code	**EE473-19**
Course Title	**Instrumentation Engineering**
Type of Course	**OE**
L T P	3 0 0
Credits	3
Course Prerequisites	NA
Course Objectives (CO)	To understand the principle and working of electronic instruments and their application. 2. To understand the concept of digital instruments and their comparison. 3. To be able to inculcate the knowledge regarding different types of transducers. 4. To identify the details of instrumentation and devices intended for a particular application.

SYLLABUS

UNIT-I

ELECTRONIC INSTRUMENTS:-Electronic Voltmeter and Current Probes, Tuned Type and Sampling type Voltmeter, Current Probes for D.C. and A.C. Measurements, Electronic Multimeter - Construction, Measurement of D.C. and A.C. Voltage and Current, Measurement of Resistance. CRO- Construction, Synchronization, Measurement of Voltage, Current, Phase and Frequency, DSO- Working and Operation

UNIT-II

Comparison of Analog and Digital Instruments, Digital Voltmeter, Multimeter and Frequency Meter.

UNIT-III

TRANSDUCERS:-Block Diagram Representation of Instrumentation System, Terminology and Definition, Classification, Transducing Principles and Elements, Ultrasonic, Optical and Infrared Sensors, Inductive, Capacitive and Resistive Transducers for Measurements of Length, Thickness, Displacement, Velocity, Torque, Level, Pressure, Temperature, Flow, Humidity, Moisture and ph.

UNIT-IV

Recorders: X-Y Recorders, Strip-Chart Recorder, Magnetic and Potentiometric Recorder, Digital Display

s- LED and LCD, Introduction to Data Acquisition Systems

Recommended Books			
S.No.	**Name**	**Author(s)**	**Publisher**
1	A course in Electrical & Electronic Instrumentation,	Sawhney A.K.,	Dhanpat Rai and Sons.
2	Electronics Instrumentation and Measurements,	Bell David A	Prentice Hall, India
3	Electrical Measurements Fundamentals, Concepts, Applications,	Reissl and Martin V	Wiley Eastern Limited, New Delhi.

Course Code	**ECE471-19**
Course Title	**Bio-Medical Electronics**
Type of Course	**OE**
L T P	3 0 0
Credits	3
Course Prerequisites	Applications Of Electronics In Medical Field.
Course Objectives (CO)	To study the methods of recording various bio-potentials, how to measure various physiological information, understand the working of biotelemetry and understand the practical application of electronics in biomedical.

SYLLABUS

UNIT I

Introduction to Biomedical Signals: The origin of Bio-potential, biological amplifiers, ECG, EMG, PCG, EOG, lead systems and recording methods, typical waveforms and signal characteristics. Electrode theory and Different types of Electrodes. Polarization, Electrode behavior, Electrode-skin interface.

UNIT II

Cardio Vascular Measurement: Measurement of blood pressure, balloon flow, cardiac output and cardiac rate. Assist Devices and bio-telemetry: Cardiac pacemakers, DC Defibrillator, Telemetry principles, frequency selection, Biotelemetry, radio-pill and tele-stimulation.

UNIT III

Neurological Signal Processing :Modeling of EEG Signals, Detection of spikes and spindles, Detection of Alpha, Beta and Gamma Waves, Auto Regressive (A.R.) modeling of seizure EEG, Sleep Stage analysis, Inverse Filtering, Least squares and polynomial modeling.

UNIT IV

Radiological Equipment: Ionizing radiation, Diagnostic x-ray equipment, use of Radio Isotope in diagnosis, Radiation Therapy. Recent trends in medical instrumentation: Thermograph, endoscopy unit, Laser in medicine, Diathermy units, Electrical safety in medical equipment.

RECOMMENDED BOOKS			
S. No	**Name**	**Author(S)**	**Publisher**
1	Biomedical Signal Processing: Principles and techniques	D.C.Reddy	Tata McGraw-Hill
2	Willis J Tompkins	Biomedical Signal Processing	Prentice Hall
3	Khandpur, R.S.	Handbook of Biomedical Instrumentation	Tata McGraw-Hill
4	Introduction to Biomedical equipment Technology	Joseph J.Carr and John M.Brown	John Wiley and Sons
5	Biomedical Signal Processing & Signal Modeling	Bruce	John Wiley and Sons

Course Code	**ECE473-19**
Course Title	**Principles of VLSI Design**
Type of Course	**OE**
L T P	3 0 0
Credits	3
Course Prerequisites	Knowledge of Microprocessor 8085 and Microcontroller 8051.
Course Objectives (CO)	To introduce Microprocessor Architectural Concepts, Instructions & communications and latest microcontrollers.

SYLLABUS

UNIT I: Introduction: Introduction to Computer-aided design tools for digital systems. Hardware description languages, Introduction to VHDL, Data objects, Classes and data types, Operators, Overloading, Logical operators. Types of delays, Entity and Architecture

UNIT II: VHDL Statements: Assignment statements, sequential Statements and process, Conditional statements, Case statements, Array and loops, Resolution functions, Packages & Libraries, Concurrent statements.

UNIT III: Combinational Circuit and Sequential Circuit Design: VHDL models and simulation of combinational circuits such as Multiplexers, Encoders, Decoders, Code converters, Comparators, Implementation of Boolean functions etc VHDL Models and simulation of sequential circuits, Shift registers, Counters etc.

UNIT IV: Design of Microcomputer: Basic components of a computer, Specifications, Architecture of a simple Microcomputer system, Implementation of a simple microcomputer system using VHDL. Design with CPLDs and FPGAs: Programmable logic devices : ROM, PLAs, GAL, PEEL, CPLDs and FPGA. Design and implementation using CPLDs and FPGA

RECOMMENDED BOOKS

S. No	Name	Author(S)	Publisher
1	A VHDL Primmer	Bhasker	Prentice Hall
2	“Digital System Design using VHDL	Charles. H. Roth	PWS
3	VDHL-Analysis & Modelling of Digital Systems	Navabi Z	McGraw Hill
4	Fundamentals of Digital Logic with VHDL Design.	Brown and Vranesic;	TMH

Course Code	**CE471-19**
Course Title	**Rural Technology and Community Development**
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	
Course Objectives (CO)	The objective of this course is to make students aware of the various elements of rural technology and community development.

SYLLABUS

UNIT-I

Data analysis and measures of central tendency

Meaning nature scope and limitations of statistics, collection of statistical data, classification, tabulation and diagrammatic representation of data, measures of central tendency : statistical averages means, media and mode.

UNIT-II

Data Information and Knowledge

Concept of information, need of information(professional education, research), qualities of information, value of information, difference between data and information, properties of the needed information, information and management, planning organizing, Coordinating and controlling

UNIT-III

Concept of Marketing

Difference between marketing selling and retailing, marketing mix, market segmentation, marketing planning, strategy and approaches; modern concept of marketing

Community Development

Concept, definition, meaning, need, history, principles objectives and scope. Community building: coming age, regenerating community, community model

UNIT-IV

Consensus Organizing model

What's behind building healthy communities, participatory democracy. The role of various NGOs in community development. The role of business and government in community development initiatives, how to form a non profit corporation fund raising and grant writing.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**Author(s)**	**Publisher**
1	Encouraging community development	Biddle William wishart	Mcgraw hill
2	Sustainable rural technology	M.S Virdi	Daya publishing house
3	Rural technology	Punia RD Roy	Satyaparkashan
4	Rural education and technology	S.B Verma, S.K Jiloka	Deep and deep publication

Course Code	**CE473-19**
Course Title	**Waste Water Engineering**
Type of Course	**OE**
L T P	3 0 0
Credits	3
Course Prerequisites	Environmental Engineering
Course Objectives (CO)	It is the branch of environmental engineering in which the basic principles of science and engineering are applied to the problems of water pollution control. So, as an overview, this wastewater engineering includes wastewater treatment, sludge disposal and reuse, wastewater reclamation and reuse, effluent disposal and the role of engineer.

SYLLABUS

UNIT I

Introduction:

Terms & definitions, systems of sanitation and their merits and demerits, system of sewerage, choice of sewerage system and suitability to Indian conditions.

Design Of Sewers:

Quantity of sanitary and storm sewage flow, forms of sewers. Conditions of flow in sewers, sewers of equivalent section, self cleansing and limiting velocity, hydraulic formulae for flow of sewerage in sewers and their design.

UNIT II

Construction & Maintenance Of Sewers:

Sewer appurtenances, materials for sewers. Laying of sewers, joints in sewers, testing of sewers pipes. Maintenance, operation and precaution before entering a sewer.

House Drainage:

Principles of house drainage, traps, inspection chamber Indian and European type W.C. flushing cisterns, soil-waste and anti-syphonage pipes, plumbing system.

UNIT III

Characteristics & Testing Of Sewage:

Composition of sewage, sampling, physical & chemical analysis of sewerage, biological decomposition of sewage, kinetics of organic waste stabilization.

Treatment Of Sewage:

Unit processes of waste water treatment, importance of environmental sanitation, treatment of water; impurities in water-processes for their removal – typical flow-sheets. Sedimentation: factors affecting efficiency, design values of various parameters, tube settlers. Coagulation and flocculation: mechanisms, common coagulants, rapid mixing and flocculating devices screens, grit chambers, detritus tank, skimming tank, grease traps, sedimentation, chemical treatment, aerobic biological treatment, trickling filter (lrtf & hrtf), activated sludge processes, anaerobic treatment, units-sludge digesters and biogas plant.

UNIT IV

Low Cost Waste Water Treatment Units:

Theory, design, advantages & disadvantages of oxidation's ponds, lagoons, ditches, septic tanks and imhoff tanks.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Water Supply Engineering, Vol. II	Garg S K	Khanna Publishers, New Delhi, 2003
2	Environmental Engg. - A design Approach	Arcadio P. Sincero and Gregoria P. Sincero	Prentice Hall of India, New Delhi
3	Waste Water Engineering - Treatment and Reuse	Metcalf & Eddy	McGraw Hill, New Delhi, 2003
4	Waste Water Engg. (Environmental Engg.-II)	Punmia B C	Laxmi Publication, New Delhi, 2002

Course Code	**CSE475-19**
Course Title	**Image Analysis**
Type of Course	**OE**
L T P	3 0 0
Credits	3
Course Prerequisites	Computer fundamentals
Course Objectives (CO)	To make students familiar with the various fundamentals & and processes involved in the processing of an image.

SYLLABUS

UNIT -I

Digital Image Fundamentals & Transforms: Introduction, Background, Digital Image Representation, Fundamental Steps in Image Processing, Elements of a Digital Image Processing System. Elements of Visual Perception, Sampling and Quantization, Basic Relationships between Pixels, Imagining Geometry. Introduction to the Fourier Transform, The Discrete Fourier Transform, Some Properties of the Two-Dimensional Fourier Transform.

UNIT-II

Image Enhancement: Spatial Domain Methods, Frequency Domain Methods, Some Simple Intensity Transformations, Histogram Processing, Image Subtraction, Image Averaging, Smoothing Filters, Sharpening Filters, Low pass Filtering, High pass Filtering.

UNIT-III

Image Restoration & Compression: Degradations Model - Definitions, Degradation Model for Continuous, Restoration in the Spatial Domain, Geometric Transformation. Error free compression, Variable-Length Coding, Bit-Plane Coding, Lossless Predictive Coding. Lossy Compression – Lossy Predictive Coding, Transform Coding.

UNIT-IV

Image Segmentation &Representation: Edge Detection, Thresholding, Region-Based Segmentation. Image Representation, Boundary and Regional Descriptors, Relational Descriptors. Object Recognition: Pattern and pattern classes, recognition based on Decision Theoretic Methods, Structural Methods.

RECOMMENDED BOOKS

S. No	Name	Author(S)	Publisher
1	Digital Image Processing	Rafael. C. Gonzalez & Richard E.Woods	Pearson Education
2	Digital Image Processing	W.K.Pratt.	John Wiley & sons
3	Image Processing Analysis and Machine Vision	M. Sonka	Thomson Learning

Course Code	**CSE474-19**
Course Title	**Concepts of Cloud Computing**
Type of Course	**OE**
L T P	3 0 0
Credits	3
Course Prerequisites	Distributed System, Operating Systems and Networking
Course Objectives (CO)	This Course work provides the complete understanding of Cloud system, its implementation techniques and its various applications in the field of computer Science.

SYLLABUS

UNIT-I

Introduction: Principles and characteristics of cloud computing- IaaS, PaaS, SaaS; service oriented computing and cloud environment. Cloud Computing Technology: Client systems, Networks, server systems and security from services perspectives; Accessing the cloud with platforms and applications; cloud storage.

UNIT-II

Working with Cloud: Infrastructure as a Service–conceptual model and working Platform as a Service – conceptual model and functionalities. Software as a Service: conceptual model and working.

UNIT-III

Using Cloud Services: Cloud collaborative applications and services–case studies with calendars, schedulers and event management; cloud applications in project management. Case studies: Microsoft Azure, Google App Engine and Open source clouds- Open-Nebula and Eucalyptus.

UNIT-IV

Virtualization Technology, Creating VMs, Hypervisor. Storage Technology, types of Storage Devices, RAID Tech Practical Session for RAID (Hands on) File system, DAS, NAS & SAN Tech.

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

Course Code	**ME472-19**
Course Title	**Operations Management**
Type of Course	OE
L T P	3 0 0
Credits	3
Course pre-requisite	NA
Course Objectives	1) To gain an understanding and appreciation of the principles and applications relevant to the planning, design, and operations of manufacturing/service firms. 2) To develop skills necessary to effectively analyze and synthesize the many inter-relationships inherent in complex socio-economic productive systems

Syllabus

UNIT- I

Operations management: Concept, Functions. Product Design and development : Product design and its characteristics: Product development process (Technical): Product development techniques .Process selection- Project, job, Batch, Mass and Process types of Production Systems.

UNIT-II

Facility Location: importance, Factors in Location Analysis: Location Analysis Techniques. Facility Layout : Objectives: Advantages: Basic types of layouts. Capacity Planning : Concepts: Factors Affecting Capacity Planning, Capacity Planning Decisions. Production Planning & Control (PPC) :Concepts, Objectives, Functions. Work Study : Productivity: Method Study; Work Measurement.

UNIT- III

Introduction to modern productivity techniques : just in time, Kanban system. Total Quality Management & six sigma. Functions of Purchasing Management : Objectives, Functions: Methods: Procedure. Value analysis : Concepts. Stock control systems. Virtual factory concept. Production worksheets.

UNIT- IV

Inventory Management : Concepts, Classification: Objectives: Factors Affecting Inventory Control Policy: Inventory costs: Re-order Level, Quality Management - Quality Concepts, Difference between Inspections,

Quality Control, Quality Assurances, Total Quality Management: Control Charts: acceptance Sampling.

RECOMMENDED TEXT BOOKS			
S. No	Author	Title	Publisher
1	Nair	Production & Operations Management	Tata McGraw hill
2	Adam and Eben	Production & Operations Management	Prentice Hall

Course Code	**ME474-19**
Course Title	**Industrial Safety**
Type of Course	**OE**
L T P	3 0 0
Credits	3
Course pre-requisite	EVS
Course Objectives	To aware the students with potential Risks in operations and their Management.

SYLLABUS

UNIT- 1

Introduction Growing concern for safety and health, Safety terminology. Health and safety regulations: International and National scenario : National policy: Product and system liability, Safety cost and losses: Cost of accidents and hidden costs, Growing awakening and concern for environment: Environment protection Act 1986 (amended 1991) : Global warming . Principles of total safety and environment management: Goal, synergy and differences between safety and environment, Synergy of quality with safety, health and environment, Safety . Safety and health hazards, Types of hazards, . Measuring performance of safety and health systems : Indices, and their computation . Safety hazards: Safety in construction, Machine guards & machine tools safety, Safety in material handling.

UNIT- II

Fire safety and industrial security, Principles of fire safety : Occupational injuries and precaution, Characteristics and nature of fire : Fire hazards . Types of fires and ways of extinguishing: Automatic sprinklers : Portable extinguisher : Extinguishing agents . Fire prevention techniques: Building codes & regulation : Building materials and internal finishes . Electrical fire safety: Problems and facts : Electrical distribution and earthing : FRLS wiring : Portable genset and appliances : Electrical processes like welding & cutting . Fire regulations: Standards : Occupancy & egress : Escape plans & displays : Protective clothing : Protective strategies : Emergency preparedness . Fire losses and assessment: After effect & plan of action

UNIT- III

Health, Industrial hygiene, Loss control and productivity, Application of occupational hygiene, Health hazard agents: Chemical agents like toxic compounds and materials: Physical agents like noise, vibration & radiation : Biological hazards . Exposure risk assessment: Routes of exposure Measurement of exposure: Exposure factors . Pulmonary diseases due to environment pollution. Respiratory and personal protective equipment, Development and administering medical surveillance system, Environmental management. Sustainable development planning: National policy Environmental damage and costs : Deteriorating impact on environment . Environmental factors and safety. Environmental design of work place: Location: Work direction walkways: Area allocation and sitting/working plan . Illumination: Types of lighting (natural vs artificial) : Luminous level : Glare . Ventilation: Types (natural and mechanical): Heat calculation: Measurements. Noise: Types: Protection: Effects & productivity . Drinking water: Contamination: Causes: Precaution : Preventive maintenance Industrial pollution hazards . Air pollution: Types: Causes: Prevention and control Water pollution: Categories : Causes : Prevention and control . Soil and ground pollution: Categories: Causes: Prevention and control . Noise pollution: Causes: Prevention : Acoustic design : Monitor and controls . Industrial waste: Types: Control : Reuse . Environmental impact assessment: Objective: Environment impact in India: Other efforts in conserving nature

UNIT-IV

Compliance of environmental laws: Guidelines for location of industries: Compliance of water & air pollution acts, and other environmental laws, Imperative for sustainable development. Green house gases: Composition: Effect . Carbon emission: Kyoto protocol: Carbon credits: Emission trading: Carbon credit scenario in India : Corporate social responsibility . Carbon foot print: Measures to reduce : Initial investment . Ozone layer depletion. Mutual agreements: Member states: Scope: Responsibilities . Rain water harvesting: India's tradition in water harvesting : Rainfall data : Catch water practice and policy : Basic design : Making a mass movement . Wasteland reclamation and reforestation: Restoration of ecology: Restoration of water logged soil : Mine rehabilitation : Managed reforestation : Tree plantation : Climatic change mitigation EHS regulations and disaster management . Introduction to disaster management.

RECOMMENDED BOOKS			
S. No.	**NAME**	**AUTHOR(S)**	**PUBLISHER**
1	L M Deshmukh	Industrial Safety Management	McGraw Hill, 2010
2	A.K. DAS	Principles of Fire Safety Engineering: Understanding Fire and Fire Protection	PHI
3	R.K. Mishra	Safety Management	AITBS Publishers India

Course Code	**EE472-19**
Course Title	**Electrical Materials**
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Basic electrical.
Course Objectives (CO)	To familiarize about Materials used in Electrical Engineering

SYLLABUS

UNIT-I

Dielectric Materials:

Static dielectric constant, Polarization, atomic interpretation of the dielectric constant of mono- atomic and poly atomic gases, internal fields in the solids and liquids, static dielectric constants of solids, ferroelectric materials and spontaneous polarization, piezo- electricity. Frequency dependence of electronics, ionic and orientation polarization, complex dielectric constant and dielectric losses.

UNIT-II

Conductivity of Metals:

Ohm's Law and relaxation time of electrons, collision time and mean free path. Electron scattering and resistivity of metals. Heat developed in current carrying conductor, thermal conductivity of metals, superconductivity.

UNIT-III

Magnetic Materials :

Magnetization from microscopic view point, orbital magnetic dipole movement and angular momentum materials, diamagnetism, origin of permanent magnetic dipoles in material. Paramagnetic spin systems.

UNIT-IV

Properties of ferromagnetic materials:

Spontaneous magnetization and the curie-Weils Law. Ferromagnetic Domains and coercive force, anti-ferromagnetic and ferromagnetic materials, magnetic materials for electrical devices, introduction to permanent magnets.

RECOMMENDED BOOKS			
S. No.	**NAME**	**AUTHOR(S)**	**PUBLISHER**
1	Electrical Engineering materials	A.J. Dekker.	Englewood Cliffs, NJ: Prentice Hall
2	Electrical Engineering Materials	G.P. Chhalotra.	Khanna
3	Electrical Engineering materials	S.P. Seth and P.V. Gupta.	Dhanpat Rai

Course Code	**EE474-19**
Course Title	**Electrical & Hybrid Vehicles**
type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Applied mechanics & Basic Electrical.
Course Objectives (CO)	Understand the models to describe hybrid vehicles and their performance. Understand the different possible ways of energy storage. Understand the different strategies related to energy storage systems.

SYLLABUS

UNIT-I

Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization, transmission characteristics. Introduction to Hybrid Electric Vehicles: History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

UNIT-II

Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis. Electric Propulsion unit: Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives, drive system efficiency.

UNIT-III

Energy Storage: Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis,

UNIT-IV

Energy Management Strategies: Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy management strategies.

RECOMMENDED BOOKS			
S.No.	**Name**	**Author(s)**	**Publisher**
1	Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives.	C. Mi, M. A. Masrur and D. W. Gao.	John Wiley & Sons, 2011.
2	Hybrid Electric Vehicles: Energy Management Strategies.	S. Onori, L. Serrao and G. Rizzoni, “	Springer, 2015.
3	Electric and Hybrid Vehicles.	T. Denton	Routledge, 2016.

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Course Code	**ECE472-19**
Course Title	**Embedded Systems**
Type of Course	**OE**
L T P	3 0 0
Credits	3
Course Prerequisites	Basics Knowledge of Microprocessor and Microcontroller and its Programming
Course Objectives (CO)	The goal of the course is to teach the concepts C Language and object oriented programming, ARM architecture and peripheral interfacing. To read and understand the C and C++ programming, ARM processor architecture and programming The course focuses on how to write program and peripheral interfacing of ARM processor and develop the applications.

SYLLABUS

UNIT-I

Embedded system introduction: Introduction to embedded system, embedded system architecture, classification of embedded system, challenges and design issues in embedded system, introduction to the register bank, families of the ARM processor, interrupt and vector table & other features of ARM: JTAG, I2C bus.

UNIT-II

ARM Programming Instructions Introduction to the instruction set of the ARM processor, Addressing modes, load store instruction, PSR (Program Status Register) instructions, conditional instructions, and interrupt instructions.

UNIT-III

C Programming Integrated Development Environment (IDE) for C/C++ Programming, C/C++ Programs using Function Calls, Structures, Pointers, Integers & Floating Point Arithmetic, and Assembly Code using Instruction Scheduling, Register Allocation, and Conditional Execution Loops.

UNIT- IV

Interfacing Peripherals ARM processor interfacing with ADC, DAC, Sensors, Memory, LCD Display, Stepper Motor, DC Motor, SD-MMC Card, Biometric & RFID, ZIGBEE, GSM Interfaces, and Debugging Tools.

RECOMMENDED BOOKS			
S. No	**Name**	**Author(S)**	**Publisher**
1	Radio Frequency & Microwave Electronics	Mathew. M. Radmanesh	Pearson Education Asia
2	Foundation of Microwave Engineering	RE Collin	Prentice Hall of India
3	Antenna and Radio Wave Propagation	RE Collin	Prentice Hall of India
4	Antennas: Theory and Practice	R Chatterjee	Pearson Education Asia

Course Code	**ECE474-19**
Course Title	**Advanced Optical Communication System**
Type of Course	**OE**
L T P	3 0 0
Credits	3
Course Prerequisites	Electromagnetic Theory, Communication Engineering, Digital Communication
Course Objectives (CO)	To explain the need and significance of Optical Communication System and impart knowledge of types, basic laws, and transmission characteristics, components of optical fibres.

SYLLABUS

UNIT-I

Overview: The Electromagnetic Spectrum, Properties of Light, Dual Nature of Light, Concept of a photon, Wave Model, Characteristics of light waves, general communication systems, evolution of Basic Fiber Optic Communication System, Benefits and disadvantages of Fiber Optics, Transmission Through Optical Fiber, The Laws of Reflection and Refraction, Light rays and light waves, Reflection of light from optical surfaces, Refraction of light from optical interfaces, The Numerical Aperture (NA), The Optical Fiber, Types of Fiber.

UNIT-II

Losses In Optical Fiber: Attenuation, Material absorption losses, linear and non linear scattering losses, fiber bend loss, dispersion viz. inter modal dispersion and intra modal dispersion, overall fiber dispersion and polarization, Dispersion shifted and dispersion flattened fibers, attenuation and dispersion limits in fibers, Kerr nonlinearity, self phase modulation, combined effect of dispersion and self phase modulation.

UNIT-III

Optical Sources And Detectors : Sources: Basic principle of surface emitter LED and edge emitter LED-material used, structure, internal quantum efficiency and characteristics, LASER Diode - material used, structure, internal quantum efficiency and characteristics, working Principle and characteristics of Distributed feedback (DFB) laser. Detectors: PIN photodiode - material used, working principle & characteristics, Avalanche Photodiode: - material used, working principle and characteristics

UNIT-IV

Advanced Topics: Optical TDM, SCM, WDM and Hybrid multiplexing methods, Fiber Optic Networks, Transreceivers for Fiber-Optic Networks, Semiconductor Optical Amplifiers, Erbium

- Doped Fiber Amplifiers (EDFAs).

RECOMMENDED BOOKS			
S. No	**Name**	**Author(S)**	**Publisher**
1	Optical Fiber Communication Principles and Practice.	John M. Senior	PHI Publication
2	Optical Communication Systems	John Gowar	PHI Publications.
3	Optical Fiber Communication	Gerd Keiser.	Mc Graw Hill International Publications

Course Code	**CE472-19**
Course Title	**Tall Building**
Type of Course	**OE**
L T P	3 0 0
Credits	3
Course Prerequisites	Design of concrete, steel structures, earthquake engineering
Course Objectives (CO)	The objective of the study is to identify the structural systems for various combinations of gravity and horizontal loading considering their functional use and heights. The students Should be able to analyze the behaviour and drift capacities of various high rise structural forms.

SYLLABUS

UNIT-I

Definition of tall building-need for constructing tall building-Historic background-factors affecting growth. Design Criteria, Design Philosophy of High Rise structures, Materials, Loading gravity loading- Dead and live load, live load reduction techniques-sequential loading, Impact loading, Wind Loading, Wind Characteristics, Static and Dynamic wind Effects.

UNIT-II

Analytical and wind tunnel experimental method, Earthquake loading-equivalent lateral force method, modal analysis, Introduction to Performance based seismic design. Structural form, Floor systems, Rigid frame Structures- rigid frame behaviour –approximate determination of member forces by gravity loading-two cycle moment distribution, approximate determination of member forces by lateral loading- Portal method, Cantilever method, approximate analysis of drift.

UNIT-III

Structural design of tall concrete and masonry buildings: commentary structure a standards, plastic analysis-strength of members and correction, non-linear analysis and limit design, stability, stiffness and crack control creep shrinkage and temperature effects. Limit state design, masonry structures.

UNIT-IV

Frame-shear wall systems: Twist of frame. Analysis of shear wall, frame wall interaction, analysis of coupled shear wall, computation of earthquake load dynamic analysis of tall building

Suggested textbooks			
S. No	**Name**	**Author(S)**	**Publisher**
1	High rise Building Structures”	Schumelles W	John Wiley and Sons, New York
2	Structural Analysis and Design of Tall Buildings	Taranath Bungale	McGraw Hall
3	Tall Building structures: Analysis and Design	Smith Bryan Stafford, Coull Alex.	New York Wiley-Inter science, , 1991.

Course Code	**CE474-19**
Course Title	**Remote Sensing And Geographical Information System**
Type of Course	**OE**
L T P	3 0 0
Credits	3
Course Prerequisites	---
Course Objectives (CO)	To introduce the principles and basic concepts of Remote Sensing and GIS To introduce the remote sensing systems, data products and analysis. To introduce the spatial data models, analysis and presentation techniques. To study the applications of Remote Sensing and GIS in agriculture, soil and water resources

SYLLABUS

UNIT– I

Introduction

Basic principles of remote sensing; Conventional aerial photography; Non-conventional photography; Non-photographic sensors; Rocket and earth orbital imagery; Energy sources and radiation principles; Energy interaction in the atmosphere and with earth surface; Nature of electromagnetic radiation; Active and passive remote sensing systems; Earth resource satellite.

Photographic Systems for Remote Sensing

Fundamental consideration; Aerial photographic film, cameras and filters.

UNIT– II

Imaging and Nonimaging Sensors

Sensor fundamentals; Nonimaging sensors; Optical mechanical scanners; Radiometric calibration.

Remote Sensing Data Systems Processing and Management

Information system; Image data storage and retrieval; Image data input and output; Image processing principles; Image processing implementation; Pattern recognition.

UNIT-–III

Ground Investigations in Support of Remote Sensing

Test sites; Common measurements; Geologic investigations; Agriculture and Forestry investigations; Atmospheric investigation.

Image Interpretation

Activities of image interpretation; Elements of image interpretation; Techniques of Image interpretation;

Visual requirements for image interpretation; Image interpretation equipment.

UNIT-– IV

Digital Image Processing and Geographic Information System

Image rectification and restoration; Image enhancement; Contrast manipulation; Multi image manipulation; Image classification; Post classification smoothing; Classification accuracy assessment; Basic concepts of GIS; Data imagery and GIS application for land and water resources.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**Author(s)**	**Publisher**
1	Introduction to Environmental Remote Sensing	Barret, E.C. and Curits, L.F.	John Wiley and Sons Inc. New York
2	Space Remote Sensing System Introduction	Chern, H.S.	Academic Press Inc. New York
3	Remote Sensing and Image Interpretation	Lillesand, T.M. and Kiefer, R.W.	John Wiley and Sons Inc. New York
4	Remote Sensing: Methods and Applications	Hard, R.M.	John Wiley and Sons Inc. New York
5	Manual of Remote Sensing	Reeves, R.G., Ansom, A. and David Landen	

Course Title	**Big Data**
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Knowledge of Database Management System.
Course Objectives (CO)	To understand big data analytics as the next wave for businesses looking for competitive advantage, To understand the financial value of big data analytics, To explore tools and practices for working with big data, To understand how big data analytics can leverage into a key component, To understand how to mine the data, To learn about stream computing, To know about the research that requires the integration of large amounts of data.

SYLLABUS

UNIT I

Introduction to Big Data

Analytics, Nuances of big data, Value, Issues, Case for Big data, Big data options Team challenge, Big data sources, Acquisition, Nuts and Bolts of Big data. Features of Big Data, Security, Compliance, auditing and protection, Evolution of Big data.

UNIT II

Data Analysis

Evolution of analytic scalability, Convergence, parallel processing systems, Cloud computing, grid computing, map reduce, enterprise analytic sand box, analytic data sets, Analytic methods, analytic tools, Cognos, Microstrategy, Pentaho. Analysis approaches, Statistical significance, business approaches, Analytic innovation, Traditional approaches

UNIT III

Stream Computing

Introduction to Streams Concepts, Stream data model and architecture, Stream Computing, Sampling data in a stream, Filtering streams, Counting distinct elements in a stream, Estimating moments, Counting oneness in a window, Decaying window.

UNIT IV

Predictive Analytics And Visualization

Predictive Analytics, Supervised, Unsupervised learning, Neural networks, Kohonen models, Normal, Deviations from normal patterns, Normal behaviours, Expert options, Variable entry, Mining Frequent itemsets, Market based model, Apriori Algorithm, Handling large data sets in Main memory, Limited Pass algorithm, Counting frequent itemsets in a stream, Clustering Techniques, Hierarchical, K-Means, Clustering high dimensional data Visualizations, Visual data analysis techniques, interaction techniques; Systems and applications

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RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Big Data Analytics: Turning Big Data into Big Money	Frank J Ohlhorst	Wiley and SAS Business Series
2	Data Mining and Predictive Analysis: Intelligence Gathering and Crime Analysis	Colleen Mccue	Elsevier
3	Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics	Bill Franks	Wiley and SAS Business Series
4	Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data	Paul Zikopoulos, Chris Eaton, Paul Zikopoulos	McGraw Hill
5	Data Mining Concepts and Techniques	Jiawei Han, MichelineKamber	Elsevier

Course Code	**CSE478-19**
Course Title	**Network Security**
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Computer Networks
Course Objectives (CO)	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.

SYLLABUS

UNIT- I

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

UNIT-II

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

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

UNIT-III

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

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

UNIT-IV

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

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

RECOMMENDED BOOKS

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

Course Code	**ME476-19**
Course Title	**IC Engine**
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Computer Networks
Course Objectives (CO)	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.

SYLLABUS

UNIT-I

Introduction to IC Engines: Definition of engine; Heat Engine, Historical Development of IC Engines, Classification & Nomenclature, Application of IC Engines, Air Standard Cycle, Carnot Cycle, Sterling Cycle, Ericson Cycle, Otto Cycle, Diesel cycle, Dual Cycle, Thermodynamics Analysis of these cycle.

Actual Working of I.C. Engine: Working of 4 stroke petrol & diesel engines and their valve timing diagram, working of 2-stroke petrol & diesel engines & their valve timing diagrams, comparison of two stroke & four stroke engines, Actual working of 2 & 4 stroke gas engine and their valve diagram

UNIT-II

Fuel Air Cycles and their analysis: Introduction to fuel air cycles and their significance, composition of cylinder gases, variable specific heats, Dissociation, effect of no. of moles, comparison of air standards & fuel air cycles, effect of operating variable like compression ratio, fuel air ratio, actual cycles and their analysis; Difference between Actual and Fuel-Air Cycle, Actual and Fuel-Air Cycles for S.I. and C.I. Engines.

IC Engine Fuels: Introduction, types of fuels, solid, liquid and gaseous fuels, chemical structure of petroleum, petroleum refining process, important qualities of S.I. & C.I. Engine fuels and their rating. Combustion of fuels; Calorific valves of fuels, theoretical determination of CV of fuel, combustion equation for hydrocarbon fuels, determination of minimum air required for combustion, conversions of volumetric analysis of mass analysis, Determination of air supplied from volumetric analysis of Dry flue gases, Determination of excess air supplied, Determination of % of carbon in fuel burning to CO & CO2 , Determination of minimum quantity of air supplied to gaseous

UNIT- III

Fuel Supply System: Fuel Supply System and fuel pumps, properties of air fuel mixture, a sample carburetor an its working, approximate analysis of simple carburetor, Actual air fuel ratio of single jet carburetor, Exact analysis of single jet carburetor, ideal requirements from a carburetor, limitations of single jet carburetor, different devices used to meet the requirements of

an ideal carburetor. Different modern carburetors, introduction to petrol injection, fuel injection systems for C.I.

Engines: classification of injection systems, injection pump, injection pump governor, mechanical

governor, fuel injection systems, injection pump Governor, Mechanical Governor, Fuel Injector, Nozzle, Injection of S.I. Engines, Fuel Filters. Introduction, Stages of Combination in S.I. Engine, Flame font propagation, factor influencing the flame speed, ignition lag and factors affecting the lag, Abnormal combustion and knocking, control and measurement of knock, rating of S.I. Engine fuels and anti knock agents, combustion chambers of S.I. Engines

UNIT-IV

Supercharging: Introduction, purpose of supercharging, type of superchargers, analysis of superchargers, performance of superchargers, Arrangement of Supercharger and its installation, Turbo charged engines, supercharging of S.I.and C.I. Engines. Limitations of supercharging.

Measurement and Testing: Measurement of friction horse power, brake horse power, indicated horse power, measurement of speed, air consumption, fuel consumption, heat carried by cooling water, heat carried by the exhaust gases, heat balance sheet, governing of I.C. Engines, performance characteristics of I.C. Engines: Performance parameters, performance of S.I. Engines, performance of C.I. Engine, Engine performance maps

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Internal Combustion Engines	V. Ganesan	Prentice Hall
2	A Course in Internal Combustion Engines.	M. Damundwar	Dhanpat Rai
3	Internal combustion engine fundamentals	John B. Heywood	McGraw-Hil

Course Code	**ME478-19**
Course Title	**Power Plant Engineering**
Type of Course	OE
L T P	3 0 0
Credits	3
Course pre-requisite	Applied thermodynamics
Course Objectives	To provide an overview of power plants and the associated energy conversion issues.

Syllabus

UNIT-I

Coal based thermal power plants, basic Rankine cycle and its modifications, layout of modern coal power plant, super critical boilers, FBC boilers, turbines, condensers, steam and heating rates, subsystems of thermal power plants, fuel and ash handling, draught system, feed water treatment, binary cycles and cogeneration systems Gas turbine and combined cycle power plants, Brayton cycle analysis and optimization, components of gas turbine power plants, combined cycle power plants, Integrated Gasifier based Combined Cycle (IGCC) systems.

UNIT-II

Basics of nuclear energy conversion, Layout and subsystems of nuclear power plants, Boiling Water Reactor (BWR), Pressurized Water Reactor (PWR), CANDU Reactor, Pressurized Heavy Water Reactor (PHWR), Fast Breeder Reactors (FBR), gas cooled and liquid metal cooled reactors, safety measures for nuclear power plants.

UNIT-III

Hydroelectric power plants, classification, typical layout and components, principles of wind, tidal, solar PV and solar thermal, geothermal, biogas and fuel cell power systems.

UNIT-IV

Energy, economic and environmental issues, power tariffs, load distribution parameters, load curve, capital and operating cost of different power plants, pollution control technologies including waste disposal options for coal and nuclear plants.

Recommended Text Books

S. No	Author	Title	Publisher
1	El Wakil M.M	Power Plant Technology	McGraw Hill, 2010.
2	Elliot T.C&Chen K	Power Plant Engineering	McGraw Hill, 1998.
3	Nag P.K.,	Power Plant Engineering	Tata McGraw Hill, 2008

Course Code	**EE476-19**
Course Title	**Electrical Measurement**
Type of Course	Open Elective
L T P	3 0 0
Credits	3
Course Prerequisites	Basic electrical
Course Objectives (CO)	To understand various electrical quantities, their measurements and to familiarize with the construction, working principle and applications of various electrical instruments.

SYLLABUS

UNIT-I

UNITS, DIMENSIONS AND STANDARDS: Introduction to MKS **(Meter-Kilogram- Second)** and Rationalized MKSA **(Meter-Kilogram-Second-Ampere)** System, SI Units (International System of Units), Standards of electromotive force (EMF), Resistance, Capacitance and Inductance, Systematic errors

GENERAL THEORY OF ANALOG MEASURING INSTRUMENTS: Operating torque, damping and controlling torque, Torque-weight ratio, Pointers and Scales. Principles of operation of various types of electro mechanical indicating / registering instruments viz. Permanent Magnet Moving Coil (PMMC), dynamometer, induction, thermal, etc. for direct current and alternating current measurement of voltage, current, power, frequency, phase and power factor etc., energy meter: their sources of error and compensation, shunts and multipliers, multi-meter.

UNIT-II

POTENTIOMETERS: Basic direct current (DC) potentiometer circuit, Modern form of DC potentiometer, measurement of voltage, current, Resistance and calibration of voltmeter and ammeter using DC potentiometer, volt ratio box, Self-balancing potentiometer, Alternating current (AC) potentiometers and their applications.

UNIT-III

MAGNETIC MEASUREMENTS: Flux meter, B-H Curve, Hysteresis loop, Permeameters, AC Testing of Magnetic materials, Separation of iron losses, iron loss measurement by Wattmeter and Bridge methods

UNIT-IV

INSTRUMENT TRANSFORMERS: Theory and construction of current and potential transformers, ratio and phase angle errors and their minimization, Characteristics of current transformers (CT) and potential transformers (PT) and their Testing.

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Solar Energy and Energy Conservation.	Sawhney and Maheshwari	Prentice Hall (India)
2	Energy Technology	Rao S. and B. B. Parulkar	Khanna Publishers
3	Solar Energy	Sukhatme S. P	Tata McGraw Hill

Course Code	**EE478-19**
Course Title	**Energy Auditing & Management.**
Type of Course	Open Elective
L T P	3 0 0
Credits	3
Course Prerequisites	Basic electrical.
Course Objectives (CO)	To understand how energy is used within the plant and to find opportunities for improvement, energy saving, energy audits concepts to evaluate the effectiveness of an energy efficiency project or program.

SYLLABUS

UNIT-I

Energy Scenario: Energy needs of growing economy, Long term energy scenario, Energy pricing, Energy sector reforms, Energy and environment: Air pollution, Climate change, Energy security, Energy conservation and its importance, Energy strategy for the future, Energy conservation Act- 2001 and its features.

UNIT-II

Energy Management and Audit: Definition, Energy audit- need, Types of energy audit, Energy management (audit) approach-understanding energy costs, Bench marking, Energy performance, Matching energy use to requirement, Maximizing system efficiencies, Optimizing the input energy requirements, Fuel and energy substitution, Energy audit instruments

UNIT-III

Financial Management: Investment-need, Appraisal and criteria, Financial analysis techniques- Simple payback period, Return on investment, Net present value, Internal rate of return, Cash flows, Risk and sensitivity analysis, Financing options, Energy performance contracts and role of energy savings companies (ESCOs).

UNIT-IV

Electrical system: Electricity tariff, Load management and maximum demand control, Power factor improvement, Distribution and transformer losses. Losses in induction motors, Motor efficiency, Factors affecting motor performance, Rewinding and motor replacement issues, energy efficient motors. Light source,

Choice of lighting, Luminance requirements, and Energy conservation avenues

Compressed air system: Types of air compressors, Compressor efficiency, efficient compressor operation, Compressed air system components, Capacity assessment, Leakage test Factors affecting the performance and efficiency.

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Solar Energy and Energy Conservation.	Sawhney and Maheshwari	Prentice Hall (India)
2	Energy Technology	Rao S. and B. B. Parulkar	Khanna Publishers
3	Solar Energy	Sukhatme S. P	Tata McGraw Hill

Course Code	**ECE476-19**
Course Title	**Digital System Design**
Type of Course	Open Elective
L T P	3 0 0
Credits	3
Course Prerequisites	Basic Electronics, Digital Electronics, VHDL
Course Objectives (CO)	To provide the knowledge of designing various combinational and Sequential circuits using VHDL. To introduce the concept of Finite state machine and use it for minimization of specified synchronous and asynchronous sequential circuits

SYLLABUS

UNIT-I

Review of Digital Electronic concepts: Basic gates, Adder, Subtractor, Multipliers, Multiplexers, ROM, PLA, PAL, and PLD, Minimization techniques: optimal combinational with K Map and tabular methods. Simplification and minimization.

UNIT- II

Synchronous Sequential Logic: The Concept Of Memory, The Binary Cell, The Cell and the Bouncing Switch, Set /Reset, Design of sequential modules – SR, D, T and J-K Flip-flops, Flip- flop applications – Clock generation, Counters, Registers, Triggering of flip-flops, State reduction and assignment, Flip-flop excitation tables, Design procedure.

UNIT-III

Finite State Machines: Finite state model, Memory elements and their excitation functions, Synthesis of Synchronous sequential circuits, Capabilities and limitations of FSM, Design, Modeling and Simulation of Moore and Mealy machines. Design and VHDL implementation of FSMs.

UNIT IV

Asynchronous Sequential Logic: Analysis Procedure, Circuits with latches, Design procedure, Reduction of state and flow tables, Race-free state assignment, Hazards, Design examples. Design issues like metastability, synchronizers, clock skew and timing Considerations. Designing with Programmable Logic Devices and Programmable Gate Arrays: Read only memories, Programmable logic arrays, Programmable array logic

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	VHDL	Douglas Perry	TMH
2	An Engineering Approach to Digital Design	William I. Fletcher	Prentice Hall of India
3	Digital System Design using VHDL	Charles H.Roth	Thomson

4.	Fundamentals of Digital Logic with VHDL design	Stephen Brown, ZvonkoVranesic	TMH
5.	Digital Design	John Wakerley	Prentice Hall

Course Code	**ECE478-19**
Course Title	**Broadband Communication**
Type of course	OE
L T P	3 0 0
Credits	3
Course prerequisites	Knowledge of Analog and Digital Communication.
Course objectives (CO)	Study the principles and features of various possible alternatives for realizing high speed communication systems. Analyze and identify the suitability of a specific broadband system from the available alternatives depending on the geographical location, subscriber density.

SYLLABUS

UNIT I

Mobile and Satellite Communication - Mobile Communication Principles, Architecture of GSM, Introduction to 2G to 4G Systems such as GSM, HSCSD, GPRS, EDGE etc, Principles of CDMA. Satellite technology evolution, LEO, MEO, GEO satellites and their special services, orbital equations, link budget for C- band satellite, impact of satellite in Indian scenario.

UNIT II

Fixed Wireless System and Wireless System-Microwave Links, Private Unlicensed links(Spread Spectrum), MMDS(Multi channel Multi- point distribution service), LMDS (Local multipoint Distribution Service), Introduction to Wi- Fi and Wi- MAX , Principles and Parameters for Wireless LAN (IEEE 802.11 Standards), Operating Principles for Wi- MAX(IEEE 802.16 standard) , Comparison of Wi- Fi and Wi- MAX.

UNIT III

Optical Fiber Communication.-Principles of optical fiber communication, significant features and advantages of optical fiber communications, Recent trend- FTTH(Fiber – to –the – Home) System.

UNIT IV

Quality of Service (Qos) in Broadband. Qos issues in broadband communication.

RECOMMENDED BOOKS			
S. No.	**Name**	**Author(S)**	**Publisher**
1	Mobile Communication Design Fundamentals	William C.Y. Lee	John Wiley & Sons
2	Satellite Communications	Timothy Pratt	John Wiley & Sons
3	Wireless Communications	T.L Singhal	Tata McGraw-Hill
4	Optical Fibre Communications	Senior.John.M	Prentice Hall

Course Code	**CE476**
Course Title	**Infrastructure And Real Estate Management**
Type of Course	**OE**
L T P	3 0 0
Credits	3
Course Prerequisites	Engineering Economics
Course Objectives (CO)	The objective of this course is to make students aware of the various elements of infra structure and real estate management.

SYLLABUS

UNIT- I

Introduction:
Impact of Infrastructure development on economic development, standard of livingand environment. Reasons for rise of public sector and government in infrastructural activities. Changed socio-economic scenario and current problems and related issues.

Infrastructure Management:

Importance, scope and role in different sectors of construction.

- **Highway Sector:**

  Repayment of Funds, Toll Collection Strategy, Shadow tolling, and directtolls, Maintenance strategy, Review of toll rates & structuring to suit the traffic demand
- **Irrigation Projects:**

  Large / Small Dams - Instrumentation, monitoring of water levels,catchments area, rainfall data management, prediction, land irrigation planning & policies,processes Barrages, Canals.
- **Power Projects:**

  Power scenario in India, Estimated requirement, Generation of Powerdistribution strategies, national grid, load calculation & factors, Hydropower - day to dayoperations, management structures, maintenance, Thermal Power, Nuclear Power.
- **Airports:**

  Requisites of domestic & International airports & cargo & military airports, facilitiesavailable, Terminal management, ATC.
- **Railways:** Mass Rapid Transport System MRTS, LRT, Multi-modal Transport System.

UNIT- II

Real estate management
Introduction, functions of real estate project management.

Project management –I
Project management processes and organizational pattern, work breakdown structure, time scheduling techniques, CPM/PERT network analysis, resource management and scheduling techniques, material management, time cost analysis, project organization, project peculiarities, good practices and

managerial responsibilities, project cost control.

Project management II

The application of management processes such as scope management, cost management, risk phases. Some of the major techniques to be discussed are value engineering, quality function deployment, cost benefit analysis, risk identification and its quantification.

UNIT- III

Operation management

Introduction , nature & scope of operation/production management, relationship with other functional areas, recent trends in operation management, manufacturing & theory of constraints, types of production system, just in time(JIT) and lean system

Product design and process selection

Stages in product design processes, value analysis, facility location and layout: types characteristics, merits and demerits, work measurement, job design management, communication management and time management during the different construction

UNIT- IV

Forecasting and capacity planning

Method of forecasting, overview of operation planning, aggregate production planning, production strategies, capacity requirement planning, MRP, scheduling supply chain management, purchase management, inventory management.

Quality management

Definition, dimension, cost of quality, continuous improvement(kaizen), ISO (9000&14000 series), quality awards, statistical quality control, variable and attribute, process control, control chart(X,R,P,np and C Charts) acceptance sampling operating characteristic curve(AQL, LTPD, a & b risk) total quality management(TQM)

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Project planning analysis, selection, financing, implementation and review	Chandra, prassanna	Tata McGraw Hill.Pub
2	Infrastructure development & financing towards a public private partnership	Raghuram.G& Jain R	Macmillan India ltd
3	Production and operation management, concepts methods & strategy	Charry S.N(2005)	John willy &sons asiapvt ltd

Course Code	**CE478**
Course Title	**Site Investigation**
Type of Course	**OE**
L T P	3 0 0
Credits	3
Course Prerequisites	Soil Mechanics
Course Objectives (CO)	The course is intended for geotechnical engineers/engineering geologists to gain a practical understanding of the planning and design of site investigations, the spectrum of investigation techniques available, laboratory test scheduling, and interpretation of result

UNIT-I

Introduction: Soil formation Processes – Characteristics of major soil deposits of India. Necessity and Importance of soil exploration Method of sub surface exploration Test pits , Trenches, Caissons, Tunnels and drifts, Wash boring , Percussion drilling , Rotary drilling, Factors affecting the selection of a suitable method of boring. Extent of boring, Factors controlling spacing and depth of bore holes, Spacing and depth for various Civil engineering structures.

UNIT-II

Indirect method of exploration, Seismic method, Electrical resistivity, Resistivity sounding and profiling, Qualitative and quantitative interpretation of test results, Comparison of resistivity and seismic surveys, Shortcomings.

Ground water Observation: Different method of ground water observation: Time lag in observation, Sampling of ground water.

UNIT-III

Sampling: Source of disturbance and their influence, Type of sampler, Principle of design of sampler, Representative and undisturbed sampling in various types of soils, Surface sampling, Amount of sampling, Boring and sampling record, Preservation and shipment of sample preparation of bore log. Standard penetration test

UNIT-IV

Investigation below sea/river bed – methods and equipment's – interpretation of offshore exploration, Instrumentation in soil engineering - strain gauges - resistance and inductance type.

RECOMMENDED BOOKS

S. No	Name	Author(S)	Publisher
1	Site investigation	Simon and Cayton	
2	Foundation Analysis and Design	Bowles J E	McGraw Hill, New York