ProgrammeCode:UG018

SCHEME AND SYLLABUS

B.Tech Computer Science and Engineering

(As per NEP 2025)

Department of Computer Science and Engineering
University Institute of Engineering Technology
Sant Baba Bhag Singh University
Batch 2025

ProgrammeCode:UG018

INDEX

ProgrammeCode:UG018

ABOUTTHEDEPARTMENT

The Department of Computer Science and Engineering focuses not only on the theoretical aspects butemphasize the overall development of the students. There are Special Interest Groups among the facultywho are focused in their research domains like Data Mining and Big Data Analytics, Wireless &

MobileComputing, Security & Trust Computing, Wireless Sensor Networks & IOT, Soft Computing, ImageProcessing, Machine Learning and Data Analytics, Natural Language Processing, Cloud Computing andSocial 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, strongfocus on teaching learning balanced with leading-edge research and emphasis on leadership, service andethics. TheefficacyoftheTeaching-Learningprocessisreflectedintheconsistentlyexcellentresultsbeingachieved every year. To augment professional competence, the department supports outside talents to gainmore inputs, organizes hackathons, seminars, workshops, industrial visits and expert lectures not only toofferanewdimensiontothelearningprocessbutalsoinfuseleadershipqualitiesinthebuddingengineers.

SALIENTFEATURESOFTHEDEPARTMENT

1. Providesalearningenvironment stronglyfocusedoncollaborativeandinterdisciplinaryresearchundertheguidance ofexperiencedandqualifiedfaculty.Majorityofthefacultymembers aredoctorates.
2. Theteachingprogramme,here,isdevisedkeepinginviewthesignificanceofIndustry-Academiainteractionenablingthestudentstofacetheglobalcompetitivenesswitheffectivecommunicationskills .
3. TheCSEDepartmentregularlyorganizesconferences,hackathons,seminars,studentsymposia,short-termtraining program and value-added courses. This provides a wide range of opportunities for faculty andstudentstobringouttheirpotentialandinnovativeskillsinavarietyoffields.
4. Thedepartmenthaswellequippedcomputinglaboratoriesandarichrepositoryofsoftwarecoveringawidespectrum of applications. The department in collaboration with IIT has setup Virtual lab for remoteexperiments. Besides this department takes in NEPTEL and MOOC courses both for its students andfaculty.
5. Digital Librarywithaccesstojournalsandvideolectures ofeminentprofessors.

B.TECH(BACHELORSINTECHNOLOGY)

Educational qualification matters a lot in gaining success. Along with academic qualification, technicalskills are also required. Job openings for Software professionals are much higher in the corporate sectorthan in public sector. Professionals can join as junior programmer, database administrator, junior networkmanager, Data Analyst, Software Developer, Software Engineer, and Client-Server Systems Manager etcintheinitialstage.

Studentshavejobopportunitiesatorganizationslike,IBM,Intel,HP,TCS,INFOSYS,WIPRO,TECHMAHINDRA,CTSandDellinIndiaandabroad.

VISION

Empower every student to be innovative, creative and acquire skills in Computer Science & Engineering

toenrichsocietyandachieveahappy,successfulandmeaningfullife.

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 fosterscritical thinking, dynamism and innovation to transform them into globally competitive professionals andempoweringtheyouthinruralcommunities withcomputereducation.

ELIGIBILITYCRITERIA

- Passed 10+2 examinations with Physics & Mathematics as a compulsory subject along with one of theChemistry/ Computer Science/ Biology/Biotechnology/ Technical Vocational subjects. Obtained at least45%marks(40%incaseofcandidatebelongingtoreservedcategory)intheabovesubjectstakentogether.
- B.Tech(LateralEntry)DiplomainEngineering&technologyfromAICTEapprovedinstitutionorB.Sc (N.M)fromUGCapproveduniversityatleast45%marks.(40%incaseofreservedcategory)

DURATION

B.TechCSE-4yearsB.TechCSELeet-3years

CAREERPATHWAY

Job openings for Software professionals are much higher in the corporate sector than in public sector.Professionalscanjoinasjuniorprogrammer,databaseadministrator,juniornetworkmanager,DataAnalyst, SoftwareDeveloper,SoftwareEngineer,andClient-ServerSystemsManageretcintheinitialstage.

Studentshavejobopportunitiesatorganizationslike-IBM, Intel,HP,TCS,INFOSYS,WIPRO,TECHMAHINDRA,CTSandDellinIndiaandabroad.

These are some of the big names that aspiring software engineers are aware of. On the other hand, there arecompanies like Infosys, Capgemini, Accenture, Cognizant, etc that pay anywhere between**3–3.5 lac P.A** tofresher.AllthecompaniesmentionedabovearetheleadingcompaniesthathireB.TechCSEfreshers.Soasa B. Tech CSE graduate, candidate can be happy with 2 LPA or 10 LPA, it totally depends on him/her. Butthere'sdefinitelysomuchmoneytomake.

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CHOICEBASEDCREDITSYSTEM(CBCS)

PREAMBLE:

The University Grants Commission, New Delhi, in its 12th Plan Guidelines, directed the Universities in thecountrytoimplementtheChoiceBasedCreditSystem(CBCS)toset abenchmarkintheUniversityeducationandfulfilexpectations ofallthestakeholders.

OBJECTIVES

1. ShiftinfocusfromTeacher-CentrictoLearner-Centriceducation.

2. Allowstudentstochooseaccordingtotheirlearningneeds,interestsandaptitude.

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

4. Makeeducationbroad-based.Studentscanearncreditsbychoosinguniquecombinations.

5. Helpself-pacedlearningwithflexibility.Studentscanoptfor asmanyas26creditspersemester.

6. Student can exercise the option to decide his/her own pace of learning- slow, normal or accelerated planand sequence the choice of courses, learn to face challenges through term/project work and may venture outtoacquireextraknowledge/proficiency throughadd-oncourses.

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AllIndiaCouncilforTechnicalEducation, NewDelhi

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

January2018(Volume-II)

(AsperInputsofExperts)

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

   (i) HumanValuescoursesisupdated.

   (i) CourseCodeHSMC(HU-102)maybereadas(H-102)alongwiththefollowing:-

      a. Nameofthecourse'UniversalHumanValues2:Self,SocietyandNature'isre-namedas**"UniversalHumanValues2:UnderstandingHarmony''.**

      b. Contentsof**"UniversalHumanValues2:UnderstandingHarmony''**tobeincluded.

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AllIndiaCouncilforTechnicalEducationModelcurriculum
for

UndergraduateDegreeCoursesinEngineering&TechnologyCOMPUTER SCIENCEANDENGINEERING

Chapter-1
General,Coursestructure&Theme&
Semester-wisecreditdistribution

A. DefinitionofCredit**:**

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

B. Range of credits-A range of credits from 150 to 160 for a student to be eligible to get UnderGraduate degree in Engineering. A student will be eligible to get Under Graduate degree withHonours or additional Minor Engineering, if he/she completes an additional 20 credits. ThesecouldbeacquiredthroughMOOCs.

C. StructureofUndergraduateEngineeringprogram:

S. No.	Category	CreditBreakupf orCSEstudents
1	HumanitiesandSocialSciencesincludingManagementcourses	15
2	BasicSciencecourses	23
3	EngineeringSciencecourses includingworkshop,drawing,basicsofelectrical/mechanical/compute retc	29
4	Professionalcorecourses	49
5	ProfessionalElectivecoursesrelevant tochosenspecialization/branch	18
6	Opensubjects–Electivesfromothertechnicaland/oremergingsubjects	12
7	Projectwork,seminarandinternshipinindustryorelsewhere	15
8	MandatoryCourses [EnvironmentalSciences,InductionProgram,IndianConstitution,Essenc eofIndianKnowledgeTradition]	(non-credit)
	Total	**162**

**Minorvariationisallowed asperneedoftherespectivedisciplines.*

ProgrammeCode:UG018

D. Coursecodeanddefinition:

Course code	**Definitions**
BS	BasicScienceCourses
ES	EngineeringScienceCourses
HSMC	HumanitiesandSocialSciencesincludingManagementcourses
PC	Professionalcorecourses
PE	ProfessionalElectivecourses
OE	OpenElectivecourses
MC	Mandatorycourses
SI	SummerIndustryInternship
PROJ	Project

ProgrammeCode:UG018

InductionProgram(PleasereferAppendix-Aforguidelines)

Inductionprogram(mandatory)	**3weeksduration** (PleasereferAppendix-Aforguidelines&alsodetailsavailableinthecurriculumof Mandatorycourses)
Inductionprogramforstudentstobeofferedrightatthe startofthe firstyear.	• Physicalactivity • CreativeArts • UniversalHumanValues • Literary • ProficiencyModules • LecturesbyEminentPeople • VisitstolocalAreas • FamiliarizationtoDept./Branch&Innovations

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	UndergraduateProgrammeOutcomes(PO) **Attheend ofProgramme/Degreementionedabove,thegraduateswillbeableto ……**	
	PO1.	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineeringfundamentals,andengineeringspecializationtothesolutionofcomplex engineeringproblems.
	PO2.	**Problem analysis:** Identify, formulate, research literature, and analyze engineering problems toarrive at substantiated conclusions using first principles of mathematics, natural, and engineeringsciences.
	PO3	**Design/developmentofsolutions:**Designsolutionsforcomplexengineeringproblemsand design system components, processes to meet the specifications with considerationforthepublichealthandsafety,andthecultural,societal,andenvironmental considerations.
	PO4	**Conduct investigations of complex problems:** Use research-based knowledge includingdesignofexperiments,analysisandinterpretationofdata,andsynthesisoftheinformationto providevalidconclusions.
	PO5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modernengineeringandITtoolsincludingpredictionandmodelingtocomplexengineeringactivities withanunderstandingofthelimitations.
	PO6	**Theengineerandsociety:**Applyreasoninginformed bythecontextualknowledgetoassesssocietal,health,safety,legal,andculturalissuesandtheconsequentr esponsibilitiesrelevant totheprofessionalengineeringpractice.
	PO7	**Environment and sustainability:** Understand the impact of the professional engineeringsolutionsinsocietalandenvironmentalcontexts,anddemonstratetheknowledgeof,andnee dforsustainabledevelopment.
	PO8	**Ethics:**Applyethicalprinciplesandcommittoprofessionalethicsandresponsibilitiesandnormsofthe engineeringpractice.
	PO9	**Individualandteamwork:**Functioneffectivelyasanindividual,andasamemberorleaderinteams,andi nmultidisciplinarysettings.
	P10	**Communication:** Communicateeffectivelywiththeengineeringcommunityandwithsocietyatlarge. Be able to comprehend and write effective reports documentation. Make effectivepresentations,andgiveandreceiveclearinstructions
	P11	**Projectmanagementandfinance**:Demonstrateknowledgeandunderstandingofengineeringand managementprinciples andapplythesetoone'sown work,asamemberandleaderina team.Manageprojectsinmultidisciplinaryenvironments
	P12	**Life-longlearning:**Recognizetheneedfor, andhavethepreparationandabilitytoengageinindependentandlife-longlearninginthebroadestcontextoftechnologicalchange.

UnderGraduateProgrammeSpecificOutcomes (PSO)	
PSO1	AbilitytoacquireknowledgeinComputerScienceandEngineeringand develop innovative solutions to complex problems.
PSO2	Design and build websites, androidapps,automatedprojectsusingtheknowledgeofprogramming,testing,lifecyclemodels,artificialintelligence,machinelearning andCASEtools.
PSO3	Pursue life long learning in advanced technologies of Computer Science and Engineering and apply it for the benefit of the society.

UnderGraduateProgrammeEducationalObjective(PEO)	
TheGraduate/Undergraduatewillbe….	
PEO1	**AcquiringknowledgeofComputerScienceandotherengineeringdisciplinesforanalyzinganddevelopinginnovativesolutionstorealworldproblems.**
PEO2	**Developinginterdisciplinaryprojectsusinglatesttools,techniquesandmodelsforthebenefitofthesocietyandenvironment**
PEO3	**Demonstratingteamleadershipandeffectivecommunicationskillswhilepursuingacareer in life-long learning, research and development or generating employmentsthroughstartups.**
PEO4	**Preparingcompetitiveexaminationsforhigherstudiesabroadorforgetting job inprivate,publicormultinationalcompanies.**

ProgrammeCode: UG018

Semester-wise structure of curriculum

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

SEMESTER I

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

I. Theory Subjects

S.No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	ES	CSE111	Introduction to programming in C	3:0:0	3:0:0	3	3
2	BS	MAT171	Engineering Mathematics-I	3:1:0	3:1:0	4	4
3	AEC-1/ HS	AEC0010	Communication Skills-I	2:0:0	2:0:0	2	2
4	ES	ME107	Smart Material	2:0:0	2:0:0	2	2
5	BS	*PHY115	Engineering Physics (include semiconductor unit)	4:0:0	4:0:0	4	4
6	MC	EVS002	Environmental Sciences	3:0:0	NC	3	NC

II. Practical Subjects

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

Total Contact Hours=34

Total Credit Hours= 22

ProgrammeCode: UG018

SEMESTERII

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

I. Theory Subjects

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

II. Practical Subjects

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

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

Total Contact Hours= 30
Total Credits Hours = 22

ProgrammeCode: UG018

SEMESTER III

I. Theory subjects:

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PC	CSE251	Computer Organization and Architecture	4:0:0	4:0:0	4	4
2	PC	CSE253	Data structure and Algorithms	4:0:0	4:0:0	4	4
3	PC	CSE255	Operating System	4:0:0	4:0:0	4	4
4	PC	CSE259	Computer Programming using python	3:0:0	3:0:0	3	3
5	PC	MAT271	Engineering Mathematics-III	4:0:0	4:0:0	4	4

II. Practical subjects:

S. No.	Type	Subject Code	SubjectName	Contact Hours(L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PC	CSE261	Computer Organization and Design Laboratory	0:0:2	0:0:1	2	1
2	PC	CSE263	Data structure and Algorithms Laboratory	0:0:2	0:0:1	2	1
3	PC	CSE265	Computer Programming using python laboratory	0:0:2	0:0:1	2	1
4	PC	CSE267	Operating System Laboratory	0:0:2	0:0:1	2	1
5	EMC	EMC211	Entrepreneurship Mindset Curriculum -III: (Mandatory course by Punjab Government)	0:0:**4**	0:0:2	4	2
6	SI	CSE269	FOUR WEEKS INSTITUTIONAL/ INDUSTRIAL TRAINING EVALUATION (undertaken after 2nd sem)		0:0:3		3
7	PT	PT201/PT203/ PT205	Physical Training-III(NSO/NCC/NSS)	0:0:2	NC	2	NC

Total Contact Hours= 33
Total Credits Hours= 28

ProgrammeCode: UG018

SEMESTER IV

I. Theory subjects:

S.No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	TotalContact Hours	Total Credit Hours
1	BS	MAT212	Discrete Mathematics	4:0:0	4:0:0	4	4
2	PC	CSE252	Object Oriented Programming using C++	4:0:0	4:0:0	4	4
3	PC	CSE254	Database Management System	4:0:0	4:0:0	4	4
4	MDC	MDC019	Universal Human Values: Understanding Harmony	3:0:0	3:0:0	3	3
5	AEC/HS	AEC0015	Effective Technical Communication Skills	2:0:0	2:0:0	2	2
6	PC	CSE258	Computer Networks	4:0:0	4:0:0	4	4

II. PracticalSubjects

S. No.	Type	Subject Code	Subject Name	Contact Hours(L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PC	CSE260	Database Management System Laboratory	0:0:2	0:0:1	2	1
2	PC	CSE264	Object Oriented Programming using C++ Laboratory	0:0:2	0:0:1	2	1
3	PC	CSE266	Computer Networks Laboratory	0:0:2	0:0:1	2	1
4	EMC	EMC212	Entrepreneurship Mindset Curriculum -IV: (Mandatory course by Punjab Government)	0:0:4	0:0:2	4	2
5	MC	PT202/PT204 /PT206	Physical Training-IV (NSO/NCC/NSS)	0:0:2	NC	2	NC

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

Total Contact Hours= 33

Total Credits Hours= 26

Programme Code: UG018

SEMESTER V

I. TheorySubjects

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

II. Practical Subjects

S.No.	Type	Subject Code	Subject Name	Contact Hours(L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PC	CSE361	Computer Graphics Laboratory	0:0:2	0:0:1	2	1
2	PC	CSE357	Advanced Computer Networks Laboratory	0:0:2	0:0:1	2	1
3	PC	CSE377	Design and Analysis of Algorithms Laboratory	0:0:2	0:0:1	2	1
4	SEC-II	CSE367	Four weeks industrial/institutional training evaluation (undertaken after 4th sem)	-	0:0:3	-	3
5	EMC	EMC311	Entrepreneurship Mindset Curriculum -V: (Mandatory course by Punjab Government)	0:0:4	0:0:2	4	2
6	MC	PT301/PT303 /PT305	Physical Training-V (NSO/NCC/NSS)	0:0:2	NC	2	NC

III. Professional Elective-I

S.No.	Type	Subject Code	Subject Name	Contact Hours(L:T :P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PE	CSE369	Mobile Application Development	3:0:0	3:0:0	3	3
2	PE	CSE371	Introduction toInternetofThings	3:0:0	3:0:0	3	3
3	PE	CSE373	Cloud computing	3:0:0	3:0:0	3	3
4	PE	CSE375	Neural Networks and Deep Learning	3:0:0	3:0:0	3	3

Total Contact Hours= 33
Total Credits Hours = 26

Programme Code: UG018

SEMESTERVI

I. Theory Subjects

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

II. Practical Subjects

S.No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits(L:T:P)	Total Contact Hours	Total Credit Hours
1	PC	CSE380	Software Engineering Laboratory	0:0:2	0:0:1	2	1
2	PC	CSE382	Internet web Programming Laboratory	0:0:2	0:0:1	2	1
3	PC	CSE384	Programming in Java Laboratory	0:0:2	0:0:1	2	1
4	EMC	EMC312	Entrepreneurship Mindset Curriculum -VI: (Mandatory course by Punjab Government)	0:0:4	0:0:2	4	2

III. Professional Elective-II

S.No.	Type	Subject Code	SubjectName	Contact Hours (L:T:P)	Credits(L:T:P)	TotalContact Hours	TotalCredit Hours
1	PE	CSE366	Digital Image Processing	3:0:0	3:0:0	3	3
2	PE	CSE314	Computer Vision	3:0:0	3:0:0	3	3
3	PE	CSE362	Compiler Construction	3:0:0	3:0:0	3	3
4	PE	CSE348	DigitalMarketing	3:0:0	3:0:0	3	3
5	PE	CSE378	Advanced Parallel Computing	3:0:0	3:0:0	3	3

IV. Professional Elective-III

S.No.	Type	Subject Code	Name	Contact Hours(L :T:P)	Credits(L:T:P)	Total Contact Hours	Total Credit Hours
1	PE	CSE320	Optimization Techniques in Machine Learning	3:0:0	3:0:0	3	3
2	PE	CSE322	Distributed Systems	3:0:0	3:0:0	3	3
3	PE	CSE324	Wireless Communications	3:0:0	3:0:0	3	3
4	PE	CSE326	BlockChain	3:0:0	3:0:0	3	3
5	PE	CSE376	Advanced DataBase Management System	3:0:0	3:0:0	3	3

Note: 4 weeks industrial training after 3rd year/6th semester TotalContactHours=31

TotalCreditsHours =26

Programme Code: UG018

SEMESTERVII

I. Theory Subjects

S.No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PC	CSE479	Cyber Security	4:0:0	4:0:0	4	4
2	PE		Professional Elective-IV	3:0:0	3:0:0	3	3
3	OE		Open Elective-II	3:0:0	3:0:0	3	3
4	OE		Open Elective-III	3:0:0	3:0:0	3	3
5	PC	CSE407	Theory of Automata and Computation	4:0:0	4:0:0	4	4

II. Practical Subjects

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

III. Professional Elective-IV

S.No.	Type	Subject Code	Subject Name	Contact Hours(L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PE	CSE451	Cryptography	3:0:0	3:0:0	3	3
2	PE	CSE453	Multimedia and Animation	3:0:0	3:0:0	3	3
3	PE	CSE455	Natural Language Processing	3:0:0	3:0:0	3	3
4	PE	CSE477	Data Mining in Business Intelligence	3:0:0	3:0:0	3	3

Total Contact Hours= 21
Total Credits Hours= 22

Programme Code: UG018

SEMESTERVIII

I. Practical Subjects

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

Total Credits Hours= 20

Programme Code: UG018

Open-Elective-I

1. **Basic of Artificial Intelligence**
2. **Introduction to Cloud Computing**

Open Elective-II

1. **Introduction to Operating System**
2. **Basics of Networking**

Open Elective-III

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

Open Elective-IV

1. **E-commerce**
2. **Introduction to Cybersecurity**

Programme Code: UG018

CourseCode	**CSE111**
CourseTitle	Introduction to programming in C
TypeofCourse	ES
L T P	3:0:0
Credits	3
CoursePrerequisites	BasicKnowledge aboutComputers
CourseObjective(s)	Togainexperience about structuredprogramming. To help students to understand the implementation ofProgramminglanguage. TounderstandvariousfeaturesinProgrammingLanguage.
CourseOutcome(CO)	Thestudents will beableto: 1. Illustratetheflowchartand todevelop Cprograms. 2. DevelopconditionalanditerativestatementstowriteCprograms and exercise user defined functions to solve realtimeproblems 3. Inscribe C programs that use Pointers to access arrays, stringsandfunctions. 4. Exerciseuserdefineddatatypesincludingstructuresandunionsto solve problems**.**

SYLLABUS

UNITI

Fundamentals of computer: Computer generations, History of languages, high- level, Lowlevel, Assembly languages etc. Definition and properties, Principles of flowcharts. Flowchartingsymbols, Algorithms.

IntroductionToProgrammingLanguage: CharacterSet,Constants,Typesofconstants,VariablesandKeywords,datatypes.Instructions:TypeDeclarationInstruction,ArithmeticInstructions.

UNITII

Controlstructures:Decisionmakingstructures:If,If-else,Nested If–else,Switch. LoopControlstructures:While,Do-while,for,Nestedforloop.Otherstatements:Break,Continue, goto,Exit

ArraysandPointers: ArraysInitialization,TypesofArray.InitializingTwoDimensionalandMultidimensionalArrays, Introduction toPointers. Pointers andFunctions.

UNITIII

StorageClassesandCharacterStrings:Automatic,Register,Static,External(LocalandGlobal), Strings, Standard library String Functions: strlen(), strcpy(), strcat(),strcmp()**Functions:**Definition,Passingvaluesbetweenfunctions,callbyvalue,callbyreference,Recursion

UNITIV

Structures and Unions: Declaring structure and its variables,Arraysof structures.Introduction to Unions.

Input/Output: Getchar (), putchar (), printf (), scanf (), puts (), gets () Introduction to files and its operations.

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1.	ProgramminginC	ByronGottfried,JitenderChhabra	Schuamoutlineseries
2.	LetusC	YaswantKanetkar	BPBPublication
3.	A structuredProgrammingapproachusing C	BehrouzForouzan	Thomaslearning

Programme Code: UG018

CourseCode	**MAT171**
CourseTitle	**EngineeringMathematics-I**
Type ofcourse	Theory
L T P	4:0:0
Credits	4
Courseprerequisite	+2withnon- medical
Course Objective	The objective of this course is to familiarize the prospective engineers with techniques in basic calculus and linear algebra. It aimsto equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that theywouldfind useful intheirdisciplines.
CourseOutcome(CO)	**Bytheendofthe course,studentswillbeableto:** CO1:Applydifferentialandintegralcalculustonotionsofcurvatureand to improper integrals. CO2:UnderstandtheBetaandGammafunctions. CO3:Comprehendtoolsofmatricesandlinearalgebraincluding linear transformations, eigenvalues, diagonalization and orthogonalization.

Syllabus

UNIT-I: Basic Calculus

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

UNIT-II: Single-variable Calculus

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

UNIT -III: Sequences and series

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

UNIT-IV: Multivariable Calculus (Differentiation)

Limit, continuity and partial derivatives, directional derivatives, gradient, total derivative;

Programme Code: UG018

Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers.

Recommendedbooks:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9 th Edition, John Wiley & Sons, 2006.

2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11 th

Reprint, 2010.

3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi

Publications, Reprint, 2008.

4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36 th Edition, 2010.

Programme Code: UG018

CourseCode	**AEC0010**
CourseTitle	**Communication Skills - I**
Typeof course	AEC-1
LTP	2:0:0
Credits	2
Courseprerequisite	+2inanystream
Course Objective (CO)	Objectivesof the courseis to: 1. Equipthelearnerwithproficiencyinreadingcomprehension.. 2. Enablethelearnerwithimprovedwritingskillsand command overofficial/ corporate communication. 3. Enhancethelearners'rangeofvocabularyandknowledgeoftheessentialsof grammar.
CourseOutcomes	Attheconclusion ofthecoursethelearner willbeableto: 1. Havefairlygood proficiencyin readingcomprehension. 2. Haveenhancedwritingskillsandcommandinofficial/corporatecommunication. 3. Develop confidence in making presentation: oral ordocumentary. 4. Developspeakingskills.

SYLLABUS

UNIT-I

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

UNIT-II

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

Reading Skills: Purpose of reading,Processofreading,readingskillsModelsandstrategies,scanning,skimming,SQ3R,Approachesof Reading,Comprehensionpassagesforpractice.

UNITIII

WritingSkills: Purposeofwriting,Effectivewriting,Typesofwriting,BusinessCorrespondence,Precisewriting, Memo writing,minutes of meeting.

UNIT-IV

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

RecommendedBooks:

SrNo	**Author(s)**	**Title**	**Publisher**
1.	BhupenderKour	EffectualCommunicationSkills	S.K.KatariaandSons
2.	R.DattaRoyandK.K.Dheer	CommunicationsSkills	Vishal PublishingCompany

Programme Code: UG018

CourseCode	**ME107**
CourseTitle	**SmartMaterials**
Typeof Course	ES
LTP	2 0 0
Credits	2
Course pre-requisite	NA
Course Objectives	By the end of this course, student should be able to apply basic principles and mechanismsofsmartmaterialsanddevicesandprovidesaspringboardforfurtherstudy, demonstrate knowledge and understanding of the physical principles underlying the behavior of smart materials, describe the basic principles and mechanisms of the importantsmartmaterials,demonstrateknowledgeandunderstandingoftheengineering principlesinsmartsensors,actuatorsandtransducertechnology,proposeimprovements on the design, analysis, manufacturing and application issues involved in, integrating smartmaterialsanddeviceswithsignalprocessingandcontrolcapabilitiestoengineer smartstructuresand products.
Corse Outcomes	**CourseOutcomes:** Bytheendofthiscourse,studentwillbeableto **1** Understandthebehaviorandapplicabilityofvarioussmartmaterials. **2** Designandconductexperiments,analyzeandinterpretdatarelatedtosmart materials and devices. **3** Designasystem,component,orprocessbasedonsmartmaterialstomeet desired needs.

SYLLABUS

UNIT-I

Introduction: Overview of Smart Materials and their properties, Classification of Smart Materials, Development of smart materials and devices. Areas of application of devices.

UNIT-II

Piezoelectric and Electrostrictive Materials: Constitutive relationship, electromechanical coupling coefficients,piezoelectricconstants,piezoceramicmaterials,variationofcouplingcoefficients inhardandsoft piezoceramics, polycrystalline vs single crystal piezoelectric materials, polyvinyldene fluoride, piezoelectric composites

Magnetostrictive and Magnetoelectric Materials: constitutive relationship, magneto-mechanical coupling coefficients, Joule Effect, Villari Effect, Matteuci Effect, Wiedemann effect, Giant magnetostriction in Terfenol-D, Terfenol-D particulate composites, Galfenol and Metglas materials

UNIT-III

ShapeMemoryAlloys: Synthesis,Typesofshapememoryalloys,Nickel-Titaniumalloy(Nitinol),Cubased alloys, Chiral materials, Applications, Fastners, Fibers, Reaction vessels, Nuclear reactors, Chemical plants, Satellite antenna, Blood clot filter, Plastics.

Electrorheological (ER) And Magnetorheological (MR) Fluids: Suspensions and ER fluids,

ER phenomenon,chargemigrationmechanism,ERfluidactuators,applicationsofERfluids.Compositiono fMR fluid, applications of MR fluids.

UNIT-IV

Sensor and Actuator: Sensing Technology, Types of Sensors, Physical Measurement using Piezo Electric Strain measurement, Inductively Read Transducers, The LVOT, Fiber Optic Techniques. Chemical and Bio- Chemical sensing in Structural Assessment, Absorptive chemical sensors, Spectroscopes, Fibre Optic Chemical Sensing Systems and Distributed measurement.
Actuator Techniques, Actuator and actuator materials, Piezoelectric and Electrostrictive Material, Magneto structure Material, Shape Memory Alloys, Electrorheological Fluids, Electromagnetic actuation, Role of actuators and Actuator Materials.

Measuring Techniques: Strain Measuring Techniques using Electrical strain gauges, Types, Resistance, Capacitance, Inductance, Wheatstone bridges, Pressure transducers, Load cells, Temperature Compensation, Strain Rosettes.

REFERENCEBOOKS

Sr No	Author(s)	Title	Publisher
1.	M.S. Vijaya	Piezoelectric Materials and Devices: Applications in EngineeringandMedical Sciences	CRCPress,2017
2.	JaspritSingh	Smart Electronic Materials: FundamentalsandApplications	CambridgeUniversityPress, 2005
3	M.Addington,Schodek,L. Daniel	Smart materials and new technologies	Routledge,2016
4	M.V. Gandhi, Brian S. Thompson	SmartMaterialsandStructures	SpringerNetherlands,1992

Programme Code: UG018

Course Code	**PHY115**
Course Title	**Engineering Physics**
Type of course	BS
LTP	4 0 0
Credits	4
Course prerequisite	10+2 with physics as core subject.
Course Objective(CO)	The aim of the subject is to enhance the knowledge of engineering students about Semiconductor Physics and apply the knowledge to engineered semi conductor materials.
CourseOutcome(CO)	**Students will be able to:** CO1: Gain the knowledge to explain the concept of electronics materials. CO2: Understand the physics of semiconductors and light semi conductor interaction. CO3: illustrate the measurements of carrier density, resistivity and hall mobility using different techniques. CO4: Analyze engineered semiconductor materials and its applications.

Syllabus-

UNITI

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

UNITII

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

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

UNITIII

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

UNITIV

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

TextandReferenceBooks

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

Programme Code: UG018

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

SYLLABUS

UNIT I

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

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

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

UNIT II

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

environment friendly products, Ecomarks

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

UNIT IV

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

Text and reference Books:

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

Programme Code: UG018

CourseCode	**CSE113**
CourseTitle	**Programming in C practical**
TypeofCourse	ES
L T P	0:0:2
Credits	1
CoursePrerequisites	BasicKnowledge aboutComputers
CourseObjective(s)	Tohelpstudentstounderstandtheimplementationoflanguage.ThisProgramming languagehelps in solving a problem.
CourseOutcome(CO)	Thestudents will beableto: 1. Illustratetheflowchartandtodevelop Cprograms. 2. Developconditionalanditerativestatementstowrite C programs and exercise user defined functions to solverealtimeproblems 3. Inscribe C programs that use Pointers to accessarrays,strings andfunctions. 4. Exerciseuserdefineddatatypesincludingstructuresand unions to solve problems.

SYLLABUS

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Programming using C

1. Writeandexecute programtoshow theworkingof input/outputstatements.
2. Write and execute programs to show the use of different types ofoperators(arithmetic, relational,logical,andconditional).
3. Writeand executeprograms basedon conditionalcontrol statements(if, if-else)
4. Writeandexecute programsbasedon switch-case statements.
5. Writeand executeprograms based onfor loops
6. Writeand executeprograms basedon whileloops.
7. Writeandexecuteprogramsbasedonjumpingcontrolstatements(break,continue).
8. Writeandexecuteprogramstoimplementonedimensionalarrays.

Programme Code: UG018

Course Code	ME105
Course Title	**Workshop/Manufacturing Practices**
Programme	ES
L T P	0 0 6
Credits	3
Course Prerequisites	+2 Physics and Mathematics
Course Objectives	Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using Different materials.
Course Outcome(CO)	CO1: Understanding different manufacturing techniques and their relative advantages/ disadvantages with respect to different applications with selection of a suitable technique for meeting a specific fabrication need. CO2: Acquire a minimum practical skill with respect to the different manufacturing methods and develop the confidence to design and fabricate small components for their project work. CO3: Introduction to different manufacturing methods in different fields of engineering. CO4: Practical exposure to different fabrication techniques and Creation of simple components using different materials.

SYLLABUS

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

WORKSHOP PRACTICE

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

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

RECOMMENDEDBOOKS

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

Programme Code: UG018

Course Code	**PHY107**
Course Title	**Engineering Physics Practical**
Type of course	Practical
L TP	0:0:2
Credits	1
Course prerequisite	10+2 with physics as core subject.
Course Objectives	The aim of the subject is to enhance the Practical knowledge of students about various aspects of fundamental of physics including mechanics, optics, wave optics, quantum mechanics; solid-state physics and its applications.
Course Outcome(CO)	**Students will be able to:** CO1: Measure the Magnetic effects along axis of circular coil, magnetic dipole moment of a bar magnet. CO2: Infer the characteristics, wavelength & diffraction of laser beam using Michels on interferometer, grating elements. CO3: determine numerical aperture, attenuation and propagation losses in optical fiber, various crystal structures, polarizability of a dielectric substance. CO4: Determine the resistivity, band gap of semiconductor materials. .

*__Note:__Performat least12-14experimentsfromlistofexperimentgivenbelow.

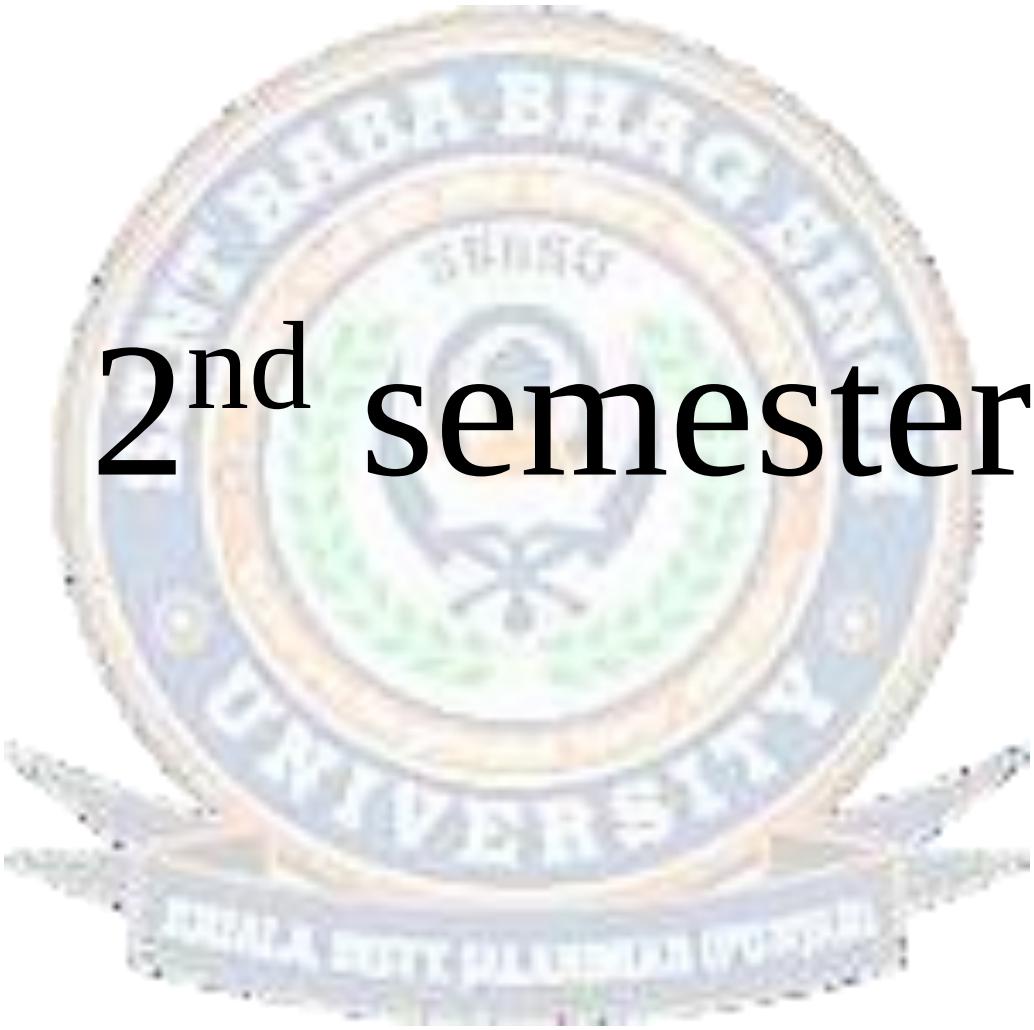
1. Tostudythevariationofmagneticfieldwithdistancealongtheaxisofacircularcoilcarryingcurrent.
2. Todeterminethemagneticdipolemomentofabarmagnetandhorizontalintensityofearth'smagneti cfield using adeflection galvanometer.
3. TostudyB-HcurveusingCRO.
4. Tostudythelaserbeamcharacteristicslikedivergenceusingdiffractiongratingaperture.
5. TodeterminethewavelengthofalaserusingMichelsoninterferometer.
6. Tostudydiffractionusinglaserbeamandthustodeterminethegratingelement.
7. Tofindtherefractiveindexofamaterialusingspectrometer.
8. Tofindtherefractiveindexofaliquidusingahollowprismandspectrometer.
9. Todeterminenumericalaperture ofanopticalfiber.
10. Todetermineattenuationandpropagationlossesinopticalfibers.
11. Tostudyvariouscrystalstructures.
12. Tofindoutpolarizabilityofadielectricsubstance.
13. TosetupandobserveNewton'srings.
14. ToDetermineEnergyBandGapofSemiconductor.
15. Todeterminethenumberoflinespermillimeterofthegratingusingthegreenlineof themercuryspectrum.
16. Tocalculatethewavelengthoftheotherprominentlinesofmercuryby normalincidencemethod.
17. Tofindtheacceleration ofthecartinthesimulator(Newton2nd law)
18. Todeterminetheresistivityofsemiconductorsbyfourprobe Method.

Programme Code: UG018

TextandReferenceBooks

S.No	Name	Author(S)	Publisher
1	Advanced Practical Physicsforstudents	B.L. Flint & H.T.Worsnop	Asia PublishingHouse.
2	AdvancedlevelPhysics Practical's	MichaelNelsonandJon M.Ogborn	HeinemannEducational Publishers
3	ATextBookofPracticalPhysics	InduPrakashand Ramakrishna	KitabMahal,NewDelhi

ProgrammeCode: UG018



2nd semester

CourseCode	**CHM105**
CourseTitle	Engineering Chemistry
Typeofcourse	BS
L T P	3:1:0
Credits	4
Courseprer equisite	NA
Course Objective(CO)	Theobjectivesoftheengineeringchemistryaretorelatethestudentswithbasicconceptsof chemistry.Somenewtopicshavebeenintroducedtothesyllabus forthedevelopmentoftherightattitudesbytheengineeringstudentstocopewith newtechnology
CourseOutcomes	**Thecoursewillenable thestudentto:** CO1: Analyzemicroscopicchemistryintermsofatomicandmolecularorbital's and intermolecular forces. Rationalize bulk propertiesandprocessesusing thermodynamicconsiderations. CO2: Distinguish the ranges of the electromagnetic spectrum used forexcitingdifferentmolecularenergylevelsinvariousspectroscopictechniq ues CO3: Rationalizeperiodicpropertiessuchasionizationpotential,electronegativity,oxidati on statesand electronegativity. CO4: Listmajorchemicalreactionsthatareusedinthesynthesisofmolecules.

SYLLABUS

UNIT-I

AtomicandmolecularstructureSchrodingerequation.Particleinaboxsolutionsandtheirapplicationsforconjug atedmoleculesandnanoparticles.Formsofthehydrogenatomwavefunctionsand the plots of these functions to explore their spatial variations. Molecular orbitals of diatomicmolecules and plots of the multi center orbitals. Equations for atomic and molecular orbitals. Energylevel diagrams of diatomics. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystalfield theory and the energy level diagrams for transition metal ions and their magnetic properties.Bandstructureofsolids and the roleof doping on band structures.

UNIT-II

Spectroscopictechniquesandapplications

Principlesofspectroscopyandselectionrules.Electronicspectroscopy.Fluorescenceanditsapplicationsinmedici ne.Vibrationalandrotationalspectroscopyofdiatomicmolecules.Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterizationtechniques.Diffraction and scattering.

Intermolecularforcesandpotentialenergysurfaces
Ionic,dipolarandvan DerWaalsinteractions.Equationsofstateofreal gasesandcriticalphenomena.Potentialenergy surfacesof H_3,H_2Fand HCNand trajectoriesonthesesurfaces.

UNIT-III

Useoffreeenergyinchemicalequilibria: Thermodynamicfunctions:energy,entropy andfreeenergy

Estimationsofentropyandfreeenergies.Freeenergyandemf.Cell potentials,theNernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Waterchemistry.Corrosion.Useoffreeenergyconsiderationsinmetallurgythrough Ellinghamdiagrams.

Periodic properties: Effective nuclear charge, penetration of orbitals, variations of s, p, d and forbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes,ionizationenergies,electronaffinityandelectronegativity,polarizability,oxidationstates,coordinatio nnumbersandgeometries,hardsoftacidsand bases, moleculargeometries

UNIT-IV

StereochemistryRepresentationsof3dimensionalstructures,structuralisomersandstereoisomers,confi gurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absoluteconfigurationsandconformational analysis.Isomerismin transitionalmetal compounds

Organicreactionsandsynthesisofadrugmolecule: Introductiontoreactionsinvolvingsubstitution,additio n,elimination,oxidation,reduction,cyclizationandringopenings.

Synthesisofacommonlyuseddrugmolecule.

RECOMMENDEDBOOKS

S.No	Name	Author(S)	Publisher
1.	Engineeringchemistry	J.C.CuriacoseandJ.RajaRam	TataMcgraw-HillCo.NewDelhi.
2	InorganicChemistry	GaryL.Miessler,PaulJ.FischerandDonaldA. Tarr,(2013).	Pearson
3	Introduction tospectroscopy(2008).	Pavia,D.L.,Lampman, G.M.,Kriz,G.S.,andVyvyan,J. A.	CengageLearning.
4	PrinciplesofOrganic Synthesis	NormanandCoxon	*CRCPress*
5	InorganicChemistry4thedition	D.F.Shriverand P.W.Atkins,	Oxford University, Oxford(2006)
6	Stereochemistryconformation andMechanism	P.S.Kalsi	NewAgeInternational
7	Thermodynamics forChemists	S.Glasstone	East West Press, NewDelhi(1950).

ProgrammeCode: UG018

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

SYLLABUS

UNIT-I: Matrices

Linear Systems of Equations; Linear Independence; Rank of a Matrix; Determinant, Inverse of a matrix, System of linear equations; Symmetric, skew-symmetric and orthogonal matrices. Determinants; Eigenvalues and eigenvectors; Cayley-Hamilton Theorem (without proof).

UNIT-II: First order ordinary differential equations

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

UNIT-III: Ordinary differential equations of higher orders

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

UNIT-IV: Complex Variables

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

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

Recommended books:

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

ProgrammeCode: UG018

CourseCode	**ME101**
CourseTitle	**EngineeringGraphicsand Design**
TypeOfCourse	ES
L T P	2:0:4
Credits	4
CoursePre-requisites	NIL
Courseobjectives	Toprepare you to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability to prepare you to communicate effectively ton prepare you to use the techniques, skills and modern engineering tools necessary for engineering practice.
Courseoutcome(CO)	**Bytheendofthecourse,studentswillbeableto learn:** CO1: Introduction to engineering design and its place in society and engineering communication. CO2: Exposure to visual aspects and engineering graphics of engineering design standard, exposure to solid modeling CO3: Exposure to computer aided geometric design creating working drawings.

Syllabus

UNIT-I

IntroductiontoEngineeringDrawing

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering,Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid,HypocycloidandInvolute;Scales–Plain,DiagonalandVernierScales.

OrthographicProjections

Principles of Orthographic Projections-Conventions – Projections of Points and lines inclined to bothplanes;Projections ofplanesinclinedPlanes–AuxiliaryPlanes;

UNIT-II

ProjectionsofRegularSolids

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

scale.Floorplansthatinclude:windows,doors,andfixturessuchasWC,bath,sink,shower,etc.

SectionsandSectionalViewsofRightAngularSolidsCovering
Prism,Cylinder,Pyramid,Cone–AuxiliaryViews;DevelopmentofsurfacesofRightRegularSolids
-
Prism,Pyramid,CylinderandCone;Drawthesectionalorthographicviewsofgeometricalsolids,objectsfro mindustryanddwellings(foundationtoslabonly)

UNIT-III
IsometricProjections
Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Viewsoflines,Planes,SimpleandcompoundSolids;ConversionofIsometricViewstoOrthographicViewsa ndVice-versa,Conventions;

OverviewofComputerGraphics
listingthecomputertechnologiesthatimpactongraphicalcommunication,Demonstratingknowledgeof the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties,Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialogboxesandwindows,Shortcutmenus(ButtonBars),TheCommandLine(whereapplicable),TheStatu sBar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines,Planes,Simple and compound Solids];

UNIT-IV

Customization&CADDrawing
consisting of set up of the drawing page and the printer, including scale settings, Setting up of unitsanddrawinglimits;ISOandANSIstandardsforcoordinatedimensioningandtolerancing;Orthographi c constraints, Snap to objects manually and automatically; Producing drawings by usingvarious coordinate input entry methods to draw straight lines, Applying various ways of drawingcircles;

Annotations,layering&otherFunctions
applyingdimensionstoobjects,applyingannotationstodrawings;SettingupanduseofLayers,layersto create drawings, Create, edit and use customized layers; Changing line lengths through modifyingexisting lines (extend/lengthen); Printing documents to paper using the print command; orthographicprojectiontechniques;Drawingsectionalviewsofcompositerightregulargeometricsolidsand projectthe true shape of the sectioned surface; Drawingannotation, Computer-aided design (CAD) softwaremodeling of parts andassemblies. Parametric andnon-parametric solid,surface,and wireframemodels.Parteditingandtwo-
dimensionaldocumentationofmodels.Planarprojectiontheory,includingsketchingofperspective,isometri c,multiview,auxiliary,andsectionviews.Spatialvisualization exercises. Dimensioning guidelines, tolerancingtechniques; dimensioning and scalemultiviews ofdwelling;

DemonstrationofaSimpleTeamDesign ProjectthatIllustrates
Geometryandtopologyofengineeredcomponents:creationofengineeringmodelsandtheirpresentationinst andard2Dblueprintformandas3Dwire-
frameandshadedsolids;meshedtopologiesforengineeringanalysisandtool-

pathgenerationforcomponentmanufacture;geometricdimensioningandtolerancing;Useofsolid-modelingsoftwareforcreatingassociativemodelsatthecomponentandassembly levels; floor plans thatinclude: windows, doors, and fixtures such as WC, bath, sink,shower, etc. Applying colour coding according to building drawing practice; Drawingsectionalelevationshowingfoundationto ceiling;Introductionto BuildingInformationModelling (BIM).

Recommendedbooks:

S. No	Name	Author(s)	Publisher
1.	EngineeringDrawing	BhattN.D.,Panchal V.M.&IngleP.R.,(2014)	CharotarPublishingHouse
2.	Engineering DrawingandComputerGraphics	Shah,M.B.&Rana B.C.(2008)	PearsonEducation
3.	Engineering Graphics	AgrawalB.&AgrawalC. M. (2012)	TMHPublication
4.	TextbookonEngineeringDrawing	Narayana,K.L.&PKannaiah(2008)	ScitechPublishers

ProgrammeCode: UG018

CourseCode	**EE102**
CourseTitle	**Basic Electrical Engineering**
TypeOfCourse	ES
L T P	3:0:0
Credits	3
CoursePrerequisites	Physics&Mathematics
Courseobjectives	To familiarize with AC, DC circuits & their fundamentals, Magneticcircuits&Transformer,ElectricalMachinesandMeasuringInstruments
CourseOutcome(CO)	**Bytheendofthecourse,studentswillbeableto:** 1. Understandandanalyze basicelectricandmagneticcircuits 2. Studytheworkingprinciplesofelectricalmachinesandpowerconverters. 3. Introduce the components of low voltage electricalinstallations.

Syllabus

UNIT-I

DCCircuits

Electricalcircuitelements(R,LandC),voltageandcurrentsources,Kirchoffcurrentandvoltagelaws,analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domainanalysis offirst-orderRLandRC circuits.

UNIT-II

ACCircuits

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power,reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L,C, RL, RC, RLC combinations (series and parallel), resonance. Three-phase balanced circuits, voltageandcurrentrelationsinstaranddeltaconnections.

UNIT-III

Transformers

Magneticmaterials,BHcharacteristics,idealandpracticaltransformer,equivalentcircuit,lossesintransformers,regulationandefficiency.Auto-transformerandthree-phasetransformerconnections.

UNIT-IV

ElectricalMachines

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor,Significance of torque-slip characteristic. Loss components and efficiency, starting and speed

controlof inductionmotor.Single-phaseinductionmotor.Construction,working,torque-speedcharacteristic andspeedcontrolofseparatelyexciteddcmotor.Constructionandworkingofsynchronousgenerators.

werConverters

DC-DCbuckandboostconverters,dutyratiocontrol.Single-phaseandthree-phasevoltagesourceinverters;sinusoidalmodulation.

ElectricalInstallations

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires andCables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculationsforenergyconsumption,powerfactor improvementandbatterybackup.

Recommendedbooks:

S. No	Name	Author(s)	Publisher
1.	BasicElectricalEngineering	D.P.KothariandI.J. Nagrath	TataMcGraw Hill,2010
2.	BasicElectricalEngineering	D.C.Kulshreshtha	McGrawHill,2009
3.	Fundamentals of ElectricalEngineering	L.S.Bobrow	OxfordUniversityPress,2011
4.	ElectricalandElectronicsTechnology	E.Hughes	Pearson,2010
5.	PrenticeHallIndia,1989	Electrical EngineeringFundamentals	V.D.Toro

ProgrammeCode: UG018

Course Code	**MDC023**
Course Title	**Indian Knowledge System**
Type of Course	MDC-1
L T P	3:0:0
Credits	3
Course Prerequisites	NA
Course Objective(s)	1. Comprehend the core principles of the Indian knowledge system, including health, spirituality, and cultural preservation. 2. Explore the contributions of ancient Indian mathematicians to number systems, geometry, and astronomy.
Course Outcome (CO)	The students will be able to: 1. Students will grasp the essence of the Indian knowledge system, encompassing health, mathematics, and cultural heritage. 2. Upon completion, students will appreciate the influence of ancient Indian texts, mathematicians, and cultural practices on contemporary society.

SYLLABUS

UNIT 1:

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

UNIT 2:

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

UNIT 3:

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

UNIT 4:

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

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

ProgrammeCode: UG018

CourseCode	**CHM107**
CourseTitle	**Engineering Chemistry Practical**
Typeofcourse	BS
LTP	002
Credits	1
CourseObjectives	Thechemistrylaboratorycoursewillconsistofexperimentsillustratingtheprinciplesoftchemistryrelevanttothestudyofscienceand engineering.
Course Outcome(CO)	Thestudents willlearnto: 1. Estimaterateconstantsofreactionsfromconcentrationofreactants/product sasafunctionof time 2. Measuremolecular/systempropertiessuch assurfacetension,viscosity,conductanceof solutions,redoxpotentials,chloridecontentofwater,etc 3. Synthesizeasmalldrugmoleculeandanalyzeasalt sample.

SYLLABUS

ListofExperiment(Choiceof 10-12experiments fromthefollowing)

1. Determinationofsurface tension andviscosityofliquids.
2. Determinationofviscosityofoilbymeansof RedWoodViscometer.
3. Thinlayerchromatography:Determination ofRfvalueofamixturebyTLC.
4. Separation of methyl orange and phenolphthalein from given mixture by paperchromatography
5. Ion exchange column for removal of hardness of water/Determination of totalhardnessof waterby EDTAmethod.
6. DeterminationofTotalResidualChlorineinwatersample.
7. Colligativepropertiesusingfreezingpoint depression
8. Determinationoftherate constantofareaction
9. Determinationofcellconstantandconductanceofsolutions
10. Potentiometry-determinationofredoxpotentialsandemfs:
11. Determinethestrengthofasolutionp Hmetrically.
12. Synthesisofapolymer/drug:PreparationofUrea FormaldehydeResin;
13. Synthesisofparacetamol
14. Tobringcatalysedcondensationortoprepareapuresampleofdibenzalpropane
15. Saponification/acidvalue ofanoil
16. Chemicalanalysis ofasalt
17. Latticestructuresandpackingofspheres
18. Modelsofpotentialenergysurfaces
19. Chemicaloscillations-Iodineclockreaction
20. Determination of the partition coefficient to of a substance between two immiscibleliquids
21. Adsorptionofaceticacidby charcoal
22. Useofthecapillary viscosity meters to the demonstrate oftheisoelectric pointas thepHof minimumviscosity forgelatin sols and/orcoagulation of the white part of egg.

ProgrammeCode: UG018

CourseCode	**EE104**
CourseTitle	**Basic Electrical Engineering Laboratory**
TypeOfCourse	ES
L T P	002
Credits	1
CoursePre-requisites	BasicsofElectricalEngineering
Courseobjectives	TofamiliarizewithvariousAC,DCcircuits,Transformer,ElectricalMachineandMeasuringInstruments
Courseoutcome(CO)	**Bytheendofthecourse,studentswillbeableto:** CO1: Get anexposureto commonelectricalcomponents andtheirratings. CO2: Makeelectricalconnectionsbywiresofappropriateratings. CO3: Understandtheusageofcommonelectricalmeasuringinstruments. CO4: Understandthe basiccharacteristicsoftransformersandelectricalmachines. CO5: Getexposuretotheworking ofpowerelectronicconverters.

Listofexperiments/demonstrations:

1. Basic safety precautions. Introduction and use of measuring instruments– voltmeter, ammeter,multi-meter,oscilloscope.Real-liferesistors,capacitors and inductors.
2. Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to astepchangeinvoltage(transientmaybeobservedonastorageoscilloscope).Sinusoidalsteadystate response of R-L, and R-C circuits – impedance calculation and verification. Observationofphasedifferences betweencurrentandvoltage.ResonanceinR-L-Ccircuits.
3. Transformers:Observationoftheno-loadcurrentwaveformonanoscilloscope(non-sinusoidalwave-shapeduetoB-Hcurvenonlinearityshouldbeshownalongwithadiscussionabout harmonics). Loading of a transformer: measurement of primary and secondary voltagesandcurrents,andpower.
4. Three-phasetransformers:StarandDeltaconnections.VoltageandCurrentrelationships(line-line voltage, phase-to-neutral voltage, line andphase currents). Phase-shifts between theprimaryandsecondaryside.Cumulativethree-phasepowerinbalancedthree-phasecircuits.
5. Demonstration of cut-out sections of machines: dc machine (commutator-brush

arrangement),inductionmachine(squirrelcagerotor),synchronousmachine(fieldwinging–slipringarrangement)andsingle-phaseinductionmachine.

6. TorqueSpeedCharacteristicofseparatelyexciteddcmotor.
7. Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal bychange of phase-sequence of connections. Torque-Slip Characteristic of an induction motor.Generatoroperationofaninductionmachinedrivenatsuper-synchronous speed.
8. SynchronousMachineoperatingasagenerator:stand-aloneoperationwithaload.Controlofvoltagethroughfieldexcitation.
9. Demonstrationof(a)dc-dcconverters(b)dc-acconverters–PWMwaveform(c)theuseofdc-acconverterforspeedcontrolofaninductionmotorand(d)ComponentsofLTswitchgear.

ProgrammeCode: UG018

3rd semester

ProgrammeCode: UG018

CourseCode	**CSE251**
CourseTitle	**ComputerOrganizationandArchitecture**
TypeofCourse	PC
L T P	400
Credits	4
CoursePrerequisites	Basicknowledgeofcomputersanditscomponents
CourseObjectives	Toexposethe students to the following: 1. Understand the internal structure and operation of digital computers. 2. Learn instruction set architecture and its impact on processor design. 3. Explore memory hierarchy, I/O systems, and performance optimization. 4. Develop skills to design and analyze CPU components and control units.
Course Outcome(CO)	**Thelearnerwill beableto-** 1. Explain the basic structure and functional units of a computer system. 2. Design and analyze instruction formats, addressing modes, and control units. 3. Evaluate performance trade-offs in memory and I/O systems. 4. Apply pipelining and parallel processing techniques in processor design.

Syllabus

Unit I: Basic Computer Organization

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

Unit II: CPU Design & Microprogramming

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

Unit III: Memory Organization

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

Unit IV: I/O Systems & Parallel Processing

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

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

ProgrammeCode: UG018

CourseCode	**CSE253**
CourseTitle	**Data Structure and Algorithms**
TypeofCourse	PC
L T P	4 00
Credits	4
CoursePrerequisites	BasicknowledgeofClanguageand C++ language
CourseObjectives	This course work provides the thorough understanding of the Linear and Non-LinearDataStructures insolving problemsandtogivethe ideaoftheefficiencyofvariousalgorithms.
CourseOutcome(CO)	Thelearnerwillbeableto– 1. For a given algorithm student will able to analyze the algorithms todeterminethetimeandcomputationcomplexityandjustifythecorrectness. 2. For a given Search problem (Linear Search and Binary Search) studentwillable to implementit. 3. For a given problem of Stacks, Queues and linked list student will ableto implement it and analyze the same to determine the time and computationcomplexity. 4. Student will able to write an algorithm Selection Sort, Bubble Sort,InsertionSort,QuickSort,MergeSort,HeapSortandcomparetheirperformance in term ofSpaceandTimecomplexity. 5. Student will able to implementGraph search and traversal algorithmsanddeterminethe timeandcomputationcomplexity.

Syllabus

UNIT-I

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

UNIT-II

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

UNIT-III

Linked Lists: Singly linked lists: Representation in memory, Algorithms of several operations:Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stackand Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; CircularLinkedLists: alloperationstheiralgorithmsandthecomplexityanalysis.

Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree,Binary Search Tree, AVL Tree; Tree operations on each ofthetreesandtheir algorithms withcomplexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms andanalysis.

UNIT-IV

SortingandHashing: Objectiveandpropertiesof differentsorting algorithms: SelectionSort, Bubble Sort, InsertionSort,QuickSort,MergeSort,HeapSort; PerformanceandComparisonamong allthemethods,Hashing.

Graph: Basic Terminologies and Representations, Graph search and traversal algorithms andcomplexityanalysis.

RECOMMENDEDBOOKS

SrNo	Author(s)	Title	Publisher
1.	Fundamentals of DataStructures	IllustratedEditionbyEllisHorowitz,Sartaj Sahni	ComputerSciencePress
2.	Algorithms,DataStructures,andProblemSolvingwithC++	IllustratedEditionbyMarkAllenWeiss	Addison-WesleyPublishingCompany
3.	HowtoSolveitby Computer	2nd ImpressionbyR.G.Dromey	PearsonEducation

ProgrammeCode: UG018

Course Code	**CSE255**
Course Title	**Operating Systems**
Type of Course	PC
L T P	4:0:0
Credits	4
Course Prerequisites	Overview of Computer Architecture
CourseObjectives	TolearnthefundamentalsofOperating Systems. 1. TolearnthemechanismsofOStohandleprocessesandthreadsand their communication 2. To learn the mechanisms involved in memory management incontemporaryOS 3. To gain knowledge on distributed operating system conceptsthatincludesarchitecture, Mutualexclusionalgorithms,deadlockdetectionalgorithmsand agreementprotocols 4. Toknowthecomponentsandmanagementaspectsofconcurrency management 5. TolearntoimplementsimpleOSmechanisms
CourseOutcome (CO)	**Thelearnerwillbeableto-** 1. Createprocessesandthreads. 2. Developalgorithmsforprocessschedulingforagivenspecificationof CPU utilization, Throughput, Turnaround Time,WaitingTime,ResponseTime. 3. For a given specification of memoryorganization developthetechniquesfor optimallyallocatingmemorytoprocessesbyincreasingmemoryutilization andforimprovingtheaccesstime. 4. Designandimplementfilemanagementsystem. 5. ForagivenI/OdevicesandOS(specify)developtheI/Omanagementfunctions inOSaspartofauniformdevice abstractionbyperformingoperationsforsynchronizationbetweenCPU andI/O controllers.

SYLLABUS

UNIT-I

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

UNIT-II

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

Process Management: Process states, Process Scheduling, Process hierarchy, Threads, Threading issues, Multi-threading models, Non-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

ProgrammeCode: UG018

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Operating System ConceptsEssentials	9th Edition by Avi Silberschatz, PeterGalvin, GregGagne	WileyAsiaStudentEdition.
2	OperatingSystems:InternalsanddDesignPrinciples	5thEdition,WilliamStallings	PrenticeHallofIndia
3	OperatingSystem:ADesign-orientedApproach	1stEditionbyCharlesCrowley	Irwin Publishing
4	OperatingSystems: AModernPerspective	2nd Edition byGary J. Nutt	Addison-Wesley
5	Designof theUnixOperatingSystems	8thEditionbyMauriceBach	Prentice-Hall ofIndia
6	UnderstandingtheLinuxKernel	3rdEdition,DanielP.Bovet, MarcoCesati	O'ReillyandAssociates

Course Code	CSE259
Course Title	Computer Programming using python
Type Course	PC
L T P	3:0: 0
Credits	3
Course Pre-requisite	NA
Course Objectives (CO)	1. To understand syntax and data types used in python. 2. To write and perform programs using control structures in python 3. To implement programs using functions and to handle exceptions in python. 4. Creating and using classes in python programming
Course Outcomes	The learner will be able to: 1. Understand basic syntax and data types used in python. 2. Write and perform programs using control structures 3. Implement programs with functions and handle Exceptions. 4. Create and use classes in python

SYLLABUS

UNIT-I

Introduction : Introduction, History, Versions, Installation, Environment Variables, Command Line Execution, IDLE, Script mode and Batch mode, Editing Files, Documentation, Help, Dynamic Types, Reserved Words, Naming Conventions, Typing, id(), typeof(), Indentation, Basic Syntax, Comments, Datatype, String Values, String Methods, String formatting Method (f string,% method, and format method), String Operators, Data typecasting, Simple Output, Simple Input, print Function.

UNIT-II

Control Structures: Indenting Requirements, Code Formatting Standards, Whitespace and Code Readability, Coding Style Guidelines, Nested if Statements, Ternary Operator, Truthy and Falsy Values, Operator Precedence and Associativity, Bitwise Shift Operators, Bitwise Operations, Masking and Bitwise Flags, Infinite Loops, Loop Termination Conditions, Do-While Loop, Loop Control Statements, break and continue, Exiting Nested Loops, Use Cases, Best Practices, Iterating Over Collections, Range-Based for Loops, Loop Indexing and Iteration Patterns

UNIT-III

Functions and Modules: Introduction, Defining Your Own Functions, Pass, Parameters, Function Documentation, Keyword and Optional Parameters, Passing Collections to a Function, Variable Number of Arguments, Scope, Functions - "First Class Citizens", Passing Functions to a Function, map, filter, Mapping Functions in a Dictionary, Lambda, Modules and Importing, Creating Modules, Using Standard Library Modules, Module Search Path, Importing from Packages, Namespace and Module Attributes.

Exception: Errors, Runtime Errors, The Exception Model Exception Hierarchy, Handling Multiple Exceptions, Raise, assert

UNIT-IV

Classes in Python: Classes in Python, Principles of Object Orientation, Creating Classes, Constructor, Constructor Overloading, Instance Methods, Static Method, Self Keyword, File Organization, Special Methods, Class Variables, Inheritance, Polymorphism

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

UNIT-I: Fourier Series

Definition of Fourier series, Orthogonal and orthonormal functions, Fourier series with arbitrary period, in particular periodic function with period 2, Fourier series of even and odd function, Half range Fourier series.

UNIT II: Laplace Transform and Applications

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

UNIT III: Partial Differential Equations

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

UNIT IV: Basic Statistics

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

Recommendedbooks:

1.Erwin Kreyszig, Advanced Engineering Mathematics, 10 th Edition, John Wiley & Sons2006.

2. S. L. Ross, Differential Equations, 3 rd Edition, Wiley India, 1984.

3. N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36 th Edition, 2010.

CourseCode	**CSE261**
CourseTitle	**Computer Organization and Architecture Laboratory**
TypeofCourse	PC
L T P	002
Credits	1
CoursePrerequisites	Basicknowledgeofcomputeranditscomponents
CourseObjectives	1. Understand the architecture and instruction set of microprocessors (especially 8085/8086). 2. Develop assembly language programs for arithmetic, logical, and control operations. 3. Explore memory interfacing, I/O operations, and interrupt handling. 4. Strengthen low-level programming and debugging skills.
Course Outcome(CO)	**Thelearnerwill beableto-** 1. Write and execute assembly language programs for basic arithmetic and logical operations. 2. Interface peripheral devices and demonstrate control over serial communication. 3. Analyze and debug low-level programs using simulators and hardware kits. 4. Apply interrupt handling and memory operations in real-time scenarios. 1.

SYLLABUS

List of Experiments

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

CourseCode	**CSE263**
CourseTitle	**Data Structure and Algorithms Laboratory**
TypeofCourse	PC
L T P	0 0 2
Credits	1
CoursePrerequisites	KnowledgeofC++Programming Language
CourseObjectives	Allowsthestudentstounderstandtheim plementationofdata structures.
CourseOutcome(CO)	Thelearnerwillbeableto- 1. Designandanalyzethetimeandspaceefficiencyofthedatastruct ure 2. Identitytheappropriatedatastructureforgivenproblem· 3. Gainpracticalknowledgeontheapplicationsofdatastructures

SYLLABUS

LaboratoryExperiments-

1:SequentialArrays

1.1 :Insertanew element atendaswell as atagivenposition

1.2 :Deleteanelementfromagiven whosevalue isgiven orwhosepositionis given

1.3 : To find the location of a given

element1.4:Todisplaytheelementsofthelinear

array

2:LinearLinkedLists

2.1 :Insert anew element

2.2 :Deleteanexistingelement

2.3 Searchanelement

2.4:Displayalltheelements

3:StacksandQueues

3.1 :Programtodemonstratethe useofstack.

3.2 :Programtodemonstrationtheimplementation ofvariousoperationsonalinear

queuerepresentedusingalinear array.

3.3 :Programtodemonstrationtheimplementation ofvariousoperationsonacircularqueuerepresentedusing alinear array.

3.4 :Programtodemonstrationtheimplementationofvariousoperationsonaqueuerepresentedusingalinearlinked list(linkedqueue).

4:SortingandSearching

4.1:Programtosortanarrayofintegersinascendingorderusingbubblesort.4.2:Programtosortanarrayofintegersin ascendingorderusingselectionsort.

4.3:Programtosortan arrayofintegersinascending order using insertionsort.

4.4.:Programtodemonstratetheuseoflinearsearchtosearchagivenelementinanarray.4.5:Programto demonstrate theuseofbinarysearchtosearchagiven elementina sortedarrayinascendingorder.

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(S)**	**Publisher**
1	PracticalDataStructuresUsingC ::Beginner'sEasy	HarryH.Chaudhary	CreatespaceLLC USA
2	Object Oriented ProgrammingwithC++	Balaguruswamy	TataMcGraw-Hill Education
3	DataStructures throughC++	YashavantP.Kanetkar	BPBPublications

CourseCode	**CSE265**
CourseTitle	**Computer Programming using python laboratory**
TypeofCourse	PC
L:T:P	0:0:2
Credits	1
CoursePrerequisites	NA
CourseObjective(s)	1. To understand and perform python installation. 2. To create python scripts using variable, data types and operators. 3. To write programs on string manipulation, control structures and data structures. 4. To implement programs in python using functions, modules and object oriented programming concepts 5. To handle programs using file and exceptions
CourseOutcome(CO)	The learner will be able to: 1. Understand and perform python installation. 2. Create python scripts using variable, data types and operators. 3. Write programs on string manipulation, control structures and data structures. 4. Implement programs in python using functions, modules and object oriented programming concepts 5. Handle programs using file and exceptions

LIST OF EXPERIMENTS

1. **Installation and Environment Setup:** Install Python on your system and set up environment variables. Write a simple Python script and execute it using command line.
2. **Basic Syntax and Datatypes:** Create Python scripts to demonstrate basic syntax, including variables, data types, and operators. Experiment with different data types such as integers, floats, strings, lists, tuples, sets, and dictionaries.
3. **String Manipulation:** Write Python programs to demonstrate various string manipulation techniques, including string methods, formatting methods, and string operators.
4. **Control Structures:** Implement Python programs to practice control structures like if-else statements, nested if statements, loops (for, while), loop control statements (break, continue), and loop termination conditions.
5. **Data Structures:** Write Python programs to understand and utilize different data structures such as lists, tuples, sets, dictionaries, and demonstrate their access methods and built-in functions.
6. **Functions and Parameters:** Create Python functions with different parameter types (positional, keyword, default, variable-length) and demonstrate their usage.

7. **Lambda Functions and Functional Programming:** Practice using lambda functions, map, and filter functions for functional programming tasks like applying transformations and filtering elements.
8. **Modules and Importing:** Develop Python modules with functions and import them into other scripts. Experiment with importing standard library modules and modules from packages.
9. **Exception Handling:** Write Python programs to handle exceptions gracefully using try-except blocks, raise statements, and assert statements.
10. **Object-Oriented Programming (OOP**): Implement Python classes with attributes, methods, constructors, and demonstrate concepts like inheritance, polymorphism, and class variables.
11. **Static Methods and Class Methods:** Create Python classes with static methods and class methods and demonstrate their usage.
12. **File Handling:** Write Python programs to read from and write to files, handle file objects, and practice different file handling techniques.
13. **Exception Handling in Classes:** Develop Python classes that raise and handle exceptions internally, demonstrating error handling within class methods.

CourseCode	**CSE267**
CourseTitle	**Operating System Laboratory**
TypeofCourse	PC
L T P	002
Credits	1
CoursePrerequisites	KnowledgeofOperatingSystem,DOSCommands
CourseObjectives	Toprovidetheunderstanding oftheoperatingsystemoperationandinter-processcommunication.
CourseOutcome-(CO)	Thelearnerwillbeableto- 1. Understandandexecutebasiccommandsofshellscript. 2. Applybasicoperationsinshellscriptswhicharerequiredfordifferentapplications. 3. Identifyandunderstandconceptoffilesystemsinshellscript 4. Applyconcept ofcreatingnewprocessfromparentprocess.

LISTOFPRACTICALS **SYLLABUS**

1. Simulation oftheCPUschedulingalgorithms:
   a) Round Robin
   b) SJF
   c) FCFS
   d) Priority
2. Simulationofcontinuousmemorymanagement allocationtechniques:
   a) FirstFit
   b) BestFit
   c) WorstFit
3. Simulation ofpageReplacementAlgorithms:
   a) FIFO
   b) LRU
   c) OPT
4. SimulationoffileallocationStrategies:
   a) Sequential
   b) Indexed
   c) Linked
5. Simulationoffileorganizationtechniques:
   a) SingleLevelDirectory

b) Two Level6:UnixCommands

7: Reading fromafile,Writingintoafile,FileCreation

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(S)**	**Publisher**
1	PracticalLinuxProgramming:DeviceDrivers,EmbeddedSystems	AshfaqA.Khan	FirewallMedia
2	A Practical Guide to LinuxCommands,Editors,and Shell Programming	MarkG.Sobell	PearsonEducation
3	A Practical Guide to UNIXSystemV Release 4	M.G.Sobell	Benjamin/Cummings PublishingCompany
4	100ShellProgramsinUnix	SarikaJain	PinnacleTechnology

ProgrammeCode: UG018

4thSEMESTER

ProgrammeCode: UG018

CourseCode	**MAT272**
CourseTitle	**Discrete Mathematics**
TypeofCourse	BS
L T P	4:0:0
Credits	4
CoursePrerequisites	+2inanystream
Courseobjective(s)	Toprovidestudentswithanoverviewofdiscretemathematics.Studentswill learnabouttopicssuchaslogicandproofs,setsandfunctions,probability,recursion,graphtheory,matrices,Booleanalgebraand other importantdiscretemathconcepts.
CourseOutcome(CO)	Thestudents will beableto: 1. Uselogicalnotation. 2. Performlogicalproofs. 3. Applyrecursivefunctionsandsolverecurrencerelations. 4. Determineequivalentlogicexpressions.

SYLLABUS

UNIT-I: Set, Relations, Functions

Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sum and Product of Functions, Bijective functions, Inverse andComposite Function, Size of a Set, Finite and infinite Sets, Countable and Uncountable Sets, Cantordiagonal argument and The Power Set theorem.

Proof Methods and Strategies: Forward Proof, Proof by Contradiction, Proof by Contraposition, Proofof Necessity and Sufficiency, Case analysis, Induction.

UNIT-II: Modular Arithmetic and Combinatorics.

Extended Euclid's Greatest Common Divisor algorithm, The Fundamental Theorem of Arithmetic,

Modular arithmetic, Coprimality (or Euler's totient function), Chinese Remainder Theorem.

Permutation & Combination, Inclusion- Exclusion, Pigeon-hole principle, Generating functions,Recurrence.

UNIT-III: Graphs and Logics

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

UNIT-IV: Algebra & Discrete Probability

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

Text Books and References:

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

ProgrammeCode: UG018

CourseCode	**CSE252**
CourseTitle	**Object Oriented Programming with C++**
TypeofCourse	PC
L T P	4:0:0
Credits	4
CoursePrerequisites	BasicKnowledge aboutComputers
CourseObjective(s)	Togainexperience about structuredprogramming. To help students to understand the implementation ofProgramminglanguage. TounderstandvariousfeaturesinProgrammingLanguage.
CourseOutcome(CO)	Thestudents will be able to: 1. UnderstandhowC++improvesCwithobject-orientedfeatures. 2. Learn how to write inline functions for efficiency andperformance. 3. Learn the syntax and semantics of the C++ programminglanguage. 4. Learnhowto design C++classesfor codereuse.

SYLLABUS

UNIT-I:

Basics: Introduction to C++, Tokens, Identifiers, data types, control statements, functions, array,structure,union, pointers.

Classes and Objects: Classes, Structures and Classes, Unions and Classes are Related, FriendFunctions, Friend Classes, Inline Functions, Constructors and its types, Static Class Members,When Constructors and Destructors are Executed, Scope Resolution Operator, Nested Classes,LocalClasses, Passing and Returning Objects, Object Assignment

Arrays,Pointers,ReferencesandtheDynamicAllocation:ArraysofObjects,Pointers,References,DynamicAllocationOperators, ThePlacementForms ofnew and delete.

UNIT-II:

FunctionOverloadingandDefaultArguments: FunctionOverloading,OverloadingConstructor Functions, Finding the Address of an Overloaded Function, Overload Anachronism,DefaultArguments, Function Overloading and Ambiguity.

OperatorOverloading: CreatingMemberOperatorFunction,OverloadingUsingaFriendFunction,Overloading newdelete,Overloading SpecialOperators & CommaOperator

UNIT-III:

Inheritance: Base-ClassAccessControl,Inheritanceandprotectedmembers,InheritingMultipleBase Classes, Constructors, Destructors and Inheritance, Granting Access, Virtual Base Classes.**VirtualFunctions&Polymorphism:**VirtualFunctions,TheVirtualAttributeisinherited,VirtualFunctionsareHierarchical,PureVirtualFunctions,UsingVirtualFunctions,EarlyVsLateBinding.

Templates:GenericFunctions,ApplyingGenericFunctions,GenericClasses,TypenameandexportKeywords, Powerof Templates.

ProgrammeCode: UG018

UNIT–IV :

ExceptionHandling: Fundamentals,Derived-ClassExceptions,Options,Terminate()and unexpected(),uncaught_exception(),exceptionandbad_exceptionClasses,ApplyingExceptionHandling.

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

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

ProgrammeCode: UG018

CourseCode	**CSE254**
CourseTitle	**Database Management Systems**
TypeofCourse	PC
L T P	400
Credits	4
CoursePrerequisites	Elementaryknowledgeaboutcomputersincludingsomeexperience usingWindows. Basic knowledge about programming in some commonprogramminglanguage.
CourseObjectives	• To understandthe different issues involved inthedesignandimplementationofa databasesystem. • To study the physical and logical database designs, databasemodeling,relational, hierarchical,andnetworkmodels • Tounderstandandusedatamanipulationlanguagetoquery,update,andmana gea database • TodevelopanunderstandingofessentialDBMSconceptssuchas:databasese curity,integrity,concurrency,distributeddatabase,andintelligentdatabase, Client/Server(DatabaseServer),DataWarehousing. • To design and build a simple database system and demonstratecompetence with the fundamental tasks involved with modeling,designing, and implementingaDBMS.
Course Outcome(CO)	Thelearnerwillbeableto- 1. Foragivenquerywriterelationalalgebraexpressionsforthatqueryandoptimi zethe developedexpressions 2. For a givenspecificationoftherequirementdesignthedatabasesusingER methodand normalization. 3. For a given specification construct the SQL queriesfor Open source and Commercial DBMS -MYSQL, ORACLE,andDB2. 4. ForagivenqueryoptimizeitsexecutionusingQueryoptimizationalgorithms 5. Foragiventransaction-processingsystem,determinethetransactionatomicity, consistency,isolation,anddurability. 6. Implementtheisolationproperty,includinglocking,time stampingbasedon concurrencycontrolandSerializabilityofscheduling.

SYLLABUS

UNIT-I

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

Data Models: The importance of data models, Basic building blocks, Business rules, The

evolution of data models, Degrees of data abstraction.

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

UNIT-II

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

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

UNIT-III

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

UNIT-IV

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

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

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

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

ProgrammeCode: UG018

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

SYLLABUS

UNIT-I

Need, Basic Guidelines, Content and Process for Value Education

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

UNIT-II

Understanding Harmony in Human Beings

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

UNIT-III

Understanding Harmony in Human Relationships

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

UNIT-IV

Understanding Harmony in Nature & Existence

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

Sessional work:

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

ProgrammeCode: UG018

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

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

SYLLABUS

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

RECOMMENDEDBOOKS			
SrNo	**Author(s)**	**Title**	**Publisher**
1.	DavidF.BeerandDavid McMurrey	Guide to writing as anEngineer	JohnWilley.New York
2.	DianeHacker	PocketStyleManual	BedfordPublication,New York
3	ShivKhera	YouCanWin	MacmillanBooks
4	RamanSharma	TechnicalCommunications	OxfordPublication,London
5	DaleJungk	AppliedWritingforTechnicians	McGrawHill,NewYork

CourseCode	**CSE258**
CourseTitle	**Computer Networks**
Typeof Course	PC
L T P	400
Credits	4
CoursePrerequisites	BasicknowledgeofComputer,DigitalCircuitsandNetwork Arrangement.
CourseObjectives (CO)	1. To developanunderstanding of modernnetworkarchitectures froma design andperformance perspective. 2. To introduce the student to the major concepts involved in wide-areanetworks(WANs),localareanetworks(LANs)and Wireless LANs (WLANs). 3. Toprovideanopportunityto donetworkprogramming 4. ToprovideaWLAN measurementideas.
Courseoutcome	Thelearnerwillbeableto- 1. ExplainthefunctionsofthedifferentlayeroftheOSIProtocol. 2. Draw the functional block diagram of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) describe the function of each block. 3. For a given requirement (small scale) of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) design it based on the market available component 4. For a given problem related TCP/IP protocol developed the network programming. 5. ConfigureDNSDDNS,TELNET,EMAIL,FileTransfer Protocol(FTP), WWW, HTTP,SNMP, Bluetooth, Firewalls using open source available software and tools.

SYLLABUS

UNIT-I

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

UNIT-II

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

Data Link Layer: Design issues, Framing, Error detection and correction codes: checksum, CRC, hamming code, Data link protocols for noisy and noiseless channels, Sliding Window Protocols: Stop Wait ARQ, Go-back-N ARQ, Selective repeat ARQ, Data link protocols: HDLC and PPP. Medium Access Sub-Layer: Static and dynamic channel allocation, Random Access: ALOHA, CSMA protocols, Controlled Access:

Polling, Token Passing, IEEE802.3 frame format, Ethernet cabling, Manchester encoding, collision detection in 802.3, Binary exponential back off algorithm.

UNIT-III

Network Layer: Design issues, IPv4 classful and classless addressing, subnetting, Routing algorithms: distance vector and link state routing, Congestion control: Principles of Congestion Control, Congestion prevention policies, Leaky bucket and token bucket algorithms.

Transport Layer: Elements of transport protocols: addressing, connection establishment and release, flow control and buffering, multiplexing and de-multiplexing, crash recovery, introduction to TCP/UDP protocols and their comparison.

UNIT-IV

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

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

CourseCode	**CSE260**
CourseTitle	**Database Management System Laboratory**
TypeofCourse	PC
L T P	002
Credits	1
CoursePrerequisites	KnowledgeofProgramDevelopmentConstructs
CourseObjectives	Thispracticalcourseworkallowsthestudentstoefficientlydesigna workingsoftwaremodel.
CourseOutcome(CO)	Thelearnerwillbeableto- 1. Understand,appreciateandeffectivelyexplaintheunderlyingconcepts ofdatabase technologies 2. Designandimplementadatabaseschemaforagivenproblem-domain 3. Normalizeadatabase 4. PopulateandqueryadatabaseusingSQLDML/DDLcommands. 5. Declareandenforceintegrityconstraintsonadatabase usingastate-of-the-artRDBMS

SYLLABUS

ListofPractical's

1:IntroductionToDBMSAndItsApplications

1.1:IntroductiontoDBMSanditsapplications.

.2: Studyof SQLStatements

2.1 : Data types, creating tables, retrieval of rows using select statement, conditional retrieval of rows, alteranddropstatements.

2.2 :workingwithnull values,matchingapatternfromatable,orderingtheresultofaquery, aggregatefunctions,grouping theresult ofaquery,updateanddeletestatements.

3:Operators

3.1: arithmetic operators- add, subtract, multiply,
divide3.2: renamefield
3.3: logicaloperations-and,or,not

4:OtherOperations

4.1: aggregate function- average, minimum, maximum, sum, count, count(*)
4.2: numericfunctions-absolute,power,sqrt,round
4.3:stringfunctions: lower,upper,initcap,length,ltrim,rtrim,substring,lpad,rpad

ProgrammeCode: UG018

5:T-SQL:TransactStructuredQueryLanguage

5.1:Implementgrantsandrevokecommands,commitandrollbackcommands.

6:JoinsAndViews

6.1 :programtoillustrate useofjoin.

6.2 :create aview.

7:IntroductionToPL/SQL

7.1 :introductiontoPL/SQL,basiccodestructure,differenceb/wSQLandPL/SQL

7.2 :studyPL/SQLcontrolstructure

7.2.1 Conditionalcontrol-ifandcasestatements

7.2.2 Iterativecontrol-loopandexitstatements

7.2.3 Sequentialcontrol-goto and nullstatementsprograms

7.3 : Program to findgreatest oftwonumbers

7.4 :Programtofindgreatest ofthreenumbers

7.5 :Programtoperformaddition,subtraction,multiplication,divisionaccordingto user'schoice

7.6 : Programto printfirstnnaturalnumbers.

RECOMMENDEDBOOKS			
Sr. no.	**Name**	**Author(s)**	**Publisher**
1	TheAlgorithmDesignManual	StevenSSkiena	SpringerScience&BusinessMedia
2	Object Oriented ProgrammingwithC++	Balagurusamy	TataMcGraw-Hill Education
3	Object Oriented ProgrammingUsingC++	JaspreetSingh,Mrs. PinkiParampreetKaur	Technical Publications

Course Code	**CSE264**
CourseTitle	**Object Oriented Programming using C++ Laboratory**
TypeofCourse	PC
LTP	002
Credits	1
CoursePrerequisites	Knowledgeof C++Programming LanguageConcepts
CourseObjectives	ThiscourseistohelpthestudentstogivethepracticalimplementationoftheC++programs
Courseoutcome	Thelearnerwillbeableto- 1. Designaprogramusingmemberfunctioninandoutoftheclass. 2. WriteaprogramtodemonstrateuseofConstructorsandDestructors. 3. ImplementoperatoroverloadingthroughC++programming 4. DemonstrateInheritanceandpolymorphisminrealworldproblemsusingC++

ListofPractical's

1:ClassesandObjects

1.1: Write a program that uses a class where the member functions are defined inside a class1.2:Writeaprogramthatusesaclasswherethemember functionsaredefinedoutsideaclass.1.3:Writeaprogramtodemonstratetheuseofstaticdatamembers.

1.4:Writeaprogramtodemonstratetheuseofconstdatamembers.

2:ConstructorsandDestructors

2.1:Writeaprogramtodemonstratetheuseofzeroargumentandparameterizedconstructors.2.2:Write a programtodemonstratetheuseofdynamicconstructor.

2.3:Writeaprogramtodemonstratetheuseofexplicitconstructor.

3:OperatorOverloading

3.1:Writeaprogramtodemonstratetheoverloadingofincrementand decrementoperators.3.2:Writeaprogramtodemonstratetheoverloadingofbinaryarithmetic operators.

3.3:Writeaprogramto demonstratetheoverloadingofmemorymanagementoperators.

Programme Code: UG018

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 aprogramtodemonstratethetypecastingofclasstypetoclasstype.

5:Inheritance

5.1:Writeaprogramtodemonstratethemultilevelinheritance.

5.2:Writeaprogramtodemonstratethemultipleinheritances.
5.3:Writea programtodemonstratethevirtualderivationofaclass.

6:Polymorphism

6.1:Writeaprogramtodemonstratetheruntimepolymorphism.

7:ExceptionHandling

7.1: Writeaprogramtodemonstratetheexception handling.

8:FileHandling

8.1: Writeaprogramtodemonstratethereadingandwritingofmixedtypeofdata.

8.2:Writeaprogramtodemonstratethereadingandwritingofobjects.

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(S)**	**Publisher**
1	ObjectOrientedProgramminginC++	LaforeR.	WaiteGroup
2	ObjectOrientedProgrammingwithC++	E.Balaguruswamy	TataMcGrawHill
3	Mastering Object-OrientedProgrammingwithC++	R.S.Salaria	SalariaPublishing House

CourseCode	**CSE266**
CourseTitle	**Computer Networks Laboratory**
Typeof Course	PC
L T P	200
Credits	1
CoursePrerequisites	BasicknowledgeofComputer,DigitalCircuitsandNetwork Arrangement.
CourseObjectives (CO)	1. To develop an understanding of modern network architectures froma design andperformance perspective. 2. Tointroducethestudenttothe majorconceptsinvolved inwide- area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs). 3. Toprovideanopportunityto donetworkprogramming 4. ToprovideaWLAN measurementidea.
Courseoutcome	Thelearnerwillbeableto- 1. Understandfunctionalityofvariousnetworkcomponents. 2. Preparestraightcableandcross cable 3. ConfigureTCP/IPprotocol inwindows&LINUX 4. Implementfileandprintersharing 5. Designclass A,BandCnetwork

SYLLABUS

ListofPractical's

1:Specification,FamiliarizationofNetworkingComponents&devices.

114.1 :Specificationoflaptop&computers.
114.2 :FamiliarizationofNetworkingComponents&devices: LANadapter,Hub,Switches, Routers.

2:Familiarizationwithtransmissionmedia&tools,Preparingcables.
2.1:Coaxialcable,UTPCable,Coaxialcable,UTP Cable.
2.2:Preparing straight cable&crosscable.

3:Studyoftopology,StudyofTCP/IPProtocol.
3.1:StudyofLANtopology&theircreationusingN/Wdevices,cables&computers.
3.2:ConfigurationofTCP/IP protocolinwindows&LINUX.

4:Addressing,File&Printersharing.
4.1 :Implementationoffile&printer sharing.
4.2:Designing&implementing classA,B, Cnetwork

5:Subnetplanning,FTPServer, TCP/UDP

5.1:Subnetplanning&implementation.

5.2:InstallationofFTPserver&client.

5.3: StudyofTCP/UDPperformance.

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

5TH SEMESTER

CourseCode	**CSE 353**
CourseTitle	**Design and Analysis of Algorithms**
TypeofCourse	PC
L T P	400
Credits	4
CoursePrerequisites	DataStructures,C,C++Programminglanguage
Course Objectives(CO)	1. Analyzetheasymptoticperformanceofalgorithms. 2. Writerigorouscorrectnessproofsforalgorithms. 3. Demonstrateafamiliaritywith major algorithmsanddatastructures. 4. Applyimportantalgorithmicdesignparadigmsandmethodsofanalysis. 5. Synthesize efficient algorithms in common engineering designsituations.
Course Outcome(CO)	Thelearnerwill beableto- 1. For a given algorithms analyze worst-case running times ofalgorithms based on asymptotic analysis and justify the correctnessofalgorithms. 2. Describethegreedyparadigmandexplainwhenanalgorithmicdesign situation calls for it. For a given problem develop the greedyalgorithms. 3. Describethedivide-and-conquerparadigmandexplainwhenanalgorithmicdesign situation callsforit. Synthesizedivide-and-conquer algorithms.Deriveand solverecurrence relation. 4. Describethedynamic-programmingparadigmandexplainwhenanalgorithmicdesignsituationcallsforit.Foragivenproblemsofdynamic-programminganddevelopthedynamicprogrammingalgorithms,andanalyzeittodetermineitscomputationalcomplexity.

SYLLABUS

UNIT-I

Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexitybounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time andspace trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method,RecursiontreemethodandMasters'theorem.

UNIT-II

FundamentalAlgorithmicStrategies:Brute-Force,Greedy,DynamicProgramming,Branch-and-Boundand Backtrackingmethodologiesforthedesignofalgorithms; Illustrations of these techniques forProblem-Solving, Bin Packing, Knap Sack TSP. Heuristics – characteristics and their application

domains.

UNIT-III

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

UNIT-IV

Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP- complete and NP-hard. Cook's theorem, Standard NP-complete problems and Reduction techniques.

Advanced Topics: Approximation algorithms, Randomized algorithms, Class of problems beyond NP– P SPACE

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(S)**	**Publisher**
1	IntroductiontoAlgorithms	4THEdition,ThomasHCormen,Charles E Lieserson,RonaldLRivestandCliffordStein	MIT Press/McGraw-Hill
2	FundamentalsofAlgorithms	E.Horowitzetal.	PearsonEducation
3	AlgorithmDesign,1STEdition	JonKleinbergandÉvaTardos	Pearson
4	AlgorithmDesign:Foundations,Analysis,andInternetExamples,Second Edition	MichaelTGoodrichand Roberto Tamassia	Wiley
5	Algorithms—A CreativeApproach, 3RD Edition	UdiManber	Addison-Wesley,Reading, MA

ProgrammeCode: UG018

CourseCode	**CSE 355**
CourseTitle	**ComputerGraphics**
TypeofCourse	PC
L T P	400
Credits	4
CoursePrerequisites	Computergraphics(basics),linearalgebra,programming
Course Objectives	The main objective of this course is to give the student a comprehensiveunderstandingofcomputergraphicsandvisualizationandtheirapplications. In particular participants will have the ability to understandthe process of generating virtual images from virtual scenes, typicallyidentifiedasapipelineofgenerate, computer andstore/display.
CourseOutcome (CO)	Thelearnerwillbeableto- 1. Understandthefundamental graphicaloperationsandtheimplementationoncomputer. 2. Getaglimpseofrecentadvancesincomputergraphics. 3. Describeuserinterfaceissuesthatmakethecomputereasy for thenovicetouse. 4. Discuss interface issues that make the computer easy for thenovicetouse.

SYLLABUS

UNIT-I

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

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

UNIT-II

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

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

UNIT-III

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

UNIT-IV

DiscreteTechniques-Texturemapping,compositing,textures inOpenGL;RayTracing-Recursiveraytracer,ray-sphereintersection.

Representation and Visualization- Bezier curves and surfaces, B-splines, visualization,interpolation,marchingsquaresalgorithm.

RECOMMENDEDBOOKS

Sr.no.	Name	Author(s)	Publisher
1	InteractiveComputerGraphics.ATop-DownApproachUsingOpenGL	EdwardAngel	PearsonEducation
2	ComputerGraphicswithOpenGL	Donald Hearn and PaulineBaker	PrenticeHall
3	Computer GraphicsusingOpenGL	F.S.HillJr.andS.M.Kelley	PrenticeHall
4	ComputerGraphics(first edition)	Peter Shirley and SteveMarschner	A.K. Peters

CourseCode	**CSE351**
CourseTitle	**Advanced Computer Networks**
TypeofCourse	**PC**
L T P	400
Credits	4
CoursePrerequisites	Basicknowledgeofcomputersandtheircomponents.
CourseObjectives	This subject dives into next-generation networking concepts, focusing on architecture, protocols, and technologies like SDN and NFV. It builds on foundational networking knowledge and prepares students for cutting-edge developments in the field.
CourseOutcome (CO)	Thelearnerwillbeableto- 1. Understandfunctionalityofvariousnetworkcomponents, its architecture and services. 2. Implement Congestion and Wireless Networks 3. Compare Software defined networks and traditional networks 4. Discuss Network Function Virtualization, its architectures, applications and use cases 1.

SYLLABUS

Unit I: Network Architecture & Services

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

Unit II: Congestion & Wireless Networks

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

Unit III: Software Defined Networking (SDN)

- SDN vs traditional networks
- SDN controller & switch design
- OpenFlow protocol
- Control overhead & handoff algorithms

Unit IV: Network Function Virtualization (NFV)

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

RECOMMENDED BOOKS

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

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

SYLLABUS

UNIT–I

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

UNIT–II

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

UNIT–III

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

UNIT–IV

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

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

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

SYLLABUS

1. Implementation of Algorithms for drawing 2D Primitives – Line (DDA, Bresenham) – all slopes Circle (Midpoint)
2. 2D Geometric transformations –

- Translation
- Rotation Scaling
- Reflection Shear
- Window-Viewport

3. Composite 2D Transformations
4. Line Clipping
5. 3D Transformations – Translation, Rotation, Scaling.
6. 3D Projections – Parallel, Perspective.
7. Creating 3D Scenes.
8. Image Editing and Manipulation – Basic Operations on image using any image editing software, Creating gif animated images, Image optimization.
9. 2D Animation – To create Interactive animation using any authoring tool.

RECOMMENDED BOOKS

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

CourseCode	**CSE357**
CourseTitle	**Advanced Computer Networks Laboratory**
SEC	PC
L: T:P	00 2
Credits	1
CoursePrerequisites	BasicknowledgeofComputer,DigitalCircuitsandNetwork Arrangement.
CourseObjective(s)	1. Gain hands-on experience with advanced networking protocols and configurations. 2. Understand the implementation and debugging of routing, DNS, FTP, and mail services. Use open-source tools for diagnostics and performance analysis.
CourseOutcome(CO)	Thelearnerwillbeableto- 1. Understandand configure networking protocols. 2. Implement and debug routing, DNS, FTP and mail services 3. Configure and use open source tools for diagnostics and performance analysis.

SYLLABUS

List of Experiments

No.	Experiment Title
1	Basic router configuration and user interface setup
2	IP addressing for various topologies
3	DHCP server integration with BOOTP daemon
4	Debugging ARP/RARP protocols using open-source tools
5	Implementation of RIP, BGP, OSPF routing protocols
6	Static route configuration and verification using netstat
7	DNS setup: caching client, proxy, reverse and forward DNS
8	FTP server configuration and performance analysis
9	TFTP client setup and comparison with FTP
10	Mail server setup for IMAP/POP and SMTP client development
11	SNMPD with OpenNMS for device status monitoring
12	NAS setup using NIS/NFS and SMB for Windows clients

RECOMMENDED BOOKS

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

CourseCode	**CSE377**
CourseTitle	**Design and Analysis of Algorithms Laboratory**
TypeofCourse	PC
LTP	0:0:2
Credits	1
CoursePrerequisites	KnowledgeofC++ProgrammingLanguageConcepts
CourseObjectives	Makesthestudentsproficientinimplementingalgorithmsusingthe algorithmdesigntechniques.
Courseoutcome	Thelearnerwillbeableto- 1. Analyzethecomplexitiesofvariousproblemsindifferentdomains. 2. Understandmethodsforanalyzingtheefficiencyandcorrectnessof algorithms(suchasexchangearguments,recurrence,induction,and average case analysis). 3. Compare,contrast,andchooseappropriatealgorithmicdesign techniques to present an algorithmthat solves a given problem. 4. Developefficientalgorithmsforthenewproblemwithsuitable designing techniques.

SYLLABUS

1. Array

1.1 :WAP.Twocodeandanalyzetocomputegreatestcommondivisor oftwonumbers.

1.2 :WAPtwocodeandanalyzetofindthemidelementinanarray.

1.3 :WAP.Tocodetoanalyzetofindmaximumandminimumelement(without MAXMIN algorithm) inarray.

1.4 :WAP.Tocodeandanalyzetofindthelargestelementinanarray.

1.5 :WAP.Tocodetoanalyzetoenter elementsinan array.

2. Searching

2.1 :WAP.Tofindmaximumandminimumelementchoosing MAXMINalgorithm

2.2 WAPtocodeandanalyzetofindanelementusingbinarysearchandfinditstimecomplexity

3. Sorting

3.1WAP.Tocodeandanalyzetoshortanarrayofintegerusing HEAPSort.

3.2:WAP.Tocodeandanalyzetoshortanarrayofintegerusing MergeSort.

4. PatternMatching

4.1:WAP.Tocodeand arrayanalyzetofindalloccurrence ofpatternineachstring.

5:ShortestPathAlgorithm

5.1:WAP. TocodeandanalyzetofindminimumpathusingKruskal'sAlgorithm.

6:DynamicProgramming

6.1:WAP.TocodeandanalyzetofindthedistancebetweentwocharactersstringsusingDynamic programming.

7:DivideandConquer

7.1:WAPtocodeand analyzetofindanelementusinglinearsearchbyapplyingdivideand conquer technique and find its time complexity.

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(s)**	**Publisher**
1	TheAlgorithmDesignManual	StevenSSkiena	SpringerScience& BusinessMedia
2	ObjectOrientedProgramming with C++	Balagurusamy	TataMcGraw-Hill Education
3	ObjectOrientedProgramming Using C++	Jaspreet Singh, Mrs. PinkiParampreetKaur	Technical Publications

Course Code	**CSE367**
Course Title	**Four Weeks Industrial Training Evaluation (Undertaken after 4th semester)**
Type of Course	SEC
L T P	-
Credits	3
Course Prerequisites	Basics of programming and software development
Course Objectives	To enhance programming skills of a learner, so that the learner finds solutions to problems. He also gets industrial experience of software development
Course Outcomes- (CO)	The learner will be able to- 1. implement software using proper software life cycle models 2. works with the latest IT tools 3. Develop team leadership

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

CourseCode	**CSE369**
CourseTitle	**Mobile Application Development**
TypeofCourse	PE
L T P	3 0 0
Credits	3
CoursePrerequisites	StudentsareexpectedtohavebasicknowledgeofJAVA,HTML,JavaScriptand CSS
CourseObjectives	Students will learn the basicsofthe programminglanguage,designingmobileinterfaces,usinglibrariestobuildapplications,userinput and other aspects.
Course Outcome(CO)	Thelearnerwillbeableto- 1. Definemultimediatopotential clients. 2. Identify anddescribe the functionofthegeneralskillsetsinthemultimedia industry. 3. Identify thebasic componentsofamultimedia project. 4. Identify thebasichardwareand softwarerequirementsformultimedia developmentandplayback.

SYLLABUS

UNIT-I

Introduction To Mobile Devices

Mobile devices vs. desktop devices, ARM and intel architectures, Power Management, Screenresolution,Touchinterfaces,Applicationdeployment,AppStore,GooglePlay,WindowsStore ,Developmentenvironments, Xcode,Eclipse,VS2012,PhoneGap,Nativevs.webapplications

MobileApplications

Introductiontomobilecomputing,mobile applications, Embeddedsystems,Marketandbusiness drivers for mobile applications,Publishing and delivery of mobile applications ,Requirementsgatheringandvalidation formobileapplications

UNIT-II

MobileOSArchitectures

ComparingandContrastingarchitecturesofallthree–Android,iOSandWindows,UnderlyingOS (Darwin vs. Linux vs. Win 8) , Kernel structure and native level programming, Runtime(Objective-Cvs.Dalvik vs.WinRT), Approachesto powermanagement,Security

BasicDesign

Introduction, Basics of embedded systems design , Embedded OSDesign constraints formobile applications, both hardware and software related , architecting mobile applications ,userinterfacesformobileapplications, toucheventsandgestures,Achievingqualityconstraints, performance, usability, security, availabilityand modifiability.

UNIT-III

AdvancedDesign

Designingapplicationswithmultimediaandwebaccesscapabilities,IntegrationwithGPSandsocial media networking applications, accessing applications hosted in a cloud computingenvironment,Design patterns for mobileapplications.

TechnologyI -Android

Introduction,Establishingthedevelopmentenvironment, Androidarchitecture, Activitiesandviews , Interacting with UI ,Persisting data using SQLite , Packaging and deployment ,Interactionwithserversideapplications,UsingGoogleMaps, GPS andWi-Fi,Integrationwithsocialmediaapplications.

UNIT-IV

TechnologyII-iOS

Introduction to Objective C , iOS features, UI implementation, Touch frameworks , DatapersistenceusingCoreDataandSQLite,LocationawareapplicationsusingCoreLocationandMap Kit ,Integrating calendar and address book with social media application, Using Wi-FiiPhonemarketplace.

MobileDeviceSecurity

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

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(s)**	**Publisher**
1	Professional Mobile ApplicationDevelopment	JeffMcWherterandScottGowell	Wrox
2	AndroidinPractice	Charlie Collins,MichaelGalpinandMatthiasKappler	DreamTech
3	Beginning iOS 6Development:Exploring the iOS SDK	DavidMark,JackNutting, JeffLaMarcheandFredericOlsson	Apress

CourseCode	CSE371
CourseTitle	Introduction to Internet of Things
TypeofCourse	PE
L T P	3 0 0
Credits	3
CoursePrerequisites	NIL
CourseObjectives	The Internet is evolving to connect people to physical things andphysical things to other physical things all in real time. It's becoming theInternet of Things (IoT). The course enables students to understand thebasicsofInternetandprotocols.It introducessomeofthe applicationareaswhereInternet ofThingscanbeapplied.
Course Outcome(CO)	At the end of the course the learner will be able to- 1. Understand and describe Functional blocks of IOT 2. Explain MAC protocol and various routing protocols 3. Describe data aggregation and data dissemination 4. Evaluate and explain challenges in IoT design 5. Demonstrate the ability to develop applications through IoT tools

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

BOOKS RECOMMENDED

Sr.no.	Name	AUTHOR(S)	PUBLISHER
1	TheInternetofThingsintheCloud:A Middleware Perspective	Honbo Zhou	CRCPress,2012

CourseCode	**CSE373**
CourseTitle	**Cloud Computing**
TypeofCourse	PE
L T P	300
Credits	3
CoursePrerequisites	DistributedSystem, OperatingSystemsandNetworking
Course Objectives(CO)	ThisCourse work providesthecomplete understanding ofCloudsystem,itsimplementationtechniquesanditsvariousapplicatio nsin thefield ofcomputerScience.
Course Outcome	Thelearnerwillbeableto- 1. Understandcharacteristicsandtypesof cloud computing 2. Describe architectureofcloudcomputing 3. Explainapplicationsofcloud 4. Demonstrate their knowledge of cloud computing to real worldexamples

SYLLABUS

UNIT-I

Cloud Computing Basics, History of Cloud Computing, Importance, Characteristics of CloudComputing,Benefits andChallengestoCloudarchitecture.

UNIT-II

Types of Cloud: Public Cloud, Private Cloud, Hybrid and Community Cloud. Differencesbetween 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 cloudcomputing,differencesbetweengridcomputingandutilitycomputing,CloudComputings ecurityconcerns andproposedsecuritymodelforfuturecloudcomputing.

UNIT-III

Cloud Computing- Logical architecture, developing holistic Cloud Computing ReferenceModels-
Sevenstepmodelofmigratingtocloud.Virtualizationtypes,VirtualMachineLifeCycle,Virtuali zationapplications,PitfallsofVirtualization,CPUVirtualization

UNIT-IV

CaseStudyof CloudComputing,CloudComputingRisks.

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

CloudTools,CloudApplications,FutureTrends,Mobile cloud,Jungle Computing,BigData–Features andapplications

CourseCode	**CSE375**
CourseTitle	**Neural Network and Deep Learning**
TypeofCourse	PE
L T P	300
Credits	3
CoursePrerequisites	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.
CourseOutcomes	The learner will be able to 1. Design single and multi-layer feed-forward neural networks 2. Understand supervised and unsupervised learning concepts & understand unsupervised learning using Kohonen networks 3. Understand training of recurrent Hopfield networks and associative memory concepts.

SYLLABUS

Unit I: Introduction

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

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

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

Unit III: Single layer feedback Networks

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

Unit IV: Auto associative memory

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

RECOMMENDED BOOKS

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

6thSEMESTER

CourseCode	**CSE352**
CourseTitle	**Internet Web Programming**
TypeofCourse	PC
L T P	400
Credits	4
CoursePrerequisites	Basic knowledge of Program Development and Programming Language Constructs
Course Objectives	This course introduces advanced programming skills for website design. Dynamic content development will be explored through state-of-the-art programming languages for the creation of interactive websites. Students will create web pages that utilize the most current advances in web development.
Course Outcomes (CO)	The students will be able to: CO1: Understand concepts of Internet, WWW, Email, and HTML. CO2: Perform programs related to forms, table, and CSS using HTML tags. CO3: Implement the concepts of JavaScript, and DOM. CO4: Implement PHP programs, and MySQL commands using PHPMyAdmin.

SYLLABUS

UNIT-I

Internet and WWW: Introduction to internet and its applications, Email, telnet, FTP, ecommerce, 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 Image maps, Server-side Image maps, Using Server-side and Client-side Image maps together, alternative text for Image maps,

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 colour, 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, Multiplelines 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, 105

Labelling input files, Grouping related fields, Disabled and read-only fields, Form field event 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 styleinformation, Using the <LINK> tag, embedded style information, Using <STYLE> tag, Inlinestyle 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, reg Exp

Document and its associated objects: document, Link, Area, Anchor, Image, Applet, Layer Events and Event Handlers: General Information about Events, Defining Event Handlers, event, on Abort, on Blur, on Change, on Click, on Dbl Click, on Drag Drop, on Error, on Focus, on Key Down,on Keypress, on Key Up, on Load, on Mouse Down, on Mouse Move, on Mouse Out, on Mouse Over,on Mouse Up, on Move, on Reset, on Resize, on Select, on Submit, on Unload

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	Dreamtech press Solutions Inc.	Dreamtech Press
2	HTML: Beginner's guide Wendy Willard Mc Graw Hill	Wendy Willard	Osborne/McGraw-Hill
3	Managing software process	Watts Humphrey	Pearson education
4	Software Engineering – An Engineering Approach	James F. Peters and WitoldPedrycz	Wiley

Course Code	**CSE354**
Course Title	**Software Engineering**
Type of Course	PC
L T P	4 0 0
Credits	4
Course Prerequisites	Overview of Structure and Software Analysis and Design
Course Objectives	This Course Work provides the thorough understanding of the software engineering concepts and it also gives the ideas of handling the projects in the organizations and in institutes
Course Outcome (CO)	The learner will be able to- 1. Identify, formulate, and solve complexengineering problems by applying principles of engineering,science, and mathematics 2. Communicate effectively with a range ofaudiences 3. Apply engineering design to producesolutions that meet specified needs with consideration of publichealth, safety, and welfare, as well as global, cultural, social,environmental, and economic factors 4. Analyze, design, verify, validate,implement, apply, and maintain software systems

SYLLABUS

UNIT-I

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

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

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

UNIT-II

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

UNIT-III

Coding: Top-down and bottom-up, structured programming, information hiding, programming style, and internal documentation. Verification, Metrics, monitoring and control.
Testing: Levels of testing functional testing, structural testing, test plan, test cases specification, and reliability assessment.

UNIT-IV

Software Project Management: Cost estimation, Project scheduling, Staffing, Software configuration management, Quality assurance, SIX SIGMA, Project Monitoring, Risk management, reverse engineering
CASE Tools

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

CourseCode	**CSE356**
CourseTitle	Programming in Java
TypeofCourse	PC
L T P	4 0 0
Credits	4
CoursePrerequisites	Knowledgeof OOPs
CourseObjectives(CO)	1. Understand fundamentals of object-oriented programming in Java,includingdefiningclasses,invokingmethods,usingclasslibraries,etc. 2. Beawareoftheimportant topicsandprinciples ofsoftwaredevelopment. 3. Be able to use the Java SDK environment to create, debug and runsimpleJavaprograms. 4. Understandtheprinciplesofinheritance,packagesandinterfaces
Course Outcome	Thelearnerwillbeableto- 1. Useanintegrateddevelopmentenvironmenttowrite,compile,run,andtestsimpleobject-orientedJavaprograms. 2. ReadandmakeelementarymodificationstoJava programsthatsolve real-worldproblems. 3. Validateinputina Java program. 4. Identifyand fixdefectsandcommonsecurityissuesin code.

SYLLABUS

UNIT-I

Object oriented programming concepts, objects, classes, methods and messages, abstraction andencapsulation, inheritance, abstract classes, polymorphism, ObjectsandclassesinJava,definingclasses,methods,accessspecifiers,staticmembers,constructors,finalizemethod

UNIT-II

Arrays,Strings,Packages,Java-Doccomments,Inheritance,classhierarchy,polymorphism,dynamicbinding, final keyword, abstract classes

UNIT-III

TheObjectclass,Reflection,interfaces, object cloning, inner classes, proxies,I/OStreams,Graphicsprogramming,Frame,Components,workingwith2Dshapes.

UNIT-IV

Basics of event handling, event handlers, adapter classes, actions, mouse events – AWTeventhierarchy,introductiontoSwing,Model-View-Controllerdesignpattern –buttons, layoutmanagement, SwingComponents, exceptionhandling, exceptionhierarchy, throwing and catching exceptions.

CourseCode	**MDC018**
CourseTitle	**Gender ,Culture and Development**
TypeofCourse	MDC/HS
LTP	300
Credits	3
CoursePrerequisite	None
CourseObjectives(CO)	The objective of this course is to build an understanding and initiate and strengthen programs combating gender-based violence and discrimination
CourseOutcomes	Uponcompletionofthiscourse,studentswillbeableto- 1. Understandbasicgenderconcepts. 2. Explaingenderrolesandrelationshipsmatrix. 3. IdentifyGender-basedviolencefromahuman rights perspective 4. Developrelationshipbetweengender,developmentandviolence

SYLLABUS

UNIT-I

IntroductiontoGender

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

UNIT-II

GenderRoles andRelations

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

UNIT-III

GenderDevelopmentIssues

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

Gender-basedViolence

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

UNIT-IV

GenderandCulture

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

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

SYLLABUS

Develop Use Case diagrams for selected Mini project

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

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

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

2.4: Draw the State Chart diagram.

2.5: Identify the business activities and develop an UML Activity diagram

3: Implementations of Layers

3.1: Draw Component diagrams.

3.2: Draw Deployment diagrams.

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

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

SYLLABUS

List of Practical's

1. Configuration and administration Apache Web Server.
2. Develop an HTML page to demonstrate the use of basic HTML tags,
3. Develop an HTML page to demonstrate Link to different HTML pages and link within a page,
Insertion of images.
4. Implement HTML List tags
5. Implement HTML table tags.
6. Develop a registration form by using various form elements like input box, text area, radio buttons,
Check boxes etc.
7. Develop HTML webpage 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 style sheets
10. Create an HTML file to implement the concept of document object model using JavaScript
11. Create an HTML page 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 using variable.
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 web site designing tools such as Joomla, WordPress.

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

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

LIST OF PRACTICALS

● Implement a Java program demonstrating the difference between procedure-oriented programming and object-oriented programming paradigms.
● Create a Java class to demonstrate the concepts of classes, objects, andobject references.
● Develop a Java application showcasing abstraction and encapsulationprinciples.
● Design a Java program illustrating inheritance, including different types likesingle, multilevel, hierarchical, and hybrid.
● Write a Java application demonstrating method overriding and overloading forachieving polymorphism.
● Develop a Java program to showcase the use of constructors, constructoroverloading, and constructor overriding.
● Implement a Java class demonstrating the usage of access modifiers (private, public, protected, default).
● Create a Java program illustrating the use of this keyword for referring tothe current object.
● Develop a Java application showcasing the usage of the super keyword forinvoking superclass constructors and methods.
● Write a Java program to demonstrate exception handling using try, catch,finally, throw, and throw keywords.
● Develop a Java application to showcase error and exception types, such aschecked exceptions, unchecked exceptions, and errors.
● Implement a Java program demonstrating runtime polymorphism throughoverriding methods.
● Write a Java application illustrating compile-time polymorphism throughmethod overloading.
● Create a Java program demonstrating the implementation of multipleinheritance using interfaces.
● Design a Java application showcasing the usage of abstract classes andinterfaces, highlighting their differences and similarities.

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

SYLLABUS

Unit-I

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

Unit-II

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

Unit-III

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

Unit-IV

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

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

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

Course Code	**CSE314**
CourseTitle	**Computer Vision**
Typeof Course	PE
LTP	3 0 0
Credits	3
CoursePrerequisites	ComputerGraphics
CourseObjectives(CO)	Tofamiliarizethestudentwithspecific,well-known computervisionmethods,algorithmsandresults.Tounderstandtherolesofimagetransformationsandtherein variancesinpatternrecognitionandclassification.
CourseOutcomes	**Thelearnerwill beableto-** 1. Identify basic concepts, terminology, theories, models and methodsin the field ofcomputer vision 2. Describe basic methods of computer vision related to multi-scale representation, edge detection and detection of otherprimitives,stereo,motionandobjectrecognition. 3. Assesswhichmethodstouseforsolvingagiven roblem. 4. Analyzethe accuracy ofthe methods

SYLLABUS

UNIT-I

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

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

UNIT-II

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

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

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

UNIT-III

MotionAnalysis:BackgroundSubtractionandModeling,OpticalFlow,KLT,Spatio-TemporalAnalysis,DynamicStereo; Motion parameter estimation.

ShapefromX:LightatSurfaces;PhongModel;ReflectanceMap;Albedoestimation;Photometric

Stereo; Use of Surface Smoothness Constraint; Shape from Texture, color, motion and edges.Perceptualorganization andcognition:Visionasmodel-buildingand graphicsin thebrain,learningtosee.
Lessonsfromneurologicaltraumaandvisualdeficits,Visualagnosia'sandillusions,andwhattheymayimplyabout how visionworks.

UNIT-IV
Modelestimation:Machinelearningandstatisticalmethodsinvision.Machine learning applicationsincomputervision. Discriminativeand generativemethods.Content based imageretrieval.

MiscellaneousApplications:CBIR,CBVR,ActivityRecognition,computationalphotography,Biometrics, stitching and document processing; Modern trends - super-resolution; GPU, AugmentedReality;cognitive models, fusion and SR&CS.

RECOMMENDEDBOOKS			
Sr. no.	**Name**	**Author(s)**	**Publisher**
1	Computer Vision: Algorithms andApplications	RichardSzeliski	Springer
2	Computer Vision: A ModernApproach	D.A.Forsyth,J.P once	PrenticeHall
3	IntroductoryTechniquesfor3DComputerVision	Trucco andVerri	PrenticeHall
4	Computervision	Shapiro, L. &Stockman, G	PrenticeHall
5	Three-dimensional ComputerVision:Ageometric approach	OlivierFaugeras	OlivierFaugeras

CourseCode	**CSE362**
CourseTitle	**Compiler Construction**
TypeofCourse	PE
L T P	300
Credits	3
CoursePrerequisites	Basicunderstanding ofProgrammingLanguages,Datastructuresand Machinearchitecture
CourseObjectives (CO)	1. Tounderstandandlist thedifferentstagesinthe processofcompilation. 2. Identifydifferentmethodsoflexicalanalysis 3. Designtop-downandbottom-upparsers 4. Identifysynthesizedandinheritedattributes 5. Developsyntaxdirectedtranslationschemes 6. Developalgorithmstogeneratecodeforatargetmachine
Course Outcome(CO)	Thelearnerwillbeable to 1. For agivengrammarspecificationdevelopthelexicalanalyzer 2. For a given parser specificationdesign top-down and bottom-upparsers 3. Developsyntaxdirected translationschemes 4. Developalgorithms togeneratecodeforatargetmachine

SYLLABUS

UNIT-I

Introduction:Phasesofcompilation and overview. Lexical Analysis(scanner):Regularlanguages,finiteautomata,regular expressions, from regular expressions to finite automata,scanner generator(lex,flex).

Syntax Analysis (Parser): Context-free languages and grammars, push-down automata, LL (1)grammarsandtop-downparsing,operatorgrammars,LR(O),SLR(1),LR (1),LALR(1)grammarsandbottom-upparsing,ambiguityandLRparsing,LALR(1)parsergenerator(yacc,bison)

UNIT-II

Semantic Analysis:Attributegrammar,syntax directed definition, evaluation and flow ofattributein asyntax tree.

SymbolTable:Itsstructure,symbolattributesand management. Run-timeenvironment:Procedureactivation,parameterpassing,valuereturn,memoryallocation,and scope.

UNIT-III

IntermediateCodeGeneration:Translationofdifferentlanguagefeatures,differenttypesofintermediateforms. CodeImprovement(optimization):Analysis: control-flow,data-flowdependence etc.; Codeimprovementlocaloptimization, globaloptimization, loop optimization, peep-

holeoptimization etc.

UNIT-IV

Architecturedependentcodeimprovement:instructionscheduling(forpipeline),loop optimization(for cachememory)etc.Registerallocationandtargetcodegeneration

Advanced topics: Type systems, data abstraction, compilation of Object-Oriented features andnon-imperativeprogramminglanguages.

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(s)**	**Publisher**
1	CompilersPrinciples,Techniques, &Tools	A.V. Aho, R. Sethi&J.D. Ullman	PearsonEducation
2	EngineeringaCompiler	Keith Cooperand LindaTorczon,	Morgan-Kaufman Publishers
3	Craftingacompiler	C.Fischerand R. LeBlanc	BenjaminCummings
4	Modern Compiler ImplementationinJava	AndrewW.Appel	CambridgeUniversityPress
5	CompilerConstructionPrinciples and Practice	KennethC.Louden	KennethC.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 knowledge of business advantages of digital marketing and its importance for marketing success; to develop a digital marketing plan; to make SWOT analysis; to define a target group; to get introduced to various digital channels, their advantages and ways of integration;
Course Outcomes	The learner will be able to- 1. Identify the importance of digital marketing for marketing success, 1. Manage customer relationships across all digital channels and build better customer relationships, 2. Create a digital marketing plan, starting from the SWOT analysis and defining a target group, then identifying digital channels, their advantages and limitations. 3. Perceiving ways of integration taking into consideration the available budget.

SYLLABUS

UNIT I

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

UNIT II

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

UNIT III

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

UNIT IV

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

Answers , Blogging &Commenting , Guest Blogging Local SEO: What is Local SEO, Importance of Local SEO ,Submission to Google My Business , Completing the Profile , Local SEO Ranking Signals , Local SEO Negative Signals , Citations and Local Submissions

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

Course Code	**CSE378**
Course Title	**Advanced Parallel Computing**
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Basic knowledge of Computer System Architecture
Course 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 exchangeNetwork

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, Programmingfor shared memory systems, Example programs for parallelsystems.

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: Multi-component CPU; Apex architecture IA 64; Hyper threading

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Advanced Computer Architecture: Parallelism, Scalability, Programmability	Hwang, K	Tata McGraw Hills
2	Introduction to Parallel Processing	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

CourseCode	**CSE320**
CourseTitle	**Optimization Techniques in Machine Learning**
TypeofCourse	**PE**
L-T P	3 0 0
Credits	3
CoursePrerequisites	Discretemathematics
CourseObjectives	Tounderstandlearning models andlearning algorithms
CourseOutcomes(CO)	Thelearnerwillbeable to- 1. Recognize the characteristics of machine learning that make it useful to real-worldproblems. 2. Characterize and differentiate between supervised and unsupervised learning techniques. 3. Explain Reinforcement Learning and its control 4. Represent concepts of Decision trees.

SYLLABUS

UNITI

Introduction- Basic concepts, machine learning problems, types of learning, designing a learning system,Goalsand applications ofmachine learning

Learning Theory- Bias/variance tradeoff. Union and Chernoff/Hoeffdingbounds.VCdimension, Worst case(online)learning,learning algorithms.

UNITII

Supervisedlearning-Supervisedlearningsetup,LMS,Logisticregression,Perceptron,Exponentialfamily, Generative learning algorithms, Gaussian discriminant analysis, Naive Bayes, Support vectormachines,Model selection andfeatureselection.

Unsupervisedlearning-Clustering.K-means,EM,MixtureofGaussians,Factoranalysis,PCA(Principalcomponentsanalysis),ICA (Independent components analysis).

UNITIII

Reinforcement learning and control- MDPs, Bellman equations, Value iteration and policy iteration,Linearquadraticregulation(LQR),LQG,Q-learning.Valuefunctionapproximation,Policysearch,Reinforce,POM.

UNITIV

DecisionTreeLearning

Representingconceptsasdecisiontrees,Recursiveinductionofdecisiontrees,Pickingthebestsplitting attribute:entropyandinformationgain,Searchingforsimpletreesandcomputationalcomplexity,Occam's razor,Overfitting,noisydata.

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

Course Code	**CSE322**
CourseTitle	**Distributed System**
TypeofCourse	PE
L T P	3 0 0
Credits	3
CoursePrerequisites	Basicknowledgeofobject-oriented programming,datastructures,threads,operatingsystem concepts.
CourseObjectives	ThisCourseprovidesthecompleteunderstandingofdistributed systemanditsvariousapplicationsin thefield ofcomputerScience.
CourseOutcome(CO)	Thelearnerwillbeableto- 1. Identify characteristics of distributedsystem. 2. Explainthe system modelsof distributedprocessingand communication. 3. Explaindistributed deadlock detection. 4. Explain distributedtransaction and its types.

SYLLABUS

UNIT-I

Characterization of Distributed Systems: Introduction, Examples of distributed Systems, Issues inDistributesOperating Systems, Resourcesharingand the Web Challenges.

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

UNIT-II

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

Distributed Deadlock Detection: system model, resource Vs communication deadlocks, deadlockprevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lockdetection,path pushing algorithms, edgechasing algorithms.

UNIT-III

AgreementProtocols: Introduction,Systemmodels,classificationofAgreementProblem-InteractiveconsistencyProblem, Applications of Agreement algorithms.

DistributedObjectsandRemoteInvocation: Communicationbetweendistributedobjects,Remoteprocedurecall, Events and notifications, JavaRMI casestudy.

TransactionsandConcurrencyControl: Transactions,Nestedtransactions,Locks,OptimisticConcurrencycontrol, Timestampordering, Comparison ofmethods forconcurrency control

UNIT-IV

DistributedTransactions: Introduction,Flatandnesteddistributedtransactions,atomiccommitprotocols, concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery.Distributed shared memory – Design and Implementation issues, consistency models, CORBA CaseStudy:CORBARMI, CORBA services.

FileSystem: Fileservicecomponents,designissues,interfaces,implementationtechniques,Sun NetworkFileSystem–architectureandimplementation,otherdistributedfilesystems–AFS,CODA. Nameservices–SNSnameservicemodel.

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(s)**	**Publisher**
1	AdvancedConceptsinOperatingSystems	Mukesh Singhal &NiranjanGShivaratri	TataMcGrawHill
2	Distributed System: ConceptsandDesign	Coulouris, Dollimore, Kindberg	PearsonEducation
3	DistributedOperatingSystems	S.Tanenbaum	PearsonEducation
4	Distributed System: ConceptsandDesign	PK Sinha	PHI

Course Code	**CSE324**
CourseTitle	**Wireless Communications**
TypeofCourse	PE
L T P	3 0 0
Credits	3
CoursePrerequisites	Nil
CourseObjective	Togainanunderstandingoftheprinciplesbehindthedesignofwirelesscommunicationsystemsand technologies.
CourseOutcomes	**Thelearnerwillbeableto-** 1. Understandandexplain the Classification ofmobilecommunicationsystems. 2. Examinestate-of-the-artdistributedsystems,suchasGoogleFileSystem. 3. Learn theprinciples,architecture, algorithmsandprogrammingmodelsused in distributed systems

SYLLABUS

UNIT-I

Introduction: A basic cellular system, performance criteria, operation of cellular systems, planning a cellular system,analog&digitalcellular systems.ExamplesofWirelessCommunicationSystems:PagingSystems,CordlessTelephoneSystems, CellularTelephone Systems.
GSMsystem:Architectureandfeatures;GSMServices;Authentication;Incoming&outgoingcallflow;Handoverin GSM.

UNIT-II

Digital Communication through fading multipath channels:Fading typesand theircharacteristics. Concept ofdiversity branches and signal paths- Combining methods- Selective diversity combining-pre-detection and post-detection combining- Switched combining- maximal ratio combining- Equal gain combining. Different types ofchannels: Control&Trafficchannels.
BTS hardware: Introduction of BTS 3900 series; Baseband unit (BBU); Radio Frequency unit (RFU); DescriptionofCards;Loginto BTS3900

UNIT-III

MultipleAccessTechniquesforWirelessCommunications:Introduction,FrequencyDivisionMultipleAccess (FDMA), Time Division Multiple Access (TDMA), Spread Spectrum Multiple Access, CDMA (code divisionmultiple access), Space Division Multiple Access. WCDMA (wideband CDMA) features and architecture, handoffand itstypes.

UNIT-IV

Wireless Systems & Standards: GPRS/EDGE specification features and architecture, 3G systems: Application of 3G& UMTS & CDMA 2000 standards, specifications and architecture of UMTS, Forward CDMA Channel, ReverseCDMAChannel.BSCHardware:Introductionto6900series; MPR&EPR;DescriptionofCards; LogintoBSC6900.Futuretrends:Blue Toothtechnology, 4Gmobiletechniques, Wi-Fi Technologyadvancesystem,Zigbee.

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(s)**	**Publisher**
1	WirelessCommunications	T.S. Rappaport,	PrinciplesEdition,andPractice, 2nd PearsonEducationAsia, 2010.
2	MobileCellularTelecommunications	William CYLee	2ndEdition, MGH.
3	MobileandPersonalCommunicationsystems andservices	Raj Pandya	PrenticeHall ofIndia.
4	WirelessandDigitalCommunications	Dr.KamiloFeher	TMH

ProgrammeCode: UG018

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

SYLLABUS

Unit-I

IntroductiontoBlockchain–I :Basics,History,Architecture,Conceptualization,Bitcoinbasics.

Unit-II

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

Unit-III

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

Unit-IV

Blockchain Use Cases. Blockchain in Financial Service (Payments and Secure Trading, Compliance and Mortgage, Financial Trade). Blockchain in Supply Chain

Blockchain in Other Industries. Blockchain in Government (Advantages, Use Cases, Digital

Identity)

ProgrammeCode: UG018

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

ProgrammeCode: UG018

Course Code	**CSE376**
Course Title	**ADVANCE 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 optimaldatabase. CO3: Identify the need for Concurrent transactions and locking and explain their types, advantages and disadvantages CO4: Formulate query, using SQL, solutions to a broad range of queries and data updateproblems. 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 &MobileDatabases

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

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Advanced database mana gement 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, HenryF. Korth, S. Sudarshan	Tata McGraw-Hill
5	Database Management Systems	Raghu Ramakrishnan	Mc-Graw Hill

SeventhSemester

Course Code	**CSE479**
Course Title	**Cyber security**
Type of Course	PC
L T P	30 0
Credits	3
Course Prerequisites	Basic knowledge of computer system
Course Objective (CO)	The main aim of this course is to provide knowledge about how to secure our data on the Internet.
Course Outcome (CO)	The students will be able to: 1. Implement cybersecurity best practices and risk management 2. Integrate network monitoring and present real-time solutions 3. Impact cybersecurity risk in an ethical, social, and professional manner. 4. Learning basics of cyber laws and cyber forensic

SYLLABUS

UNIT I:

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

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

UNIT II:

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

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

UNIT III:

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

UNIT IV:

Cyberspace and the Law: Introduction, Cyber Security Regulations, Roles of International Law, the

state and Private Sector in Cyberspace, Cyber Security Standards. The INDIAN Cyberspace, National Cyber Security Policy 2013.

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

CourseCode	CSE407
CourseTitle	**Theory of Automata and Computation**
TypeofCourse	PC
L T P	4 00
Credits	4
CoursePrerequisites	BasicknowledgeofDiscretemathematicsandSystemprogramming,
CourseObjectives	• Developaformalnotationforstrings,languagesand machines. • Designfiniteautomatatoacceptasetofstringsofalanguage. • Provethatagivenlanguageisregularandapplytheclosureproperti esoflanguages. • Distinguishbetweencomputabilityandnon-computabilityanddecidabilityand undecidability.
Course Outcome(CO)	**Thestudentwillbeableto-** • Writeaformalnotationforstrings, languagesandmachines. • Designfiniteautomatatoaccept asetofstringsofalanguage. • Foragivenlanguagedeterminewhetherthegivenlanguageisregula rornot. • Distinguish between computability andnon-computability andDecidabilityandundecidability. .

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,MooreandMealymachines,Applicationsoffiniteautomatab)RegularExpression:Definition,AlgebraicLaws,ConversionofR.EtoF.A,F.AtoR.E,Applications,RegulargrammarforF.A.

UNIT-II

Regular Sets and Context Free Grammars: Properties of regular sets, Context-Free Grammars – Derivation trees, Chomsky Normal Forms and Griesbach Normal Forms, Ambiguous and unambiguousgrammars.

PushdownAutomataandParsingAlgorithms: PushdownAutomataandContext-FreeLanguages.

Top-down parsing and Bottom-up parsing, Properties of CFL, Applications of Pumping Lemma,ClosurepropertiesofCFLanddecisionalgorithms,Chomskyhierarchy.

UNIT-III

Turing Machines: Turing machines (TM) – computable languages and functions –Turing Machineconstructions–Storageinfinitecontrol.

Variations of TMs: Variations of TMs – Recursive and Recursive enumerable languages, RecursiveFunction,PartialandTotalRecursiveFunction,PrimitiveRecursiveFunction.

UNIT-IV

Introduction to Computational Complexity: Time and Space complexity of TMs – Complexityclasses – Introduction to NP-Hardness and NP-Completeness, PCP Problem, Concept of decidability&undecidability.

Undecidability:Church-Turingthesis,universalTuringmachine,theuniversalanddiagonalizationlanguages,reductionbetween languagesandRicestheorem,undecidableproblemsaboutlanguages.

RECOMMENDEDBOOKS			
S	**Name**	**Author(s)**	**Publisher**
1	IntroductiontoAutomata Theory,LanguagesandComputation	JohnE.Hopcroftand JeffreyD.Ullman	NarosaPublishers
2	Theory of ComputerScience (Automata,Languages& Computation)	K.L.P.Mishra&N. Chandershekaran	PHI
3	ElementsoftheTheoryofComputation	Harry R. LewisandChristos H.Papadimitriou	PearsonEducationAsia
4	AutomataandComputability	Dexter C.Kozen	UndergraduateTextsinComputerScience,Springer
5	IntroductiontotheTheoryofComputation	MichaelSipser	PWSPublishing
6	IntroductiontoLanguagesand TheTheoryofComputation	JohnMartin	TataMcGraw-Hill.

CourseCode	**CSE481**
CourseTitle	**Major Project**
TypeofCourse	PROJ
L T P	0 0 4
Credits	2
CoursePrerequisites	Nil
CourseObjectives	The objective of Major Project is to enable the student to work on a project,eitherfullytheoretical/practical or involving both theoretical and practical work,under the guidance of a Supervisor from the Department alone or jointlywithaSupervisordrawnfromR&Dlaboratory/Industry.Thisisexpectedtoprovideagoodtrainingforthestudent(s) inR&Dworkandtechnical leadership.
Course Outcomes (CO)	The learner will be able to 1. Understand the requirements of the project 2. Prepare Report 3. Present Findings before the department

Theassignment to normally include:

1. Indepthstudyofthetopicassignedinthelightofthe study done.
2. ReviewandfinalizationoftheApproachtotheProblem relatingtotheassignedtopic preferably in the area in which six weeks industrial / institutional training was taken after 6th semester.
3. PreparinganActionPlanforconductingtheinvestigation,includingteamwork.
4. DetailedAnalysis/Modelling/Simulation/Design/ProblemSolving/Experimentasneeded.
5. Finaldevelopmentofproduct/process,testing,results,conclusionsandfuture directions.
6. PreparingapaperforConferencepresentation/PublicationinJournals,ifpossible.
7. Preparingaproject report with running codeinthestandardformatfor beingevaluatedbytheDepartment.
8. FinalSeminar Presentationbeforethe DepartmentalCommittee.

Course Code	**CSE485**
Course Title	**Four Weeks Industrial Training Evaluation (Undertaken after 6th semester)**
Type of Course	SEC III
L T P	
Credits	3
Course Prerequisites	Basics of programming and software development
Course Objectives	To enhance programming skills of a learner, so that the learner finds solutions to problems. He also gets industrial experience of software development
Course Outcomes- (CO)	The learner will be able to- 1. implement software using proper software life cycle models 2. works with the latest IT tools 3. Develop team leadership

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

CourseCode	**CSE451**
CourseTitle	**Cryptography**
TypeofCourse	PE
L T P	3 0 0
Credits	3
CoursePrerequisites	BasicKnowledgeofcomplexitytheory,algorithms,gametheory,machinelearning
CourseObjectives	Thiscourseworkprovidesthethoroughunderstandingofthenetworksecurityandvariouscryptographytechniquestoobtainsecurityon networkandacomputer.
Course outcome(CO)	Thelearnerwillbeableto- 1. Understandconceptsrelated tosecurity attacks,encryption,decryptiontechniques,substitutionandtranspositiontechniques. 2. Describeprinciplesofpublickey cryptography,RSAalgorithm. 3. Explain authenticationrequirementsand useofhash function

SYLLABUS

UNIT-I

Introduction: Attacks, Services and Mechanisms, Security attacks, security services, modelforinternetworksecurity.ConventionalEncryption:ConventionalEncryptionModel,steganography,ClassicalEncryptionTechniques:SubstitutionTechniques,TranspositionTechniques.

UNIT-II

ModernEncryptionTechniques: SimplifiedDataEncryptionStandard,BlockCipherPrinciples.
The Data Encryption Standard, Strength of DES.
Encryption Algorithms: Triple DES,InternationalData Encryption Algorithm, Blowfish.

UNIT-III

ConfidentialityusingConventionalEncryption: PlacementofEncryptionFunction,TrafficConfidentiality, Key distribution, Random NumberGeneration.
Public- Key Cryptography: Principles of Public- Key Cryptosystems, RSA algorithm, KeyManagement,Diffie-Hellman Key.

UNIT-IV

Message Authentication and Hash Functions: Authentication Requirements,AuthenticationFunctions,MessageAuthenticationCodes,HashFunctions,SecurityofhashFunctions and MACs, DigitalSignatures, Authentication Protocols, SHA-1, RC-4,RC-5.

CourseCode	**CSE453**
CourseTitle	**Multimedia&Animation**
TypeofCourse	PE
L T P	3 0 0
Credits	3
CoursePrerequisites	BasicknowledgeofComputerGraphics&ImageProcessing.
CourseObjectives	The mainobjectiveofthe subjectistoimpartknowledgeabout Animationexecution,workflow&post-production
CourseOutcomes (CO)	Thelearnerwillbeableto- 1. Understandthe fundamentalsofanimation. 2. Getknowledgeof3DModeling tools 3. ComparingPolygonModelingandNURBSmodeling

SYLLABUS

UNIT-I

Fundamentals of Animation: Animation Drawings/Cells, Rough Drawings, Clean ups,Colorreferencedrawings,Layout,ModelSheet, KeyDrawing,MasterBackground,ConceptPiece,Characterdrawing, Story Board.

ModelingConcepts: IntroductiontoMaya,Typesof3DModeling,Advantages&Disadvantages,Difference between PolygonModeling and NURBSmodeling

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

UNIT-II

Lighting&Shadows: Sourcesoflight:NaturalandartificialLights,TypesoflightsinMaya,Typesof Shadows in Maya.

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

AnimationTypes: TypesofAnimation.Stop motionvs.motiongraphics.

UNIT-III

RenderingProcess: Process,TypesofRenderers.
DataManagement: Howto manage3DAssets

Compositing: Basicsofcompositing,Chromakeying,Backgroundcolors,EvenLighting,Processingthe video, Various Tools used.

UNIT-IV

Music&Dubbing: Processofaddingmusictotheclip,Toolsusedforplacing,editingthesoundtracks.
EditingClips: Process,Toolsusedforeditingprocess.
Output&Formats: TypesofOutputformats,lossless andlossycompressiontechniques.

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(s)**	**Publisher**
1	3D Animation for theRaw Beginner UsingMaya	RogerKing	Chapmanand Hall
2	Editing Digital Video -The Complete CreativeandTechnical Guide	RobertGoodman	McGraw-Hill
3	MayaDocumentation	https://knowledge.autodesk.com	Autodesk

Course Code	**CSE455**
Course Title	**NaturalLanguageProcessing**
TypeofCourse	PE
L T P	3 0 0
Credits	3
Course Objectives	Theobjectiveofthiscourseistoprovideknowledgeofthe fundamentals of speech and text processing
Course Outcomes(CO)	Thelearnerwillbeableto- 1. UnderstandbasicconceptsofNaturallanguageprocessing 2. ExplainMachinetranslationandspeech recognition

SYLLABUS

UNIT-I

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

UNIT-II

Structures: TheoriesofParsing,ParsingAlgorithms;RobustandScalableParsingonNoisyTextas in Web documents; Hybrid of Rule Based and Probabilistic Parsing; Scope Ambiguity and Attachment Ambiguity resolution.

UNIT-III

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

UNIT-IV

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

RECOMMENDEDBOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	NaturalLanguage Understanding	Allen, James	Second Edition, Benjamin/Cumming
2	Statistical Language Learning	Charniack,Eugene	MITPress
3	SpeechandLanguage Processing	Jurafsky,Danand Martin, James	SecondEdition,PrenticeHall
4	FoundationsofStatistical Natural Language Processing	Manning,Christopher andHeinrich,Schutze	MITPress.

Course Code	**CSE477**
Course Title	**Dataminingin Business Intelligence**
TypeofCourse	PE
L T P	3 0 0
Credits	3
CoursePrerequisites	BasicknowledgeofComputerGraphics&ImageProcessing.
CourseObjectives	Studentswillbe enabledtounderstand andimplement classical modelsandalgorithms indata mining.
CourseOutcomes (CO)	Thelearner willbeableto- 1. UnderstandDataminingandits scope. 2. Understandvariousdata mining techniques 3. Describesupervisedandunsupervisedclustering techniques 4. Illustrateapplicationsofdataminingusingreallife examples

SYLLABUS

UNIT-I

Introductionto DataMining:Introduction:ScopeofDataMining:What is Data Mining;How doesDataMiningWorks,PredictiveModeling:DataMiningandDataWarehousing: ArchitectureforDataMining:ProfitableApplications:DataMiningTools:DataPreprocessing:Introduction,DataPreprocessingOverview,DataCleaning,DataIntegrationandTransformation,DataReduction,DiscretizationandConceptHierarchyGeneration.

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,ClusterAnalysis,ClusteringMethods-Kmeans, 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

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	IntroductiontoData Mining	Pang-NingTan, MichaelSteinbach, Vipin Kumar	PearsonEducation India
2	DataMining	PieterAdrians,Dolf zantinge	PearsonEducation India
3	DatabaseManagement Systems	R.Ramakrishnan,J.	McGrawHill

8th Semester

CourseCode	**CSE466**
Course Title	**SixMonthsIndustrialTraining**
TypeofCourse	Training
L T P	
Credits	20
Course Prerequisites	Basicsofprogrammingandsoftware development
Course Objectives	Toenhanceprogrammingskillsofalearner,sothatthelearnerfinds solutionstoproblems.Healsogetsindustrialexperienceof software development
Course Outcomes-(CO)	Thelearnerwillbeableto- 1. implementsoftwareusingpropersoftwarelife cyclemodels 2. workswithlatest ITtools 3. Developteam 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, againststudent 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

Course Code	**CSE391**
Course Title	**Basics ofArtificial Intelligence**
TypeofCourse	OE
L: T:P	3:0:0
Credits	3
CoursePrerequisites	Nil
CourseObjective(s)	1. Togetintroducedtothebasicknowledgerepresentation,problem solving, and learning methods of Artificial Intelligence. 2. TosolveproblemsinArtificialIntelligenceusingPython. 3. Tofamiliarizeyourselfwithknowledgeprocessinginexpertsystems.
CourseOutcome (CO)	CO1Understandtheinformedanduninformedproblemtypesand apply search strategies to solve them. CO2Applydifficultreal-lifeproblemsinastatespacerepresentationto solve them using AI techniques like searching and game playing. CO3 Design and evaluate intelligent expert models for perception and prediction from an intelligent environment.

SYLLABUS

Unit1:FoundationsofArtificial Intelligence

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

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

Unit2:MachineLearning Basics

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

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

Decisiontreesandensemblemethods(Decisiontreeconstruction,Bagging, boosting, and random forests).

Unit3:DeepLearningandNeuralNetworks

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

Unit4:Applicationsand Ethical Considerations

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

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

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	ArtificialIntelligence	E. Rich	McGrawHill
2	IntroductiontoArtificialIntelligence	E.CharniakandD. McDermott	AddisonWesley

CourseCode	**CSE393**
Course Title	**IntroductiontoCloudComputing**
TypeofCourse	OE
L T P	300
Credits	3
CoursePrerequisites	DistributedSystem,OperatingSystemsandNetworking
CourseObjectives (CO)	This Course work provides the complete understanding of Cloud system,itsimplementationtechniquesanditsvariousapplicationsin thefieldofcomputerScience.
CourseOutcome	Thelearnerwillbeableto- 1. Understandcharacteristicsandtypesofcloudcomputing 2. Describearchitectureofcloudcomputing 3. Explainapplicationsofcloud 4. Demonstratetheirknowledgeofcloudcomputingtorealworld examples

SYLLABUS

UNIT-I

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.

UNIT-III

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

UNIT-IV

CaseStudyofCloudComputing,CloudComputingRisks.CloudTools,CloudApplications,Future Trends, Mobile cloud

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**Author(s)**	**Publisher**
1	CloudComputing–APractical Approach	AnthonyTeletubby J.Velteand RobertE	TMH
2	CloudComputing–Webbased Applications	MichaelMiller	PearsonPublishing

CourseCode	**CSE491**
CourseTitle	**IntroductiontoOperating Systems**
TypeofCourse	OE
LTP	3:0:0
Credits	3
CoursePrerequisites	OverviewofComputerArchitecture
CourseObjectives	TolearnthefundamentalsofOperatingSystems. 1. To learn the mechanisms of OS to handle processes and threads and their communication 2. To learn the mechanisms involved in memory management in contemporary OS 3. To gain knowledge on distributed operating system concepts thatinclude architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols 4. To know the components and management aspects of concurrency management 5. LearningtoimplementsimpleOSmechanisms
CourseOutcome (CO)	**Thelearnerwillbeableto-** 1. Createprocessesandthreads. 2. Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time. 3. For a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and improving the access time. 4. Designandimplementfilemanagementsystem. 10. For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstractionbyperformingoperationsforsynchronizationbetweenCPUandI/O controllers.

SYLLABUS

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

OS and Security: Securitybreaches,types of attacks, attackprevention methods,securitypolicy and access control, OS design considerations for security, access control lists and OS support, internet and general network security, Policy mechanism, Program, network and system threats, Authentication.

RECOMMENDEDBOOKS			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Operating System ConceptsEssentials	9thEditionby AviSilberschatz,PeterGalvin, Greg Gagne	WileyAsia Student Edition.
2	OperatingSystems:Internalsand Design Principles	5thEdition,WilliamStallings	PrenticeHallof India
3	OperatingSystem:ADesign-oriented Approach	1stEditionbyCharlesCrowley	IrwinPublishing
4	OperatingSystems:AModern Perspective	2ndEditionbyGaryJ.Nutt	Addison-Wesley

ProgrammeCode:UG018

CourseCode	CSE493
Course Title	Basics ofNetworking
TypesofCourse	OE
L T P	3: 0:0
Credits	3
CoursePrerequisites	
Course Objectives	It aims to introduce students to the fundamental techniques used in implementingsecurenetworkcommunications,andtogivethem an understanding of common threats and attacks.
CourseOutcomes(CO)	Thestudent willbe able to- CO1: Understand basicconcepts andsecurityin networktechnology CO2: Explain IPv6 CO3: Explain classical encryption techniques CO4:IllustrateapplicationsofNetworkSecurity

Syllabus

UNIT-I

Introduction toNetwork Technology: SLIP/PPP Dedicatedlines,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: overviewof IPsec, IP and IPv6, Authenticationheader (AH),EncapsulatingSecurityPayload (ESP).

SecurityTrends –Attacksandservices,Classical cryptosystems,Differenttypesofciphers, LFSR sequences, Basic Number theory, Congruences, Chinese Remainder theorem, Modular exponentiation, Fermat and Euler's theorem, Legendre and Jacobi symbols, Finite fields, continued fractions.

UNIT-III

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

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

UNIT-IV

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

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

BOOKS RECOMMENDED			
Sr.no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1.	NetworkSecurityandEthical Hacking	RajatKhare	LuniverPress
2.	CryptographyandNetwork Security	AtulKahate	TataMc-GrawHill
3.	ComputerNetworks	A.S Tanenbaum	Pearson

ProgrammeCode:UG018

CourseCode	**CSE495**
Course Title	**IntroductiontoDigitalMarketing**
TypeofCourse	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Nil
Course Objective	Themainobjectiveofthiscourseistoprovidelearnerswiththeknowledgeof business advantages of digital marketing and its importance for marketing success; to develop a digital marketing plan; to make SWOT analysis; to define a target group; to get introduced to various digital channels, their advantagesandwaysof integration;
Course Outcomes	Thelearnerwillbeableto- 1. Identifytheimportanceofdigitalmarketingformarketingsuccess, 2. Managecustomerrelationshipsacrossalldigitalchannelsandbuildbetter customer relationships, 3. Create a digital marketing plan, starting from the SWOT analysis and definingatargetgroup,thenidentifyingdigitalchannels,theiradvantages and limitations. 4. Perceivingwaysofintegrationtakingintoconsiderationtheavailable budget.

SYLLABUS

UNITI

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

UNITII

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

UNITIII

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

UNITIV

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

Course Code	**CSE497**
Course Title	**BasicsConceptsof IOT**
TypeofCourse	PE
L T P	3 0 0
Credits	3
Course Prerequisites	NIL
CourseObjectives	The Internet is evolving to connect people to physical things and physical things to other physical things all in real time. It's becoming the Internet of Things (IoT). The course enables students to understand the basics of Internet and protocols. It introducessomeofthe application areas where Internet of Things can be applied.
Course Outcome(CO)	Attheendofthecoursethelearnerwillbeableto- 1. UnderstandanddescribeFunctionalblocksofIOT 2. ExplainMACprotocolandvariousroutingprotocols 3. Describedataaggregationanddatadissemination 4. EvaluateandexplainchallengesinIoTdesign

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

BOOKS RECOMMENDED

Sr.no.	Name	AUTHOR(S)	PUBLISHER
1	TheInternetofThingsinthe Cloud:AMiddlewarePerspective	HonboZhou	CRCPress,2012

ProgrammeCode:UG018

Course Code	**CSE489**
Course Title	**ECOMMERCE**
TypeofCourse	PE
L T P	3 0 0
Credits	3
CoursePrerequisites	BasicsofInternet
CourseObjectives (CO)	This course examines the evolution of enterprise resource planning (ERP) systems - from internally focused client/server systems to externally focused e-business. This class studies the types of issues that managers will need to consider in implementing cross-functional integratedERPsystems.Theobjective ofthiscourseistomake students awareofthepotentialandlimitationsofERPsystems.Thisobjectivewill be reached through hands-on experience, case studies, lectures, guest speakers and a group project.
CourseOutcomes	The course would equip students with the basics of E-Commerce, technologies involved with it and various issues associated with.

SYLLABUS

UNITI

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

UNIT II

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

UNIT III

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

UNIT IV

TheBusinessModules-BusinessModulesinanERPPackage,Finance,Manufacturing(Production), Human Resources, Plant Maintenance, Materials Management, Quality Management,Sales and Distribution

RECOMMENDEDBOOKS			
S.No.	**Name**	**Author(s)**	**Publisher**
1	EnterpriseResourcePlanning	S.Sadagopan	TataMcGrawHill2000
2	E-Commerce:TheCuttingEdgeof Business	Bajaj,KamleshK.andNag, Debjani	Tata McGraw-Hill Publishing Company
3	EnterpriseResourcePlanning	AlexisLeon	TataMcGrawHill2001
4	ElectronicCommerce	Loshin,PeteandMurphy, Paul	Second edition, 1990, JaicoPublishingHouse, Mumbai

CourseCode	**CSE499**
CourseTitle	**IntroductiontoCybersecurity**
TypeofCourse	PC
LTP	3:0:0
Credits	3
CoursePrerequisites	Basicknowledgeofcomputersystem
CourseObjective(CO)	Themainaimofthiscourseistoprovideknowledgeabouthow to secureourdataonthe Internet.
CourseOutcome(CO)	Thestudentswill beableto: 1. Implementcybersecuritybestpracticesandrisk management 2. Integratenetworkmonitoringandpresentreal-time solutions 3. Impactcybersecurityriskinanethical,social,and professional manner. 4. Learningbasicsofcyberlawsandcyberforensic

SYLLABUS

UNITI:

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

Cyber Security Vulnerabilities and Cyber Security Safeguards: Cyber Security Vulnerabilities-Overview, vulnerabilities in software, Systemadministration, Complex NetworkArchitectures, Open Access to OrganizationalData,WeakAuthentication,UnprotectedBroadbandcommunications, PoorCyber Security Awareness. Cyber Security Safeguards- Overview, Access control, Audit, Authentication, Biometrics, Cryptography,Deception,Denial of ServiceFilters,EthicalHacking,Firewalls,IntrusionDetectionSystems, Response, Scanning, Security policy, Threat Management.

UNITII:

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

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

UNIT III:

Cryptography and Network Security: Introduction to Cryptography, Symmetric key Cryptography, Asymmetric key Cryptography, Message Authentication, Digital Signatures, Applications of Cryptography. Overview of Firewalls- Types of Firewalls, User Management, VPN Security Security Protocols:- securityat theApplicationLayer-PGPandS/MIME,SecurityatTransport Layer-SSLandTLS,Securityat Network Layer-IPSec.

UNITIV:

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

RECOMMENDEDBOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1.	CybersecurityandCyberwar:What EveryoneNeedstoKnow®	AllanFriedmanandP. W. Singer	Oxford University Press
2.	Cybersecurityfor Beginners	RaefMeeuwisse	Cyber Simplicity Limited
3.	CybersecurityEssentials	Charles J. Brooks, Christopher Grow, DonaldShort,and PhilipCraig	Sybex

	Entrepreneurship Mindset Curriculum (Mandatory course by Punjab Government)
Course Title	Entrepreneurship Mindset Curriculum (EMC): Introduction to Innovation and Entrepreneurship for CSE **(Mandatory course by Punjab G**overnment**)**
Type of Course	Practical
L T P	0 0 4
Credits	2
Course Prerequisites	None
Course Objective(s)	1. Introduce entrepreneurial mindset and key traits. 2. Encourage self-awareness and goal-setting.
Course Outcome (CO)	• CO1: Understand core entrepreneurial traits. .• CO2: Identify personal strengths and areas for growth • CO3: Develop curiosity and initiative.

Introduction

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

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

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

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

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

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

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

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

Learning Objectives

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

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

Learning Outcomes

After studying this course, students will be able to:

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

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

Content Creation		
Week/ Milestone	**Milestone**	**Description**
1	**Start your journey as a content creator**	Learn how to reach thousands of followers online by creating content
2	**Decide your content topic**	Explore different topics and finalize one topic on which you will create content
3	**Start your own content channel**	Launch your official channel on YouTube or Instagram and start building your audience

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

E-commerce		
Week/ Milestone	**Milestone**	**Description**
1	**Learn how to start selling online**	Learn what an E-commerce business is and how you can start selling online in less than 30 days
2	**Choose your product**	Explore different products and finalize what you want to sell online
3	**Find a supplier who will deliver the product for you**	Identify suppliers who can send your product directly to the customer and help you launch your E-commerce business

4	**Create your E-commerce store**	Make a simple online store using Instamojo and learn how to upload product images and description on the store
5	**Activate payments on your store**	Learn how to link your bank account to a payment gateway and integrate that with your Instamojo store to start receiving payments
6	**Launch your online store**	Connect your domain name to your Instamojo account, create your launch poster, and officially launch your E-commerce store
7	**Get first 100 people visit your online store**	Learn how to write simple and catchy messages to promote your store and send it to 100 people
8	**Make your first sale**	Convert one paying customer and learn how to process the order from beginning to delivery
9	**Create and post your first ad**	Learn how to design a simple promotional ad and post it to bring in more people and sales
10	**Take feedback from customers**	Engage with your paid customers, take product feedback, and upload success stories or reviews on your website
11	**Get a repeat customer or referral**	Build trust with your paid customers to get either a repeat order or a referral
12	**Plan your business growth**	Make a 1 month plan to promote and grow your E-commerce store and earn more money

Professional Service		
Week/ Milestone	**Milestone**	**Description**
1	**Start your journey in professional services**	Learn what is a service and how you can earn money by offering your skill as a service
2	**Choose your service skill**	Choose one skill you are good at and turn it into a service that people will pay for
3	**Find your ideal customer**	Talk to people directly or through social media apps, understand who is willing to pay for your service and "WHY"

4	**Build your online profile and show what you offer**	Explore apps or websites such as WhatsApp Business, Upwork, or Urban Company, and learn how to create an online profile
5	**Write your service description**	Learn how to write your service in a simple and powerful way that gets people excited to try it
6	**Finalize your pricing and launch your service**	Learn how to set the right price that your customer finds fair and launch your service
7	**Get first 100 leads for your service**	Learn how to write catchy messages to promote your service in the market and get first 100 leads
8	**Offer a free service and learn from feedback**	Give your service for free to real users and use their feedback to make it better
9	**Make your first sale**	Get one paying customer for your service and work really hard to get a 5 star rating and a video testimonial
10	**Build trust with customers and get repeat orders**	Use your trust and good relationship with existing customers to get your first repeat customer
11	**Earn your first referral**	Start offering bonus or other additional services to your existing customers and get your first referral
12	**Plan your business growth**	Make a 1 month plan on how to get more customers and earn more money

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

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

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9	**Take feedback from customers**	Engage with your paid customers and take product feedback
10	**Discover other platforms to grow your sales**	Learn how to set up a free WhatsApp Business account for your shop and collect orders there
11	**Get a repeat customer or referral**	Build trust with your paid customers to get either a repeat order or a referral
12	**Plan your business growth**	Make a 1 month plan to promote and grow your retail business and earn more money

Miscellaneous		
Week/ Milestone	**Milestone**	**Description**
1	**Start your journey as an Entrepreneur**	Learn what entrepreneurship means and how you can start earning by solving problems around you
2	**Identify and validate a problem to solve**	Look around yourself, talk to people, and pick one real problem that many people face
3	**Define your customer and their pain points**	Find out who will buy from you, what difficulties they face, and why they need your solution
4	**Generate business ideas and finalize one idea**	Think of different ways to solve the problem, compare options, and choose one idea to move ahead with
5	**Define your product or service**	Decide clearly what product or service you will provide and how it will solve the customer's problem
6	**Finalize your pricing and launch your business**	Set a fair price for your product or service and take the first step to launch your business

7	**Promote your business and get first 100 leads**	Tell people about your business using word of mouth, posters, or social media, and collect interest from 100 people
8	**Make your first sale**	Get your first paying customer and deliver your product or service with full effort
9	**Take feedback from customers and improve**	Listen to what customers say after using your product/service and make it better step by step
10	**Build trust with customers and get your first repeat order**	Keep your promise, give good quality, and motivate your customer to buy from you again
11	**Earn your first referral and expand your sales**	Ask happy customers to recommend you to friends and family so that you can grow your sales
12	**Plan your business growth**	Make a simple plan for the next month to get more customers, increase sales, and grow your business

Evaluation Criteria

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

Recommended Readings

1. Start with Why - Simon Sinek

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

2. The Lean Startup - Eric Ries

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

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

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

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

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

5. Rework - Jason Fried & David Heinemeier Hansson

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

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

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

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

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

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

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

9. Romancing The Balance Sheet - Anil Lamba

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

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

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

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

Syllabus Overview for Semester 1-5

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

Semester 1: Setup & Launch

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

Semester 2: Marketing Basics

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

Semester 3: Operations & Scale

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

Semester 4: Organic Growth

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

Semester 5: AI Automation & Financial Mastery

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