B.Tech. (CSE) Course Scheme

Academic Year 2022-2023

Department of Computer Science & Engineering

School of Engineering and Technology

Central University of Rajasthan

NH-8 Jaipur- Ajmer Highway, Bandarsindri
Kishangarh -305817
District-Ajmer,
Rajasthan Website:
www.curaj.ac.in

Program Outcomes

PO1-Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2-Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3-Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4-Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5-Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6-The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7-Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8-Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9-Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10-Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11-Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12-Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Scheme of B.Tech. (CSE)

First Year

SEMESTER I						
S.No	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
			Hours/week			
1	CSE101	Engineering Mathematics-I	3	1	0	4
2	CSE102	Engineering Physics	3	0	0	3
3	CSE103	Basic Electrical Engineering	3	0	1	4
4	CSE104	English (Communication and Writing)	3	1	0	4
5	CSE105	Engineering Graphics & Design	3	0	2	4
6	CSE106	Engineering Physics Lab	0	0	2	1
Total Credits						**20**

SEMESTER II						
S.No	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
			Hours/week			
1	CSE107	Engineering Mathematics-II	3	1	0	4
2	CSE108	Introduction to Programming	3	0	0	3
3	CSE109	Basic Electronics Engineering	3	1	0	4
4	CSE110	Engineering Chemistry	3	0	2	4
5	CSE111	Workshop Practice	3	0	2	4
6	CSE112	Programming Lab	0	0	2	1
7	CSE113	UHV*	3	1	0	4*
Total Credits						**20**

*UHV is mandatory audit course and every student has to complete the course however the credits earned shall not effecting the overall credits of the degree

Second Year

SEMESTER III						
S. No	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
			Hours/week			
1	CSE201	Discrete Mathematics	3	1	0	4
2	CSE202	Computer Organization	3	1	0	4
3	CSE203	Theory of Computation	3	1	0	4
4	CSE204	Programming Methodology	3	0	0	3
5	CSE205	Data Structures and Algorithms	3	0	0	3
6	CSE206	IT Workshop	1	0	2	2
7	CSE207	Data Structures and Algorithm Lab	0	0	2	1
Total Credits						**21**

SEMESTER IV						
S.No	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
			Hours/week			
1	CSE208	Principles and Practices of Management	3	0	0	3
2	CSE209	Design and Analysis of Algorithms	3	0	0	3
3	CSE210	Operating Systems	3	0	0	3
4	CSE211	Object Oriented Programming	3	0	0	3
5	CSE212	Digital Systems Design	3	0	0	3
6	CSE213	Operating Systems Lab	0	0	2	1
7	CSE214	OOP Lab	0	0	2	1
8	CSE215	Digital Systems Design Lab	0	0	2	1
9	CSE216	Design and Analysis of Algorithms Lab	0	0	2	1
Total Credits						**19**

Third Year

SEMESTER V						
S. No	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
			Hours/week			
1	CSE301	Environmental Studies	3	0	0	3
2	CSE302	Computer Networks	3	0	0	3
3	CSE303	Compiler Design	3	0	0	3
4	CSE304	Computer Graphics	3	0	0	3
5	CSE305	Database Management Systems	3	0	0	3
6	CSE306	Computer Networks Lab	0	0	2	1
7	CSE307	Computer Graphics Lab	0	0	2	1
8	CSE308	Compiler Design Lab	0	0	2	1
9	CSE309	DBMS Lab	0	0	2	1
10	CSE310	Industrial Training-I[#]	0	0	4	2
Total Credits						**21**

SEMESTER VI						
S. No	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
			Hours/week			
1	CSE311	Managerial Economics	3	0	0	3
2	CSE312	Data Communication	3	1	0	4
3	CSE313	Cryptography and Network Security	3	0	0	3
4	CSE314	Software Engineering	3	0	0	3
5	CSE315	Artificial Intelligence & Machine Learning	3	0	0	3
6	CSE316	Cryptography and Network Security Lab	0	0	2	1
7	CSE317	Software Engineering Lab	0	0	2	1
8	CSE318	Artificial Intelligence & Machine Learning Lab	0	0	2	1
Total Credits						**19**

Fourth Year

SEMESTER VII						
S. No	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
			Hours/week			
1	CSE401	Project Design	3	0	0	3
2	--	Program elective I	3	1	0	4
3	--	Program elective II	3	1	0	4
4	--	Open elective I	3	1	0	4
5	CSE402	Project Design Lab	0	0	2	1
6	CSE403	Project/Dissertation–I	0	0	4	2
7	CSE404	Industrial Training-II#	0	0	4	2
Total Credits						**20**

SEMESTER VIII						
S. No	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
			Hours/week			
1	--	SSR/MOOCs	3	1	0	4
2	--	Program elective III	3	1	0	4
3	--	Open Elective-II	3	1	0	4
4	CSE405	Project/Dissertation-II	0	0	16	8
5	--	Fitness*	-	-	-	2*
6	--	Societal Interface*	-	-	-	2*
Total Credits						**20+4=24**

Total Credits are: 20+20+21+19+21+19+20+20+(4)=[160+4]=>164

*2 Credits course for Fitness and Societal Interface will be spread over all the 4 years of the program. In Fitness course, the students are expected to participate in any physical activities such as Yoga, sports etc. In Societal Interface, Students are expected to participate in various social activities in the university.

6-8 weeks Internships is mandatory to earn the credits for the Internships.

Note:

List of electives is enclosed and can be chosen from. New electives may be added as per requirement. Detailed syllabus of each course shall be circulated separately.

List of electives/open electives

1. CSE431 Data warehousing and Data Mining
2. CSE432 Advanced Computer Architecture
3. CSE433 Advanced Database Management Systems
4. CSE434 Security Audit
5. CSE435 Digital Forensics
6. CSE436 Advanced Software Engineering
7. CSE437 Big Data Analytics
8. CSE438 Cloud Computing
9. CSE439 Embedded System Design
10. CSE440 Artificial Neural Networks
11. CSE441 Software Testing Techniques
12. CSE442 Delay Tolerant Networks
13. CSE443 Network Simulations
14. CSE444 Human Computer Interaction
15. CSE445 Wireless and Ad Hoc Networks
16. CSE446 Language Processors
17. CSE447 Parallel Computing
18. CSE448 Soft Computing
19. CSE449 Machine Learning
20. CSE450 Security Engineering
21. CSE451 Information Retrieval Systems
22. CSE452 Distributed Systems
23. CSE453 System Programming
24. CSE454 Security and Privacy
25. CSE455 Unix Network Programming
26. CSE456 Computer Graphics
27. CSE457 Operation Research
28. CSE458 Graph Theory
29. CSE459 E-Commerce
30. CSE460 Pattern Recognition
31. CSE461 Number Theory
32. CSE462 Advanced Topics in Compiler Design
33. CSE463 Advanced Topics in Computer Architecture

First Year

SEMESTER I

CSE101- Engineering Mathematics-I		
Teaching Scheme	Examination Scheme	Credits allocated
Theory 3 h/week+ Tutorial 1h/week	End of semester Examination-60 marks	Theory-3, Tutorial-1

Course Prerequisite: Knowledge of 10+2 Mathematics.

Course Objective:
To provide the students with sufficient knowledge in matrix, calculus, differentiation, so that it can be used in their respective fields of Engineering.

Course Outcomes: On completion this course, students will be able to

CO1: Apply elementary transformations to reduce the matrix into the echelon form and normal form to determine its rank and interpret the various solutions of system of linear equations.
CO2: To understand mean values theorems, differentiation, curvature, concavity etc.
CO3: To apply integration, integrals in higher order applications.
CO4: To understand different functions of vector calculus and to apply in further synthesis.

Level	Bachelor

Course Content:		
Unit -I	Rank and inverse of matrix by elementary transformation, consistency of linear system of equations and their solution. Eigen values and Eigen vectors. Cayley-Hamilton theorem (statement only) & its applications.	10 hrs
Unit-II	Mean value theorems and their geometrical interpretations , Taylor's and Maclaurin's series expansions, Successive differentiation and Leibnitz theorem; Indeterminate forms, L'Hospital Rule, Asymptotes, Curvature, Concavity and convexity, point of inflexion.	10 hrs
Unit-III	Integration as inverse process of differentiation; Integration by substitution,The fundamental theorem of calculus, Definite integrals and its application to find area under simple curve and area between two curves, Area of a curve using multiple integral.	10 hrs
Unit-IV	Differentiation and integration of vector functions of scalar variables, scalar and vector fields, gradient, Directional derivative. Gauss's and Stokes's theorems (statement only) and their simple applications.	10 hrs

Internal assessment		
Part A	CIA-I: Unit I, and II	20 Marks
	CIA-II: Unit III, and IV	20 Marks
Part B	ESE: Term Exam	60 Marks

Text/Reference Books:

1. R.K.Jain& S R K Iyengar, Advanced Engineering Mathematics, NarosaPub.House
2. Thomas & Finney, Advanced calculus and geometry Addison-Wesley Pub. Co.
3. D. W. Jordan & P Smith, Mathematical Techniques, OXFORD
4. Peter V. O'Neil, Advanced Engineering Mathematics, Cengage Learning,NewDehli
5. B.V.Ramana, Higher Engineering Mathematics, McGraw – Hill.
6. Methods of Real Analysis by R. R. Goldberg.
7. Foundation of Differential Calculus by Euler, Translated by J.D. Blanton, Springer-Verlag, New York, 2000.
8. Calculus, Vol. 1, 2 by T. Apostol, John Wiley.
9. Differential and Integral Calculus by Shanti Narayan.

CO/PO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	1								2
CO2	3	3	3	1					1			2
CO3	3	3	3	2					2			2
CO4	3	3	3	2					2			2

CSE102-Engineering Physics		
Teaching Scheme	Examination Scheme	Credits allocated
Theory 3 h/week+ Tutorial 1h/week	End semester Examination-60 marks	Theory-3, Tutorial-1
Total		4

Course Prerequisite: Knowledge of 10+2 Physics.

Course Objective:

1. To explain Quantum Mechanics for understanding wave particle dualism and to understand the necessity of quantum mechanics to explore the behavior of sub atomic particles.
2. To demonstrate the success of quantum free electron theory over classical free electron theory.
3. Toanalyzethe crystal parameters to investigate crystal structures and the type of the defect present in the crystals
4. To know the significance of Maxwell's equations in the Engineering applications of electromagnetic waves.

Course Outcomes: On completion this course, students will be able to

: CO-1: Derive thermodynamic parameters and apply fundamental laws to solve thermodynamic problems

: CO-2: Differentiate between the terms atomic number, atomic mass, isotopes etc and apply various rules such as Hundsrule ,octet rules and Bohr's energy levels.

: CO-3: Design and conduct simple experiments as well as analyze and interpret data.

: Summarize the importance of free electrons in determining the properties of metals; understand the concept of Fermi energy.

: CO-4: Apply the knowledge of basic quantum mechanics, to set up onedimensional Schrodinger's wave equation and its application to a matter wave system.

Level	Bachelor

Course Content:

Unit -I	Transformation of scalars and vectors under Rotation transformation; Forces in Nature; Newton's laws and its completeness in describing particle motion; Form invariance of Newton's Second Law; Solving Newton's equations of motion in polar coordinates; Harmonic oscillator; Damped harmonic motion – over-damped, critically damped andlightly-damped oscillators; Forced oscillations and resonance.	10 hrs
Unit-II	Electrostatic field and potential of a dipole. Bound charges due to electric polarization;Electric displacement; boundary conditions on displacement; Solving simpleelectrostatics problems in presence of dielectrics – Point charge at the centre of adielectric sphere, Bio-Savart law, Divergence and curl of static magnetic field; vector potential and calculating it for a given magnetic field using Stokes' theorem.	10 hrs

Unit-III	Lasers: Introduction, characteristics of a laser beam, spontaneous and stimulated emission of radiation, population inversion, Ruby laser, He-Ne laser, semiconductor laser, applications of lasers Fibre optics: Introduction to optical fibers, principle of propagation of light in optical fibers, acceptance angle and acceptance cone, numerical aperture, types of optical fibers, modes of propagation and refractive index profiles.	10 hrs
Unit-IV	Introduction to Quantum mechanics, Wave nature of Particles, Time-dependent and time independent Schrodinger equation for wavefunction, Born interpretation, probability current, Expectation values, Free-particle wavefunction and wave-packets, Uncertainty principle.	10 hrs
Unit V	Solution of stationary-state Schrodinger equation for one dimensional problems– particle in a box, particle in attractive delta-function potential, square-well potential, linear harmonic oscillator, Schrodinger's time independent and time dependent wave equations, physical significance and properties of the wave function, application; Eigen wave functions and energy Eigen values of the particle Elements of Statistical mechanics: Elementary concepts of Maxwell-Boltzman , Bose-Einstein and Fermi-Dirac statistics (no derivation)	10 hrs

Internal assessment		
Part A	CIA-I: Unit I, and II	20 Marks
	CIA-II: Unit III, and IV	20 Marks
Part B	ESE: Term Exam	60 Marks

Text/Reference Books:

1. Introduction to Mechanics — MK Verma.
2. Engineering Mechanics - Dynamics, 7th ed. - JL Meriam.
3. Introduction to Quantum Physics- Eisberg and Resnick.
4. Engineering Physics --S.O.Pilai , Sivakami New Age International Publishers.
5. Engineering physics – V. Rajendran,McGrawHill Education Private Ltd

List of experiments:

1. Resonance phenomena in mechanical oscillators.
2. Experiment on moment of inertia measurement
3. Black box experiment; Identification of unknown passive electrical components and determine the value of Inductance and Capacitance.
4. Dielectric constant (Measurement of dielectric constant).
5. Frank-Hertz experiment; photoelectric effect experiment; recording hydrogen atomspectrums.
6. Torsional pendulum (Determination of M.I. of wire and Rigidity modulus)
7. Determination of Fermi energy. (Measurement of Fermi energy in copper).
8. Uniform Bending Experiment (Determination of Youngs modulus of material bar).
9. Newtons Rings, (Determination of radius of curvature of plano convex lens).
10. Diffraction and interference experiments (from ordinary light or laser pointers); measurement of speed of light on a table top usingmodulation; minimum deviation from a prism.

CO/PO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	2	1	1	1						2
CO2	2	2	2	1					1			1
CO3	3	3	3	2					1			2

CO4	3	2	2	2	1				2			2
CO5	2	3	3			2					2	

CSE103 -Basic Electrical Engineering		
Teaching Scheme	Examination Scheme	Credits allocated
Theory 3 hrs/week	End of semester Examination-60 marks	Theory-3
Practical 2hrs/week	Internal assessment:40 marks	Lab-1
		Total-4

Course Prerequisite: Students should have basic knowledge on Physics and Mathematics

Course Objective: The main objective of this course is to understand the laws of electrical technology, operation of power converter and working of important electrical installation used in domestics or household purposes

Course Outcomes: On completion this course, students will be able to

CO1: To understand and analyze basic electric and magnetic circuits
CO2: To study the working principles of electrical machines and power converters.
CO3: To introduce the components of low voltage electrical installations

Course Content:

Unit -I	**DC Circuits:** Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.	10hrs
Unit-II	**AC Circuits:** Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Threephase balanced circuits, voltage and current relations in star and delta connections.	10 hrs
Unit-III	**Transformers:** Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.	10hrs
Unit-IV	**Electrical Machines and power converter:** Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators; DC-DC buck and boost converters, duty ratio control. Single-phase and three-phase voltage source inverters; sinusoidal modulation	10 hrs
Unit-V	**Electrical Installations:** Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup	10 hrs

Internal assessment		
Part A	CIA-I:Unit I, II and III	
	CIA-II: Unit IV, V, and VI	
Basic Electrical Engineering Laboratory		
List of Experiments		

1. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
2. Identification various passive components without multimeters.
3. Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to a step change in voltage (transient may be observed on a storage oscilloscope). Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Resonance in R-L-C circuits.
4. Observation of the no-load current waveform on an oscilloscope (nonsinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics). Loading of a transformer: measurement of primary and secondary voltages and currents, and power.
5. Observation of Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents). Phase-shifts between the primary and secondary side. Cumulative three-phase power in balanced three-phase circuits.
6. Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine.
7. Torque Speed Characteristic of separately excited dc motor.
8. Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connections. Torque-Slip Characteristic of an induction motor. Generator operation of an induction machine driven at supersynchronous speed.
9. Synchronous Machine operating as a generator: stand-alone operation with a load. Control of voltage through field excitation.
10. Demonstration of (a) dc-dc converters (b) dc-ac converters – PWM waveform (c) the use of dc-ac converter for speed control of an induction motor and (d) Components of LT switchgear.

Text Books:

1. Charles K. Alexander, Matthew N.O. Sadiku, "Fundamentals of Electric Circuits", McGraw Hill Education; 5th edition (1 July 2013)
2. Abhijit Chakrabarti, and Sudipta Nath, "BASIC ELECTRICAL ENGINEERING", McGraw Hill Education; 1st edition (1 July 2017).
3. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill,2010

Reference Books:

1. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
2. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
3. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
4. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

CO/PO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	1	1						2

CO2	2	2	2	1					1			1
CO3	3	3	3	2					1			2
CO4	3	2	2	2	1				2			2
CO5	2	3	3			2					2	

CSE105- Engineering Graphics and Design		
Teaching Scheme	Examination Scheme	Credits allocated
Theory 3 hrs/week	End of semester Examination-60 marks	Theory-3
Practical 2hrs/week	Internal assessment:40 marks	Lab-1
		Total-4

Course Prerequisite: Students should have basic knowledge on Physics and Mathematics

Course Objective:

1. Comprehend general projection theory, with emphasis on orthographic projection to represent three-dimensional objects in two-dimensional views (principal, auxiliary, sections).
2. Dimension and annotate two-dimensional engineering drawings. The application of industry standards and best practices applied in engineering graphics.
3. Emphasize freehand sketching to aid in the visualization process and to efficiently communicate ideas graphically.
4. Introduce CAD software for the creation of 3D models and 2D engineering drawings.

Course Outcomes: On completion this course, students will be able to

CO1: Demonstrate spatial visualization skills through the creation of two-dimensional drawings

CO2: Recognize graphic symbols and read basic engineering drawings

CO3: Draw simple drawings on paper and also by using AutoCAD software

CO4: Use AutoCAD software to make two dimensional drawings and diagrams

CO5: Export drawing files that meet industry standards and practices.

Course Content:

Unit -I	**Introduction to Engineering Drawing**: Principles of Engineering Graphics and their significance, Usage of drawing instruments, Different types of lines, Labelling of drawings- Numerals and different types of letters, Dimensioning of drawings, Introduction to IS codes of drawing, Paper sizes, Units of measurements and dimensions, Scales of drawings.	10 hrs
Unit-II	**Geometrical Constructions**: Orthographic Projections, Projections of regular solids (Cube, Prism, Cylinder, Pyramid, Cone, Sphere), Sections and Sectional Views of Right Angular Solids, Auxiliary Views, Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone, Isometric Projections, Principles of Isometric projection – Isometric Scale, Isometric Views, Isometric Views of lines, Planes, Simple and compound Solids, Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions	10 hrs

Unit-III	**Using computer aided software for drawings**: Making two dimensional drawings using AutoCAD (Examples of electronic circuits and components), Basic symbols for components, fixtures, furniture, windows, doors, etc., Simple floor-plans, sections and elevations (Examples like drawing of a workstation or computer lab), Simple designs on AutoCAD, Printing of drawings on a scale.	10 hrs
Unit-IV	**PROJECTION OF PLANE SURFACES** Construction of polygons-Projection of plane Surfaces–Plane surface parallel to one plane andPerpendicular toother two–Plane surface Perpendicular to one plane and inclined to the otherPlane surface inclined to both HP and VP.	10 hrs
Unit V	**Annotations, layering & other functions covering:** applying dimensions to objects, applying annotations to drawings; Setting up and use ofLayers, layers to create drawings, Create, edit and use customized layers; Changing linelengths through modifying existing lines (extend/lengthen); Printing documents to paperusing the print command; orthographic projection techniques; Drawing sectional views ofcomposite right regular geometric solids and project the true shape of the sectioned surface;Drawing annotation, Computer-aided design (CAD) software modeling of parts andassemblies.	10 hrs

	Internal assessment	
Part A	CIA-I:Unit I, II and III	
	CIA-II: Unit IV, V, and VI	
List of Experiments		

1.

Text/Refrences Books:

1. Charles K. Alexander, Matthew N.O. Sadiku, “Fundamentals of Electric Circuits”, McGraw Hill Education; 5th edition (1 July 2013)
2. Abhijit Chakrabarti, and Sudipta Nath, “BASIC ELECTRICAL ENGINEERING”, McGraw Hill Education; 1st edition (1 July 2017).
3. D. P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill,2010

CO/PO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	1	1						2
CO2	2	2	2	1					1			1
CO3	3	3	3	2					1			2
CO4	3	2	2	2	1				2			2
CO5	2	3	3			2					2	

SEMESTER II

CSE107-Engineering Mathematics-II		
Teaching Scheme	Examination Scheme	Credits allocated
Theory 3 h/week+ Tutorial 1h/week	End of semester Examination-60 marks	Theory-3, Tutorial-1

Course Prerequisite: Knowledge of 10+2 Mathematics.

Course Objective: To provide the students with sufficient knowledge of differential equations, higher orders, power series and Fourier series, so that it can be used in their respective fields of Engineering.

Course Outcomes: On completion this course, students will be able to

CO1: Analyze the behavior of functions by using differential equations concepts.
CO2: To understand second order and higher order differential equations.
CO3: To understand series solutions and to apply in higher order applications.
CO4: Analyze Fourier series, partial differential equations and to apply in further synthesis.

Level	Bachelor

Course Content:

Unit -I	Differential equations of first order & of first degree: Linear form, reducible to linear form, exact form, Reducible to exact form, Picard's Theorem (Statement only).	10 hrs
Unit-II	Unit-2: Differential equations of second & higher order with constant coefficients.	10 hrs
Unit-III	Sequence, Power series, radius of conversions, solution in series of second order LDE with variable co-efficient (C.F. only). Regular Single points and extended power series (Frobenius Method).	10 hrs
Unit-IV	Fourier series, half range series, change of intervals, harmonic analysis. Formulation and classification of linear and quasi linear partial differential equation of the first order, Lagrange's method for linear Partial Differential Equation of the first order.	10 hrs

Internal assessment

Part A	CIA-I: Unit I, and II	20 Marks
	CIA-II: Unit III, and IV	20 Marks
Part B	ESE: Term Exam	60 Marks

Text/Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathmatics, John Wiley.
2. B.V.Ramana, Higher Engineering Mathematics, McGraw – Hill.
3.Peter V. O'Neil, Advanced Engineering Mathematics, Cengage Learning, NewDehli
4. M Ray, A Text Book On Differential equations Students Friends & Co., Agra-2
5. Robert C. Mcowen, Partial Differential Equation Pearson Education.
6. George F. Simmons & S.G. krantz, Differential Equation Tata McGraw – Hill.
7. R.K.Jain& S R K Iyengar, Advanced Engineering Mathematics, Narosa
8. T Amarnath , An Elementary course in partial differential equations, Narosa, New Delhi.
9. S. G. Deo and V. Raghavendra: Ordinar Differential Equations, Tata McGraw Hill Pub. Co. ,New Delhi

CO/PO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**

CO1	3	3	3	1								2
CO2	3	3	3	1					1			2
CO3	3	3	3	2					2			2
CO4	3	3	3	2					2			2

CSE108- Introduction to Programming		
Teaching Scheme	**Examination Scheme**	**Credits**
Theory 3 hrs/week	**End of semester Examination: 60 marks**	Theory-3
	Internal assessment: 40 marks	
		Total-3

Course Prerequisite: Students should have basic knowledge of Computer fundamentals

Course Objective: The main objective of this course is to understand the concept of problem solving using algorithm and programming.

Course Outcomes: On completion this course, students will be able to
CO1: To develop algorithms for arithmetic and logical problems
CO2: To translate the algorithms to programs & execution
CO3: To decompose a problem into functions and synthesize a complete program
CO4: To apply the programming concepts in development of real-life applications

Course Content:		Total Hrs
Unit -I	**Introduction to Programming:** Concept of programming, program development steps, programming languages, concept of high-level, assembly and low-level programming languages, Concept of algorithms, representing algorithms through flow chart, pseudo code, introduction to the editing tools such as vi or ms-vc editors, concepts of the finite storage	10 hrs
Unit-II	**Programming using C:** Structure of c program, a simple c program, identifiers, basic data types and sizes, constants, variables, arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bit-wise operators, assignment operators, expressions, type conversions, conditional expressions, precedence and order of evaluation, c primitive input output using getchar and putchar, exposure to the scanf and printf function, statements and blocks, if and switch statements	10hrs
Unit-III	**Iterations and Subprograms:** Concept of loops, while, do-while and for statements, break, continue, goto and labels, introduction to arrays- concepts, declaration, definition, accessing elements, storing elements, two-dimensional and multi-dimensional arrays, applications of arrays. Concept of sub-programming, functions, parameter passing, storage classes-extern, auto, register, static, scope rules, user defined functions, standard library functions, recursive functions.	10hrs
Unit-IV	**Pointers, Structures and File Handling:** Pointers- concepts, character pointers and functions, pointers to pointers, pointers and arrays, argument passing using pointers, array of pointers, passing arrays as arguments, String and string functions. Derived types- structures- declaration, definition, passing strings as arguments, programming examples, union. File handling-reading from file, writing in file, updating in file.	10hrs

Internal assessment		
Part A	CIA-I:Unit I, II	

	CIA-II: Unit III and IV	

Text Books:

1. Schum‟s Outline of Programming with C by Byron Gottfried, McGraw-Hill
2. The C programming by Kernighan Brain W. and Ritchie Dennis M., Pearson Education.
3. Computer Basics and C Programming by V.Rajaraman , PHI Learning Pvt. Limited, 2015.
4. Computer Concepts and Programming in C, E Balaguruswami, McGraw Hill

Reference Books:

1. Problem Solving and Program Design in C, by Jeri R. Hanly, Elliot B. Koffman, Pearson Addison-Wesley, 2006.
2. Computer Concepts and Programming by Anami, Angadi and Manvi, PHI Publication.
3. Problem Solving and Programming in C, R.S. Salaria, Khanna Publishing House..
4. Computer Fundamentals and Programming in C. Reema Thareja, Oxford Publication.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	1	1							2
CO2	3	2	2		2							2
CO3	3	3	3	3	2				1		1	3
CO4	3	3	3	3	2				1		1	3

CSE109- Basic Electronic Engineering		
Teaching Scheme	Examination Scheme	Credits allocated
Theory 3 hrs/week	End of semester Examination-60 marks	Theory-3
Practical 2hrs/week	Internal assessment:40 marks	Lab-1
		Total-4

Course Prerequisite: Students should have basic knowledge on Physics and Mathematics

Course Objective:

1. The students will learn about the concepts and theories of diodes and transistors used in almost every electronic device.
2. To make the students familiar with simple logic principles used in advance digital electronics and communication.
3. Give introduction to electronic instrumentation used to measure electronic/electrical parameters.

Course Outcomes: On completion this course, students will be able to

CO1: Learn the operation of diodes and transistors and their basic applications in electronic devices.
CO2: Understand the number system and their interconversions.
CO3: Understand about digital electronics. They will get insights on digital logics theorems and basic combinational logic devices.
CO4: Develop understanding about the basic electronic instrumentation.

Course Content:

Unit -I	Diodes and Applications covering, Semiconductor Diode - Ideal versus Practical,Resistance Levels, Diode Equivalent Circuits, Load Line Analysis; Diode as a Switch, Diodeas a Rectifier, Half Wave and Full Wave Rectifiers with and without Filters; BreakdownMechanisms, Zener Diode – Operation and Applications; Diode as clipper and clampers;Opto-Electronic Devices – LEDs, Photo Diode and Applications	10hrs

Unit-II	Transistor Characteristics covering, Bipolar Junction Transistor (BJT) – Construction, Operation, AmplifyingAction, Common Base, Common Emitter and CommonCollector Configurations, Operating Point, Voltage Divider Bias Configuration; DC and AC load line analysis, Q point; Darlington pair, Field EffectTransistor (FET)	10hrs
Unit-III	Binary Numbers, Decimal to Binary and Binary to Decimal Conversion, BCD, Octal and Hexadecimal numbers, Negative numbers representation, 1's, 2's, Complements, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code.Boolean Algebra, Basic Theorems and properties of Boolean Algebra,Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND,XOR and XNOR Integrated Circuits (ICs)	12hrs
Unit-IV	Measurement, Sensors, Laboratory measuring instruments: digital multi-meters and Cathode Ray Oscilloscopes (CRO's), Measurement of resistance (Carey Foster bridge), Capacitance (De Sauty's bridge), and Self-inductance (Anderson's bridge) using different bridges.	8hrs

Internal assessment		
Part A	CIA-I: Unit I, II and III	
	CIA-II: Unit IV, V, and VI	

Basic Electronics Engineering Laboratory

List of Experiments

1. V-I Characteristics of Silicon & Germanium PN Junction diodes
2. Signal characterization using CRO-Applications
3. Diode as clipper and clamper
4. V-I Characteristics of Zener Diode
5. Characteristics of BJT in Common Emitter Configuration
6. Regulated power supply using Transistor and Zenner Diodes
7. Half Wave and Full Wave Rectifier Without Filter
8. Half Wave and Full Wave Rectifier with Filter
9. Common Emitter BJT Amplifier
10. Applications of Operational Amplifier
11. Introduction to Logic Gates

Text/Reference Books:

1. Basic Electronics- Devices, Circuits and IT Fundamentals, PrenticeHall, India.
2. Electronics A Systems Approach", 4/e - Pearson Education Publishing Company Pvt Ltd, 2011 by Neil Storey.
3. Electronic Devices and Circuits" Salivahanan, N Suresh Kumar, 3/e, McGraw Hill Publications, 2013.
4. Basic Electronics & Linear Circuits, Bhargava N. N., D C Kulshreshtha and S C Gupta, Tata McGraw Hill, 2/e, 2013

CO/PO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO1	3	3	2	2	2	2	2	1	1	3	2	3
CO2	2	2	3	1	3	1	1	2	1	2	1	3
CO3	2	1	2	2	2	3	1	3	1	1	1	2
CO4	3	3	2	1	1	2	2	2	2	2	2	2

CSE110-Engineering Chemistry		
Teaching Scheme	Examination Scheme	Credits allocated
Theory 3, Practical 2 hrs/week	End of semester Examination-60 marks	Theory-3, Practical-1
Total		4

Course Prerequisite: Knowledge of 10+2 Chemistry.

Course Objective:

1. To study and compare between various theories of atomic structure
2. To employ various spectroscopic techniques in identifying the structure and correlate it with their properties
3. To address concepts related to electrochemistry, such as corrosion, using thermodynamic principles
4. To exploit the periodic properties of elements for bulk property manipulation towards technological advancement
5. To employ various organic reactions towards the design of fine chemical and drug molecules for industries

Course Outcomes: On completion this course, students will be able to

CO-1: Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.

CO-2:Learn various spectroscopic techniques and its applications in engineering.

Understand the bulk properties and processes applying thermodynamic considerations.

CO-3:Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.

CO-4:Learn about major chemical reactions used in the synthesis of molecules.

Level	**Bachelor**

Course Content:

Unit -I	**Atomic and Molecular Structure** Schrodinger equation, Particle in a box solutions and their applications, Forms of the hydrogen atom wave functions, Molecular orbitals of diatomic molecules, Equations for atomic and molecular orbitals, Energy level diagrams of diatomic, Pi-molecular orbitals of butadiene and benzene and aromaticity, Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties, Band structure and the role of doping on band structures.	12 hrs
Unit-II	**Spectroscopic techniques and applications, Intermolecular forces and potential energy surfaces** Principles of spectroscopy and selection rules, Electronic spectroscopy, Fluorescence and its applications in medicine, Vibrational and rotational spectroscopy of diatomic molecules, Applications, Nuclear magnetic resonance and magnetic resonance imaging, surface characterisation techniques, Diffraction and scattering. Intermolecular forces and potential energy surfaces- Ionic, dipolar and van Der Waals interactions. Equations of state of real gases and critical phenomena. Potential energy surfaces of H_3, H_2F and HCN and trajectories on these surfaces.	12 hrs

Unit-III	**Use of free energy in chemical equilibria and Periodic properties** Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Water chemistry. Corrosion. Use of free energy considerations in metallurgy through Ellingham diagrams.Periodic properties- Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries.	10 hrs
Unit-IV	**Stereochemistry** Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds.	4 hrs
Unit-V	**Organic reactions and synthesis of a drug molecule** Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule.	4 hrs

Internal assessment		
Part A	CIA-I: Unit I, II and III	20 Marks
	CIA-II: Unit IV, and V	20 Marks
Part B	EoSE: Term Exam	60 Marks

Text/Reference Books:

1. University chemistry, by B. H. Mahan
2. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane.
3. Fundamentals of Molecular Spectroscopy, by C. N. Banwell
4. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
5. Physical Chemistry, by P. W. Atkins
6. Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition.

List of Experiments

Choice of 10-12 experiments from the following:

1. Determination of surface tension and viscosity
2. Thin layer chromatography
3. Ion exchange column for removal of hardness of water
4. Determination of chloride content of water
5. Colligative properties using freezing point depression
6. Determination of the rate constant of a reaction
7. Determination of cell constant and conductance of solutions
8. Potentiometry - determination of redox potentials and emfs
9. Synthesis of a polymer/drug
10. Saponification/acid value of an oil
11. Chemical analysis of a salt
12. Chemical oscillations- Iodine clock reaction
13. Determination of the partition coefficient of a substance between two immiscible liquids
14. Adsorption of acetic acid by charcoal
15. Use of the capillary viscometers to the demonstrate of the isoelectric point as the pH of minimum viscosity for gelatin sols and/or coagulation of the white part of egg.

CO/PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO1	3	2	1	1	1	2	1	1	1	2	2	1
CO2	3	2	2	1	3	1	1	1	1	2	2	1
CO3	2	2	1	2	2	1	1	1	1	1	2	1
CO4	2	1	2	1	1	1	1	1	1	2	2	1

CSE111- Workshop Practice

Teaching Scheme	Examination Scheme	Credits allocated
Theory 3 hrs/week	End of semester Examination-60 marks	Theory-2
Practical 2hrs/week	Internal assessment:40 marks	Lab-4
		Total-4

Course Prerequisite: Students should have basic knowledge on Physics and Mathematics

Course Objective:

1. To learn the basic operation principles of various electrical and mechanical machines.
2. To demonstrate the use of different electronics components for building of circuits.
3. Skill development of the students for new electronics projects.

Course Outcomes: On completion this course, students will be able to

CO1: Have sound knowledge on the operation of electronics measuring instruments.
CO2: develop some required electronics projects by their own hand for household applications.
CO3: To handle the various electrical and mechanical machines.
CO4: To troubleshoot the household electrical/electronic faults.

Course Content:

Unit -I	**Electrical and Electronics** Measuring instruments: Ammeter, Voltmeter, Wattmeter, Watt hour meter, their description and uses, CRO, function generator; Single phase A C, Two wire and three wire, 3 phase four wire; A.C; systems over-head systems and under-ground systems; Service connection, domestic lighting, Heating, mixed loads, Industrial wiring, Insulation and wiring of Industrial Motors. Estimating and costing of materials; Indian Electricity Rules, Electronics Troubleshooting, Testing of electronics components; connectors and switches.	12hrs
Unit-II	**Introduction to Cables, Connectors and Switches**: CABLES: General specifications of cables- characteristic impedance, current carrying capacity,flexibility. Types of cables: SWG Single core, Multi core, Single strand, Multi strand and theirtypes, Shielded wires, Coaxial cables, Twisted pair, UTP cables, Flat ribbon cable, Teflon coatedwires, optical Fiber Cable. CONNECTORS: General specifications of connectors- contact resistance, breakdown voltage,insulation resistance, applications of BNC, D series, Audio, Video, printer, edge, FRC, RJ 45connectors. SWITCHES: Toggle switch- SPDT, DPDT, TPDT, Centre off, Without center-off,Rocker switch, Push button latch andnon-latch, Tactile switch, Micro switch, Limit switch, DIP switch.	12hrs
Unit-III	**Use of various workshop tools:** Nose pliers, wire stripper, wire cutter. Study and understanding; electronic circuit diagrams. Transfer and testing of circuit diagram to Bread. Introduction to PCB, Types of PCBs: Single sided PCB, double sided PCB and multilayered PCB, PCB Materials, Component identification on PCB; General purposePCB, Custom made PCB- types of PCB and their use, Transfer and testing of circuit diagram toPCB, Soldering and De-soldering - technique-requirements and methods.	14hrs
Unit-IV	**Manufacturing** Metal casting, Methods of casting, forming and forging; machining, advanced manufacturing Methods, Additive manufacturing; Brief description and use of milling; Milling machine; glass cutting; Welding (arc welding & gas welding), Fitting operations & power tools	12hrs

Internal assessment		
Part A	CIA-I: Unit I, II	
	CIA-III: Unit IV	
Lectures & videos: (10 hours)		

1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturingmethods (3 lectures)
2. CNC machining, Additive manufacturing (1 lecture)
3. Fitting operations & power tools (1 lecture)
4. Electrical & Electronics (1 lecture)
5. Plastic moulding, glass cutting (1 lecture)
6. Metal casting (1 lecture)
7. Welding (arc welding & gas welding), brazing (1 lecture)

Text/Reference Books:

1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
2. Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002.
3. (iii)Gowri P. Hariharan and A. Suresh Babu,"Manufacturing Technology – I" Pearson Education, 2008.
4. Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.
5. Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGrawHill House, 2017.
6. Basic Electronics & Linear Circuits, Bhargava N. N., D C Kulshreshtha and S C Gupta, Tata McGraw Hill, 2/e, 2013

CSE112-Programming Lab		
Teaching Scheme	**Examination Scheme**	**Credit**
LAB 2 hrs/week	**End of semester Examination: 60 marks**	Lab-1
	Internal assessment: 40 marks	
		Total-1
Course Prerequisite: Students should have basic knowledge of Computer fundamentals		
Course Objective: The main objective of this course is to understand the concept of problem solving using algorithm and programming.		
Course Outcomes: On completion this course, students will be able to **CO1:** To develop algorithms for arithmetic and logical problems **CO2:** To translate the algorithms to programs & execution **CO3:** To decompose a problem into functions and synthesize a complete program **CO4:** To apply the programming concepts in development of real-life applications		
List of Experiments		

1. Write a program to calculate the area of triangle using formula at=√s(sa)(s-b)(s-c).
2. Basic salary of an employee is input through the keyboard. The DA is 25% of the basic salary while the HRA is 15% of the basic salary. Provident Fund is deducted at the rate of 10% of the gross salary (BS+DA+HRA). Program to calculate the Net Salary.
3. Write a C program for computation of slope of a straight line with following rules:
4. Consider the equation of line: y = mx+c
5. Here user will provide the value of (x,y and c) the compute slope of line.
6. If you find the slope of line the also write code to compute the value of "y" at any value of "x" given by user.
7. Write a C program to compute your age in number of days by given date of birth.
8. Write a C program to print table of any given number.
9. Write a C program to compute the factorial of any given number.
10. Write a C program to check whether number is prime or not prime.
11. Write a C program to print the list of all EVEN numbers upto the given range i.e user will input two numbers start and end; you have to print even numbers in this range.
12. Write a C program to print the following pattern:

```
*
**
***
****
*****

    *
   **
  ***
 *****
******
```

13. Write a C program to check whether a number is palindrome or not.
14. Write a C program to find sum of first and last digit of a number.
15. WAP in c to merge two different 1-D arrays.
16. WAP in c to sort the array elements in ascending order.
17. WAP in c to find the median of array elements.
18. WAP in c to perform Matrix Multiplication of two matrices, the size of both matrices must be given by the user.
19. WAP in c to find that two matrices are equal.
20. WAP in c to input your name and print in uppercase letters.
21. WAP in c to store your enrolment numbers and print them in reverse order.
22. WAP in c to store any enrollment number from your batch, find the branch in enrollment number, and print the branch name.
23. Define a structure that can describe a hotel. It should have the member that includes the name, address, grade, room charge and number of rooms. Write a function to print out hotel of given grade in order of room charges.
24. Write a program to find the largest no among 20 integers array using dynamic memory allocation.
25. Write a program to print all the prime numbers in range of 1 to 100 in file prime.txt.
26. Write a program to read number from file and then write all 'odd' number to file ODD.txt & all even to file EVEN.txt.

Internal assessment		
Part A	CIA-I:Experiments 1-13	

	CIA-II: Experiments 14-26	

Text Books:

1. Schum‟s Outline of Programming with C by Byron Gottfried, McGraw-Hill
2. The C programming by Kernighan Brain W. and Ritchie Dennis M., Pearson Education.
3. Computer Basics and C Programming by V.Rajaraman , PHI Learning Pvt. Limited, 2015.
4. Computer Concepts and Programming in C, E Balaguruswami, McGraw Hill

Reference Books:

1. Problem Solving and Program Design in C, by Jeri R. Hanly, Elliot B. Koffman, Pearson
2. Addison-Wesley, 2006.
3. Computer Concepts and Programming by Anami, Angadi and Manvi, PHI Publication.
4. Problem Solving and Programming in C, R.S. Salaria, Khanna Publishing House..
5. Computer Fundamentals and Programming in C. Reema Thareja, Oxford Publication.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	1	1							2
CO2	3	2	2		2							2
CO3	3	3	3	3	2				1		1	3
CO4	3	3	3	3	2				1		1	3

Second Year

CSE201- Discrete Mathematics		
Teaching Scheme	**Examination Scheme**	**Credits**
Theory 3 hrs/week	**End of semester Examination: 60 marks**	Theory-3, Tutorial-1
Tutorial-1 hrs/week	**Internal assessment: 40 marks**	
		Total-4

Course Prerequisite: Basic mathematics

Course Objective: This course is designed to given an introductory idea of different discrete structures, including graph theory. In particular, this course introduces logic, proofs, sets, relations, functions, counting, and abstract structure, with an emphasis on applications in computer science.

Course Outcomes: On completion this course, students will be able to

CO1: Fundamental mathematical concepts and terminology underlying a variety of discrete structures.
CO2: Use of graph and its analysis for a variety of practical problems like shortest distance, and Binary search tree.
CO3: Techniques of constructing mathematical proofs.
CO4: Understand the use of propositional and predicate logic.

Course Content:		Total Hrs
Unit -I	Sets: Definition and types, Set operations, Partition of set, Cardinality (Inclusion-Exclusion & Addition Principles), Recursive definition of set. Functions, Relations, Properties of binary relations, closure, Partial Ordering Relations, The Pigeonhole & Generalized Pigeonhole Principles, Composition of Functions Concept, Mathematical induction	10 hrs
Unit-II	Graph Theory: Graphs – Directed, Undirected, Simple,. Adjacency & Incidence, Degre of Vertex, Subgraph, Complete graph, Cycle & Wheel Graph, Bipartite & Complete Bipartite Graph, Weighed Graph, Union of Simple Graphs. Complete Graphs. Isomorphic Graphs, Path, Cycles & Circuits Euclerian & Hamiltonian Graphs.	10hrs
Unit-III	Planar Graph: Kuratowski's Two Graphs, Euler's Formula, Kuratowski's Theorem. Trees: Spanning trees- Kruskal's Algo, Finding Spanning Tree using Depth First Search, Breadth First Search, Complexity of Graph, Minimal Spanning Tree.	10hrs
Unit-IV	Language of Logic: Proposition, Compound Proposition, Conjunction, Disjunction, Implication, Converse, Inverse & Contrpositive, Biconditional Statements, tautology, Contradiction & Contingency, Logical Equivalences, Quantifiers, Arguments Groups, Ring, fields and Lattice	10hrs

Internal assessment		
Part A	CIA-I:Unit I, II	
	CIA-II: Unit III and IV	

Text Books:

1. C.L Liu and D.P. Mohapatra, Elements of Discrete Mathematics: A Computer Oriented Approach, TMH, 3rd Edition
2. Rosen, Discrete Mathematics and its applications, 6th Edition
3. Schaum's Outlines of Discrete Mathematics, Seymour Lipschutz & Marc Lipson, 2nd Edition
4. Narsingh & Deo, Graph Theory with Applications to Engineering and Computer Science, PHI 2004 Publication

Reference Books:

1. C.L Liu and D.P. Mohapatra, Elements of Discrete Mathematics: A Computer Oriented Approach, TMH, 3rd Edition
2. Rosen, Discrete Mathematics and its applications, 6th Edition
3. Schaum's Outlines of Discrete Mathematics, Seymour Lipschutz & Marc Lipson, 2nd Edition
4. Narsingh & Deo, Graph Theory with Applications to Engineering and Computer Science, PHI 2004 Publication

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	1	2								2
CO2	2	2	2	2								2
CO3	2	2	2	2	2							2
CO4	2	2	2	2	2							2

CSE202- Computer Organization		
Teaching Scheme	**Examination Scheme**	**Credits**
Theory 3 hrs/week	**End of semester Examination: 60 marks**	Theory-3, Tutorial-1
Tutorial-1 hrs/week	**Internal assessment: 40 marks**	
		Total-4

Course Prerequisite: Basic knowledge of computer and working knowledge.

Course Objective: Introduce basic concepts of working of a computer. To enable students understand working of a processor and execution of a program. Introduce basics of memory and I/O.

Course Outcomes: On completion this course, students will be able to

CO1: Understanding of a computer and processor.
CO2: Understand the internal architecture of the processor, memory and I/O.
CO3: Learn storage mechanism of computer systems.
CO4: Understand the concept of I/O

Course Content:	Total Hrs

Unit -I	Basic Structure of Computers: Computer Types, Functional Units, Basic Operational Concepts, Bus Structures, Software, Performance, Multiprocessors and Multicomputer, Historical Perspective. Machine Instructions and Programs: Memory Locations and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes, Basic I/O Operations, Stacks and Queues, Subroutines	10 hrs
Unit-II	Basic processing Unit : Fundamental Concepts, Execution of a complete Instruction, Multiple-Bus Organization, Hardwired Control, Microprogrammed Control, Instruction Pipelining, Pipelining Hazards. Arithmetic: Integer Representation, Integer Arithmetic, Floating-Point Representation, Floating-Point Arithmetic.	10hrs
Unit-III	Memory System: Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed Size and Cost, Cache Memories, Virtual Memories, Secondary storage.	10hrs
Unit-IV	Input/output Organization: Accessing I/O devices, Interrupts, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces.	10hrs

Internal assessment		
Part A	CIA-I:Unit I, II	
	CIA-II: Unit III and IV	

Text Books:

1. "Computer Organization" by Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Fifth Edition, McGraw Hill Higher Education.
2. "Computer Organization and Architecture – Designing for Performance" by William Stallings, Ninth edition, Pearson Education Inc.

Reference Books:

1. "Computer System Architecture" by M Morris Mano, Third edition Pearson Education Inc.
2. "Computer Organization and Architecture" by David A Patterson and John L Hennessey, Fifth edition, Elsevier India.
3. "Computer Architecture and Organization" by John Hayes, Third edition, McGraw Hill Education.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	2	2	1	1	1					2
CO2	2	2	2	2	1	1	1					2
CO3	2	2	3	3	1	1	1					2
CO4	2	2	3	3	1	1	1					3

CSE203- Theory of Computation		
Teaching Scheme	**Examination Scheme**	**Credits**
Theory 3 hrs/week	**End of semester Examination: 60 marks**	Theory-3, Tutorial-1
Tutorial-1 hrs/week	**Internal assessment: 40 marks**	
		Total-4
Course Prerequisite: Students should have basic knowledge of mathematics		

Course Objective: The objective of this course is to understand the concept of automata models, to identify the limitation of the proposed model and try to find the models to overcome the limitations.

Course Outcomes: On completion this course, students will be able to

CO1: To learn computing paradigms as membership, design models for various classes of sets.
CO2: Able to apply the proposed models to find the performance evaluation of scientific computations.
CO3: To be able to design various machines/models for mathematical calculations.
CO4: To apply the automata models concepts in development of real-life applications.

Course Content:		Total Hrs
Unit -I	Introduction of Automata, languages, string, basic operations on language, union, concatenation, Kleene Star, types of grammar and their equivalent models, Chomsky classification.	6 hrs
Unit-II	Regular languages model: deterministic and non-deterministic finite state machine, regular grammars, minimization of automata, equivalence of deterministic and non-deterministic machine, Melay and Moore model, regular expressions, properties of regular languages.	13hrs
Unit-III	Context Free Grammar, derivation trees, simplification of context free grammar, Chomsky normal form (CNF), Greibach normal form (GNF), pushdown automata (PDA), null store and final state PDA and their equivalence, CFG to PDA , Properties of Context Free Languages.	13hrs
Unit-IV	Turing machines, grammars, recursive and recursively enumerable languages, language acceptability, decidability, halting problem.	8hrs

Internal assessment

Part A	CIA-I:Unit I, II	
	CIA-II: Unit III and IV	

Text Books:

1. K. L. P. Mishra, N. Chadrasekaran, Theory of computer science, Automata, Languages and Computation, PHI.

2. Hofcroft J. E., Ullman J.D., Introduction to Automata Theory, Languages and Computation, Narosa Publishing House.

3. Martin J. C., Introduction to Languages and the Theory of Computation, 2e, Tata McGraw-Hill.

Reference Books:

1. Lewis H. R. and Papadimitriou C. H., Elements of the theory of computation, Pearson Education Asia.

2. Daniel I A Cohen, Introduction to computer Theory, Wiley II Edition.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	1	1					2		2
CO2	3	3	3	1	2				1	2		3
CO3	3	3	3	2	2				1	3		3
CO4	3	3	3	2	2		1		2	3		3

CSE204- Programming Methodology		
Teaching Scheme	**Examination Scheme**	**Credits**
Theory 3 hrs/week	**End of semester Examination: 60 marks**	Theory-3
	Internal assessment: 40 marks	
		Total-3

Course Prerequisite: Data Structures, and an introductory course in Computer Architecture.

Course Objective: To introduce the major programming paradigms, and the principles and techniques involved in design and implementation of modern programming languages. To introduce frameworks for specifying and reasoning about programming languages.

Course Outcomes: On completion this course, students will be able to

CO1: Notions of syntax and semantics of programming languages.
CO2: 2. Data abstractions and control constructs, Heaps.
CO3: Block-structure and scope, principles of abstraction, parameter passing mechanisms.
CO4: objects, classes and inheritance in object-oriented languages.

Course Content:		Total Hrs
Unit -I	Programming language and methodology: definition, history, features, introduction, interoperability of programming languages, software development cycle, criteria for a good programming language, history of programming paradigms and languages, classification of languages, programming environments, issues in language translation.	10 hrs
Unit-II	Elementary and Structured Data Types : Von Neumann Machine, Data structure concepts, abstract concepts in computation, Property of types and objects, data object, variable, constants, Encapsulation, structured data objects and data types, Vectors and Arrays, Lists, Structures, Sets, Files. Type checking, syntax and semantics.	10hrs
Unit-III	Sequence control: Implicit and Explicit sequence control, Sequencing with arithmetic expressions, sequence control between statements. Subprogram sequence control, attribute of data control, Parameter Passing, Exception Handling recursive subprograms.	10hrs
Unit-IV	Storage Management: Static Storage Management, Heap Storage Management, Fixed and Variable size heap storage management, Garbage Collection, Abstract Data type.	10hrs

Internal assessment		
Part A	CIA-I:Unit I, II	
	CIA-II: Unit III and IV	

Text Books:

1. "Programming Languages: Design and Implementations" , Terrance W.Pratt, Marvin V. Zelkowitz, Fourth Edition, Prentice Hall.
2. Introduction to Programming Languages by Arvind K. Bansal. Publisher: Chapman Hall / CRC Press.
3. "Programming Language Design Concept", David A. Watt, Willey India

Reference Books:

1. "Programming languages: Concepts and Constucts", Ravi Sethi, Second Ed.,Pearson.
2. Concepts of Programming Languages, Robert W. Sebesta, 10th Ed.,Pearson

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	2						2	2
CO2	1	2	1	1	1						1	2
CO3	2	2	2	2	2	1					2	2
CO4	2	2	2	2	2	1					1	2

CSE205- Data Structures and Algorithms		
Teaching Scheme	**Examination Scheme**	**Credits**
Theory 3 hrs/week	**End of semester Examination: 60 marks**	Theory-3
	Internal assessment: 40 marks	
		Total-3

Course Prerequisite: Knowledge of basic programming

Course Objective: To impart the basic concepts of data structures and algorithms

Course Outcomes: On completion this course, students will be able to

CO1: Understand the role and applications of data structure in real life
CO2: Develop abstract data types for solving the complex problems
CO3: Understand the concepts of non-linear data structures and applications
CO4: Analyze the efficiency of algorithms

Course Content:		Total Hrs
Unit -I	Pointers,Array, Row major & column major form of arrays, N-dimensional array, Addition, multiplication, Linear linked lists: singly, doubly and circularly connected linear linked lists insertion and deletion. Comparison of arrays and linked lists as data structures.Searching: Sequential and binary search.	10 hrs
Unit-II	Stack, queue, dequeue, circular queue for insertion and deletion with condition for over and underflow, linked implementation of stack, and queue. Hashing, Hash table and operations, Hash functions, open and closed hashing.	10hrs
Unit-III	Non-Linear Structures: Trees , Binary tree: different types of binary trees based on distribution of nodes, binary tree (threaded and unthreaded) as data structure, insertion, deletion and traversal of binary trees, binary search tree, B tree, topological sort.	10hrs
Unit-IV	Complexity analysis, Big/Little 'Oh', Omega, Theta notation, Recurrence equation, sorting algorithm, bubble sort, selection sort, insertion sort, quick sort and merge sort. Overview of divide and conquer, greedy techniques, backtracking.	10hrs

Internal assessment		
Part A	CIA-I:Unit I, II	
	CIA-II: Unit III and IV	

Text Books:

1. An introduction to data structures with applications By Jean-Paul Tremblay, P. G. Sorenson, TMH
2. A. Drozdek, Data Structures and Algorithms in C++, 3rd Edition, Course Technology
3. Data Structures A programming with C, D.S. Kushwaha and A.K. Mishra, PHI, 2014

Reference Books:

1. Data Structures in C & C++, Tanenbaum, PHI
2. S. Sahni, Data Structure Algorithms and Applications in C++, Wiley 2003.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2								2	2
CO2	2	2	2	2	1		1				2	2
CO3	2	2	2	2	2						2	2
CO4	3	3	3	3		1	1	1	1	1	2	2

CSE206- IT Workshop		
Teaching Scheme	**Examination Scheme**	**Credits**
Theory **1 hrs/week**	**End of semester Examination: 60 marks**	Theory-1, Practical-1
Practical 2 hrs/week	**Internal assessment: 40 marks**	
		Total-2

Course Prerequisite:

Course Objective: This is first independent lab course in basic computing tools which intends to introduce knowledge of various computing tools that are being used in Computer Science and Engineering.

Course Outcomes: On completion this course, students will be able to

CO1: Understanding the modern tools and techniques in Designing.
CO2: Understanding the modern tools and techniques for programming.
CO3: Understanding the modern tools and techniques for plotting
CO4: Understanding the modern tools and techniques for technical writing

Course Content:	Total Hrs
Topics include: Basic HTML, Latex, MATLAB, Drawing tools and any other suitable and useful open source tools.	

Internal assessment		
Part A		

Text Books:

Reference Books:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	2	2	2	2					2	2
CO2	2	2	2	2	2	2					2	2
CO3	2	2	2	2	2	2					2	2
CO4	2	2	2	2	2	2					2	2

CSE207- Data Structures and Algorithm Lab		
Teaching Scheme	**Examination Scheme**	**Credits**
Practical 2 hrs/week	**End of semester Examination: 60 marks**	**Practical-1**
	Internal assessment: 40 marks	
		Total-1

Course Prerequisite: Knowledge of basic programming

Course Objective: To impart the basic concepts of data structures and algorithms

Course Outcomes: On completion this course, students will be able to

CO1: Understand the role and applications of data structure in real life
CO2: Develop abstract data types for solving the complex problems
CO3: Understand the concepts of non-linear data structures and applications
CO4: Analyze the efficiency of algorithms

List of Experiments	Total Hrs

1. WAP to implement Arrays.
2. WAP to implement 2D Arrays.
3. WAP to apply various searching algorithms.
4. WAP to implement Stack.
5. WAP to implement Queues.
6. WAP to implement insertion and deletion in circular queue.
7. WAP to implement linked list: singly, doubly and circular.
8. WAP to implement Binary Search Tree using array.
9. WAP to implement Heap.
10. WAP to implement bubble sort, selection sort, insertion sort.
11. WAP to implement quick sort, merge sort

Internal assessment		
Part A	CIA-1- Exp 1-6	
	CIA-II: Exp 7-11	

Text Books:

1. An introduction to data structures with applications By Jean-Paul Tremblay, P. G. Sorenson, TMH
2. A. Drozdek, Data Structures and Algorithms in C++, 3rd Edition, Course Technology
3. Data Structures A programming with C, D.S. Kushwaha and A.K. Mishra, PHI, 2014

Reference Books:

1. Data Structures in C & C++, Tanenbaum, PHI
2. S. Sahni, Data Structure Algorithms and Applications in C++, Wiley 2003.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	2								2	2
CO2	2	2	2	2	1		1				2	2
CO3	2	2	2	2	2						2	2
CO4	3	3	3	3		1	1	1	1	1	2	2

CSE208- Principles and Practices of Management		
Teaching Scheme	**Examination Scheme**	**Credits**
Theory 3 hrs/week	**End of semester Examination: 60 marks**	Theory-3
	Internal assessment: 40 marks	
		Total-3

Course Prerequisite:

Course Objective: The purpose of this course is to familiarize engineering students with the various concepts and functions of management so as to enhance their managerial knowledge and skills for better decision making.

Course Outcomes: On completion this course, students will be able to

CO1: Learn the principles of management in general and its implications on business organizations.

CO2: Outline the steps of the decision-making process

CO3: Understand organizational structures and significance of human resource planning

CO4: Evaluate the need for management in different facets such as financial, marketing, supply chain, etc. in order to justify the need of planning across organization's levels and operations

Course Content:		Total Hrs
Unit -I	Approaches and Functions of Management: Overview and Definition of Management, Managerial Roles and Skills; Evolution of Management Thoughts: Scientific Management, Administrative Approach, Behavioral Approach, Systems Approach, Contingency Approach; Management Functions: Planning, Organizing, Controlling, Decision Making.	10 hrs
Unit-II	Human Resource Management: Introduction to Human Resource Management: Human Resource Planning (HRP), Recruitment, Selection, Training and Development, Compensation and Benefit, Performance Appraisal, Ethics in Human Resource Management.	10hrs
Unit-III	Financial Management: Financial Statement Analysis: Ratio Analysis and Cash Flow Statement, Introduction to Financial Management: Capital Structure Decisions, Working Capital Decisions, Performance Management: Balanced Scorecard and Economic Value Added (EVA), Ethics in Financial Management.	10hrs

Unit-IV	Marketing Management: Concepts of Marketing, Marketing Mix, Marketing Research and Survey, Market Segmentation, Targeting and Positioning, Product Life Cycle (PLC), New Product Development, Branding and Packaging, Pricing Policy, Distribution Channels, Supply Chain Management, Ethics in Marketing Management	10hrs

Internal assessment		
Part A	CIA-I:Unit I, II	
	CIA-II: Unit III and IV	

Text Books:

1. Management - principles & applications - Ricky.W. Griffin, 3rd Indian 2009, Cengage Learning.
2. Human Resource Management - Snell & Bohlander, 5th Indian Reprint, 2009, Cengage Learning.
3. Personnel & Human Resource Management - P. Subha Rao, 4th Revised Edition, Himalaya Publishing House.

Reference Books:

1. Financial Management - Theory, Concepts and problems - R.P. Rustagi, 3rd Edition, Galgotia.
2. Marketing Management - Philip Kotler, PHP, 2009
3. Marketing Management - Ranjan Saxena, 3rd Edition, Tata McGraw-Hill

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	1	1	1		2	2	2	2		3	3
CO2	1	1	1	1		2	2	2	2	1	3	3
CO3	1	1	1	1		2	2	2	2	2	2	2
CO4	1	1	1	1				2	2	2	2	2

CSE209- Design and Analysis of Algorithms		
Teaching Scheme	**Examination Scheme**	**Credits**
Theory 3 hrs/week	**End of semester Examination: 60 marks**	Theory-3
	Internal assessment: 40 marks	
		Total-3

Course Prerequisite: Students should have basic knowledge of Data structures

Course Objective: The main objective of this course is to understand the concept of problem solving using algorithm, and understand the proof of correctness and running time of the algorithms for the classic problems in various domains.

Course Outcomes: On completion this course, students will be able to

CO1: To develop algorithms for various problems.
CO2: To develop concepts, logics towards solving an unknown problem in IT and research.
CO3: To translate the algorithms to programs & execution.
CO4: To explain what competitive analysis is and which situations it is applied to perform competitive analysis.

Course Content:	Total Hrs

Unit -I	Algorithms Complexity, Concept, Notations, Classification, Recurrence Relation and its solution, Asymptotic notations: Big-Oh, theta, Omega, little 'o', little 'omega', determination of time and space complexity, Representing asymptotic notations for functions.	6 hrs
Unit-II	Divide and Conquer: Binary Search, Strassen's matrix multiplication algorithms. Master method. Greedy methods and Dynamic Programming: Knapsack Problem, Optimal Merge Patterns, Minimal Spanning Trees, Matrix Chain Multiplication.	14 hrs
Unit-III	Graph problem: Single-Source Shortest Paths, All-Pairs Shortest Paths, Backtracking, N-Queen problem, Branch-and Bound Technique, Travelling salesperson problem, String Matching: Naive, KMP and Rabin Karp string matching algorithm.	14 hrs
Unit-IV	Definitions of P, NP, NP-Hard and NP-Complete Problems, Decision Problems, optimization problems, NP-completeness and reducibility, Proving NP-Complete Problems, Satisfiability problem.	6 hrs

Internal assessment		
Part A	CIA-I:Unit I, II	
	CIA-II: Unit III and IV	

Text Books:

1. T. Cormen, C. Leiserson, R. Rivest. Introduction to Algorithms, Indian Reprint, PHI

2. H. M. Pandey. Design Analysis and Algorithms. University Science Press.
3. S. Sahani, E. Horowitz, S. Rajasekaran, Computer Algorithms.

Reference Books:

1. V. Aho, J. Hopcraft, J. Ulmann. The Design and analysis of computer Algorithms. Addison Wesley
2. S. Basse, A. V. Gelder, Computer Algorithms: Introduction to design and Analysis, 3rd., Pearson Education Asia Pvt. Ltd.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	3	1	2	2		3		2	3
CO2	3	3	3	3	2	3	2		3		2	3
CO3	3	3	3	3	2	3	2		3		3	3
CO4	3	3	3	3	2	3	2		3		3	3

CSE210- Operating Systems		
Teaching Scheme	**Examination Scheme**	**Credits**
Theory 3 hrs/week	**End of semester Examination: 60 marks**	Theory-3
	Internal assessment: 40 marks	
		Total-3

Course Prerequisite: Introduction to Programming and Data structure

Course Objective:

The main objective of this course is to help the students to understand the ingredients of an operating system and its relation with computer system, hardware components and design aspects and learn and implement the concepts such as IPC, scheduling, synchronization, file and memory management, and device management.

Course Outcomes: On completion this course, students will be able to

CO1: At the end of this course, students should be able to understand the fundamentals of operating systems and topics such as cpu scheduling, resource allocation, fault tolerance and caching issues.

CO2: With the help of a strong practical lab component, students should be able to understand the implementation and programming of any one or two operating systems.

CO3: Students will understand the advanced concepts related to performance and security issues of operating systems.

CO4: Students will be able to develop design thinking of software systems in relation to underlying operating systems.

Course Content:		Total Hrs
Unit -I	Introduction and history of operating systems, Structure and operations; processes and files, inter process communication, mutual exclusion, semaphores, wait and signal procedures, process scheduling algorithms, critical sections, threads, multithreading	10 hrs
Unit-II	Memory management: memory allocation, virtual memory, paging, page table structure, demand paging, page replacement policies, thrashing, segmentation.	10hrs
Unit-III	Deadlock detection, deadlock avoidance, deadlock prevention algorithm, IO devices and their characteristics, device drivers, disk scheduling algorithms.	10hrs
Unit-IV	File management, types and structures, directory structure, case studies, Operating System Security: Access Control, Virtualization, sandboxing.	10hrs

Internal assessment

Part A	CIA-I:Unit I, II	
	CIA-II: Unit III and IV	

Text Books:

1. Silberschatz, Galvin and Gagne, Operating Systems Concepts, Wiley

2. Modern Operating Systems by Andrew S. Tanenbaum

3. William Stallings, Operating Systems: Internals and Design Principles, Pearson Education

Reference Books:

1. **Maurice J. Bach, The Design of the UNIX Operating System**
2. **Kaiwan N Billimoria, Linux Kernel Programming: A comprehensive guide to kernel internals, writing kernel modules, and kernel synchronization**

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2		2		2				2		1	

CO2	2		2		2				2		1	
CO3	2		2		2				2		1	
CO4	2		2		2				2		1	

CSE211- Object Oriented Programming		
Teaching Scheme	**Examination Scheme**	**Credits**
Theory 3 hrs/week	**End of semester Examination: 60 marks**	Theory-3
	Internal assessment: 40 marks	
		Total-3

Course Prerequisite: Basic understanding of computer programming and knowledge of programming in C/C++.

Course Objective: To equip students with basic of object oriented programming

Course Outcomes: On completion this course, students will be able to

CO1: Understand basics of object oriented programming concepts.
CO2: Apply features of OOP in real life application development.
CO3: Develop user interface for software applications
CO4: Analyze web application development process

Course Content:		Total Hrs
Unit -I	Object Oriented Thinking : A way of Viewing the World, Computation as Simulation, Messages and Methods; - A Brief History Of Object - Oriented Programming - The History of Java, The White Paper Description; – Object - Oriented Design - Responsibility Implies Non interference, Programming in the Small and in the Large, Components and Behavior, Software Components, Formalizing the Interface.	10 hrs
Unit-II	Understanding Inheritance: An Intuitive Description of Inheritance, the Base Class Object, Subclass, Subtype, and Substitutability – Forms of Inheritance, Modifiers and Inheritance, the Benefits of Inheritance, The Costs of Inheritance. Polymorphism: Polymorphism, Polymorphic Variables, Overloading, Overriding, Abstract Methods, Pure Polymorphism, efficiency & Polymorphism.	10hrs
Unit-III	The AWT: The AWT Class Hierarchy, the Layout Manager, User Interface Components, Panels, Dialogs, The Menu Bar. Input And Output Streams: Streams versus Readers and Writers, Input Streams, Output Streams, Object Serialization, Piped Input and Output.	10hrs
Unit-IV	Web Programming: servlets and HTML, Security Issues, JSP and Applications, Web server.	10hrs

Internal assessment		
Part A	CIA-I:Unit I, II	
	CIA-II: Unit III and IV	

Text Books:

1. Timothy Budd, Object Oriented Programming with JAVA, Updated Edition, Pearson Education, 2009.
2. Herbert Schildt, Java 2 Complete Reference, TMH, 2010.

Reference Books:

1. Timothy Budd, Object Oriented Programming with JAVA, Updated Edition, Pearson Education, 2009.
2. Herbert Schildt, Java 2 Complete Reference, TMH, 2010.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	2	1					2	2
CO2	2	2	2	2	2	1					3	3
CO3	2	2	2	2	2	1					3	3
CO4	2	2	2	2	2	2					2	2

CSE212- Digital Systems Design

Teaching Scheme	Examination Scheme	Credits
Theory 3 hrs/week	**End of semester Examination: 60 marks**	Theory-3
	Internal assessment: 40 marks	
		Total-3

Course Prerequisite: Students should have basic knowledge on Basic Electronics, and Electronic devices and circuits.

Course Objective: To acquaint the students with the fundamental principles of two-valued logic and various devices used to implement logical operations on variables. To lay the foundation for further studies in areas such as VLSI, computer, microprocessor etc.

Course Outcomes: On completion this course, students will be able to

CO1: Use the basic logic gates and various reduction techniques of digital logic circuit in detail
CO2: Design combinational and sequential circuits.
CO3: Design and implement hardware circuit to test performance and application
CO4: Understand the basic operation of memory devices.

Course Content:		Total Hrs
Unit -I	Combinational Logic Design: Review of Boolean algebra and DeMorgan's theorem, Standard representations of logic functions, k map representation (upto 6 variables) of logic functions (SOP and POS forms), minimization of logical functions for min-terms and max-terms, don't care conditions, Design Examples: Arithmetic Circuits, BCD - to – 7 segment decoder, Code converters. Adders and subtractor, ALU, Digital Comparator, Parity generators/checkers, Multiplexers and their use in combinational logic designs, multiplexer trees, De-multiplexers and their use in combinational logic designs, Decoders, demultiplexer trees.	10 hrs

Unit-II	Sequential Logic Design and VHDL basic: Flip flop basics, Building blocks of SR, JK, MS J-K flip flop, D and T flip-flops. Use of preset and clear terminals, Excitation Table for flip flops, Conversion of flip flops. Application of Flip flops: Registers, Shift registers, Synchronous and ripple Counters (ring counters, twisted ring counters), Sequence Generators, up/down counters, Clock Skew, Clock jitter, Effect on synchronous designs; Design entry: Schematic, FSM & HDL, different modeling styles in VHDL, Data types and objects, Dataflow, Behavioral and Structural Modeling, Synthesis and Simulation VHDL constructs and codes for combinational and sequential circuits.	10hrs
Unit-III	Logic Families Classification of logic families, Characteristics of digital ICs-Speed of operation, power dissipation, figure of merit, fan in, fan out, current and voltage parameters, noise immunity, operating temperatures and power supply requirements; TTL logic: Operation of TTL NAND gate, active pull up, wired AND, open collector output, unconnected inputs; Tri-State logic. CMOS logic – CMOS inverter, NAND, NOR gates, unconnected inputs, wired logic, open drain output. Interfacing CMOS and TTL; Comparison table of Characteristics of TTL, CMOS, ECL, RTL, I2L, DCTL.	10hrs
Unit-IV	Programmable Logic Devices and Semiconductor Memories Programmable logic devices: Detail architecture, Study of PROM, PAL, PLA, Designing combinational circuits using PLDs. General Architecture of FPGA and CPLD Semiconductor memories: memory organization and operation, expanding memory size, Classification and characteristics of memories, RAM, ROM, EPROM, EEPROM, NVRAM, SRAM, DRAM.	10hrs

Internal assessment		
Part A	CIA-I:Unit I, II	
	CIA-II: Unit III and IV	

Text Books:

1. R.P. Jain, “Modern digital electronics”, 3rd edition, 12threprint Tata McGraw Hill Publication, 2007.
2. M. Morris Mano, “Digital Logic and Computer Design” 4th edition, Prentice Hall of India, 2013.
3. P. Albert Malvino and A. Jerrald Brown, “Digital Computer Electronics” Glencore Publishers.
4. R. J. Tocci, N. S. Widmer and G. L. Moss, “Digital Systems, Principles and Applications”, Pearson Publishers.

Reference Books:

1. W.H. Gothmann, “Digital Electronics- An introduction to theory and practice”, PHI, 2nd edition, 2006.
2. A. Kumar, “Fundamentals of digital circuits” 1st edition, Prentice Hall of India, 2001.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	3	2	1	1	3	2	2	2	2	2	3
CO2	2	2	1	1	2	2	1	2	2	2	2	2
CO3	1	2	1	1	2	1	1	2	3	2	1	2

CO4	2	2	3	2	2	1	3	3	1	1	2	2

CSE213- Operating Systems Lab		
Teaching Scheme	**Examination Scheme**	**Credits**
Practical 2 hrs/week	**End of semester Examination: 60 marks**	**Practical-1**
	Internal assessment: 40 marks	
		Total-1
Course Prerequisite:		
Course Objective: To impart the practical understanding of operating system primitives and design goals.		
Course Outcomes: On completion this course, students will be able to		
CO1: At the end of this lab course, students should be able to understand the fundamentals of operating systems design. **CO2:** Students should be able to understand the implementation and programming of any one or two operating systems. **CO3:** Students will understand the advanced concepts related to performance and security issues of operating systems. **CO4:** Students will be able to develop design thinking of software systems in relation with underlying operating systems.		
Course Content: Representative list of experiments include		Total Hrs
1. OS installation, commands 2. Shell programming constructs. 3. Process creation, cycle and termination using fork(), exec(), wait(), and exit(). 4. CPU scheduling algorithms. 5. Interprocess Communication using pipe, fifo and signals. 6. Semaphore and mutexes. 7. Thread creation and termination. 8. File management and related system calls. 9. Memory management and related system calls. 10. Advanced concepts related to devices.		
Internal assessment		
Part A	CIA-I:Experiment 1-5	
	CIA-II: Experiment 6-10	

Text Books:

1. Love, Robert. Linux system programming: talking directly to the kernel and C library. " O'Reilly Media, Inc.", 2013.
2. Stevens, W. Richard, Stephen A. Rago, and Dennis M. Ritchie. Advanced programming in the UNIX environment. Vol. 4. New York.: Addison-Wesley, 1992.
3. Das, Sumitabha. Your UNIX/Linux: The Ultimate Guide. McGraw-Hill, 2013.

Reference Books:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2		2		2				2		1	
CO2	2		2		2				2		1	
CO3	2		2		2				2		1	
CO4	2		2		2				2		1	

CSE214- OOP Lab		
Teaching Scheme	**Examination Scheme**	**Credits**
Practical 2 hrs/week	**End of semester Examination: 60 marks**	**Practical-1**
	Internal assessment: 40 marks	
		Total-1

Course Prerequisite: Basic understanding of computer programming and knowledge of programming in C/C++.

Course Objective: To equip students with basic of object oriented programming

Course Outcomes: On completion this course, students will be able to

CO1: Understand basics of object oriented programming concepts.
CO2: Apply features of OOP in real life application development.
CO3: Develop user interface for software applications
CO4: Analyze web application development process

List of Experiments	Total Hrs
The lab course consists of practicing and implementing concepts learned in OOPs theory course and writing programs in Java for: 1. Creation of Classes & Objects. 2. Usage of interfaces. 3. Implementing inheritance. 4. Implementing Multilevel & Multiple inheritances 5. Implementing Polymorphism. 6. Implementing Packages. 7. Implementing AWT. 8. Implementing I/O streams 9. Implementing Applets.	

Internal assessment		
Part A	CIA-I:Unit I, II	
	CIA-II: Unit III and IV	

Text Books:

1. Timothy Budd , Object Oriented Programming with JAVA, Updated Edition, Pearson Education, 2009.
2. Herbert Schildt, Java 2 Complete Reference, TMH, 2010

Reference Books:

1. Timothy Budd , Object Oriented Programming with JAVA, Updated Edition, Pearson Education, 2009.
2. Herbert Schildt, Java 2 Complete Reference, TMH, 2010

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	2	2	2	1					2	2
CO2	2	2	2	2	2	1					3	3
CO3	2	2	2	2	2	1					3	3
CO4	2	2	2	2	2	2					2	2

CSE215- Digital Systems Design Lab		
Teaching Scheme	**Examination Scheme**	**Credits**
Practical 2 hrs/week	**End of semester Examination: 60 marks**	**Practical-1**
	Internal assessment: 40 marks	
		Total-1

Course Prerequisite: :Knowledge of fundamental conceptsof basic electrical and electronics technology.

Course Objective:

Course Outcomes: On completion this course, students will be able to

CO1: Learn basics of logics gates.
CO2: Construct basic combinational circuits and verify their functionalities.
CO3: Learn the designing of various sequential circuits
CO4: CO4: Construct various digital circuits and their operations.

Course Content:	Total Hrs

1) Study of switches using discrete components a)Diode as a Switch b)Transistor as a switch
2) Verify four voltage and current parameters for TTL and CMOS (IC 74LSXX, 74HCXX), (Refer Data-Sheet).
3) Study of Universal Gates (NAND Gate and NOR Gate) and Implementation of a function using universal gate
4) Verification of Demorgan's Law using TTL IC
5) Study of IC-74LS153 as a Multiplexer. (Refer Data-Sheet).
   - Design and Implement 8:1 MUX using IC-74LS153 & Verify its Truth Table.
   - Design & Implement the given 4 variable function using IC74LS153. Verify its Truth-Table.
6) Study of IC-74LS138 as a Demultiplexer/ Decoder (Test benches and FSM excluded)
   - Design and Implement full adder and subtractor function using IC-74LS138.
   - Design & Implement 3-bit code converter using IC-74LS138.(Gray to Binary/Binary to Gray)
7) Study of IC-74LS83 as a BCD adder,(Refer Data-Sheet).
   - Design and Implement 1 digit BCD adder using IC-74LS83
   - Design and Implement 4-bit Binary subtractor using IC-74LS83.
8) Study of IC-74LS85 as a magnitude comparator,(Refer Data-Sheet)
   - Design and Implement 4-bit Comparator.
   - Design and Implement 8-bit Comparator
9) Study of encoders and 7 segment converter
10) Study of Counter ICs (74LS90/74LS93). (Refer Data-Sheet
    - Design and Implement MOD-N and divide by N counter using IC-74LS90 and draw Timing Diagram.
    - Design and Implement MOD-N and divide by N counter using IC-74LS93 and draw Timing Diagram.
11) Study of synchronous counter
    - Design & Implement 4-bit Up/down Counter and MOD-N Up/down Counter using IC-74HC191/IC74HC193. Draw Timing Diagram
12) Study of Shift Register (74HC194/74LS95)
    - Design and Implement Pulse train generator using IC-74HC194/IC74LS95 (Use right shift/left shift).
    - Design and Implement 4-bit Ring Counter/ Twisted ring counter using shift registers IC 74HC194/IC74LS95.
13) Study of Flipflop: RS Flip-Flop, D Flip-Flop, JK Flip-Flop, T Flip-Flop and Master-Slave Flip-Flop.

Internal assessment		
Part A	CIA-I: First 4 Experiments	
	CIA-II: First 6 Experiments	

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**

CO1	2	3	2	1	1	3	2	2	2	2	2	3
CO2	2	2	1	1	2	2	1	2	2	2	2	2
CO3	1	2	1	1	2	1	1	2	3	2	1	2
CO4	2	2	3	2	2	1	3	3	1	1	2	2

CSE216- Design and Analysis of Algorithms Lab		
Teaching Scheme	**Examination Scheme**	**Credits**
Practical 2 hrs/week	**End of semester Examination: 60 marks**	**Practical-1**
	Internal assessment: 40 marks	
		Total-1
Course Prerequisite: Knowledge of basic programming		
Course Objective: To impart the basic concepts of algorithms.		
Course Outcomes: On completion this course, students will be able to		
CO1: Understand the role and applications of algorithms. **CO2:** Develop new algorithms for solving the complex problems **CO3:** Understand the concepts advanced algorithms and its applications **CO4:** Analyze the efficiency of algorithms		
Course Content:		Total Hrs

	1. Write a program for Linear Search and Binary Search. 2. Write a program to implement various sorting algorithms. 3. Write a program for linear sorting algorithm. 4. Write a program to implement Master's Method by following relation: $T(n) = a*T(n/b) + n^k \log n$ 5. Write a program for multiplication of two matrix of dimension 2x2 by Strassen's Matrix Multiplication Method. 6. Write a program for fractional knapsack problem by Greedy Method. 7. Write a program for optical merge pattern. 8. Write a program to compare optimal solution and feasible solutions. (when objects are arranged in increasing order of profit, or objects are arranged in non-increasing order of weight) using greedy approach for fractional knapsack problem. 9. Write a program for Matrix Chain Multiplication. 10. Write a program for all pair shortest algorithm. 11. Write a program for reduce cost matrix by lower bound method. 12. Write a program for Brute force test (String Matching). 13. Write a program for Rabin Karp pattern matching. 14. Write a program for KMP Method (String Matching).	10 hrs

Internal assessment		
Part A	CIA-I: Exp 1 - 6	
	CIA-II: Exp 7- 14	

Text Books:

1. T. Cormen, C. Leiserson, R. Rivest. Introduction to Algorithms, Indian Reprint, PHI

2. H. M. Pandey. Design Analysis and Algorithms. University Science Press.
3. S. Sahani, E. Horowitz, S. Rajasekaran, Computer Algorithms.

Reference Books:

1. V. Aho, J. Hopcraft, J. Ulmann. The Design and analysis of computer Algorithms. Addison Wesley

2. S. Basse, A. V. Gelder, Computer Algorithms: Introduction to design and Analysis, 3rd., Pearson Education Asia Pvt. Ltd.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	1	2	2		3		2	3
CO2	3	3	3	3	2	3	2		3		2	3
CO3	3	3	3	3	2	3	2		3		3	3
CO4	3	3	3	3	2	3	2		3		3	3

Third Year

CSE301- Environmental Studies		
Teaching Scheme	**Examination Scheme**	**Credits**
Theory 3 hrs/week	**End of semester Examination: 60 marks**	Theory-3
	Internal assessment: 40 marks	
		Total-3
Syllabus will be provided by respective department		

CSE302- Computer Networks		
Teaching Scheme	**Examination Scheme**	**Credits**
Theory 3 hrs/week	**End of semester Examination: 60 marks**	Theory-3
	Internal assessment: 40 marks	
		Total-3
Course Prerequisite: Introduction to programming		
Course Objective: To impart the concepts related to the implementation of computer networks; architecture, protocol layers, inter-networking and addressing; network application development.		
Course Outcomes: On completion this course, students will be able to		
CO1: Identify the components required to build different types of networks **CO2: Choose the required functionality at each layer for given application** **CO3: Identify solution for each functionality at each layer** **CO4: Enterprise level network design and implementation**		
Course Content:		Total Hrs

Unit -I	Goals and applications of networks, Categories of networks, Organization of the Internet, ISP, Network structure and architecture (layering principles, services, protocols and standards), The OSI reference model, TCP/IP protocol suite, Network devices and components. Physical Layer: Network topology design, Types of connections, Transmission media, Signal transmission and encoding.	10 hrs
Unit-II	Link layer: Framing, Error Detection and Correction, Flow control (Elementary Data Link Protocols, Sliding Window protocols). Medium Access Control and Local Area Networks. Network Layer: Point-to-point networks, Logical addressing, Basic internetworking (IP, CIDR, ARP, RARP, DHCP, ICMP), Routing, forwarding and delivery, Static and dynamic routing, Routing algorithms and protocols, Congestion control algorithms, IPv6.	10hrs
Unit-III	Transport Layer: Process-to-process delivery, Transport layer protocols (UDP and TCP), Multiplexing, Connection management, Flow control and retransmission, Window management, TCP Congestion control, Quality of service.	10hrs
Unit-IV	Application Layer: Domain Name System, World Wide Web and Hyper Text Transfer Protocol, Electronic mail, File Transfer Protocol, Remote login, Network management, Data compression, Cryptography – basic concepts.	10hrs

Internal assessment		
Part A	CIA-I:Unit I, II	
	CIA-II: Unit III and IV	

Text Books:

1. **Andrew Tanenbaum "Computer Networks", Prentice Hall.**
2. **William Stallings, "Data and Computer Communication", Pearson.**
3. **Kurose and Ross, "Computer Networking- A Top-Down Approach", Pearson.**

Reference Books: 1. Data Communications and Networking by Behrouz A. Forouzan, McGraw Hill Education; Fifth edition

2. Data and Computer Communications by Stallings William, Pearson Eduction.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	1	2		2	1			1		2	
CO2	2	1	2		2	1			1		2	
CO3	2	1	2		2	1			1		2	
CO4	2	1	2		2	1			1		2	

CSE303- Compiler Design		
Teaching Scheme	**Examination Scheme**	**Credits**
Theory 3 hrs/week	**End of semester Examination: 60 marks**	Theory-3
	Internal assessment: 40 marks	
		Total-3

Course Prerequisite: Students should have basic knowledge of theory of automaton.

Course Objective: The objective of this course is to understand the basic principles of compiler design, its various constituent parts, algorithms and data structures required to be used in the compiler.

Course Outcomes: On completion this course, students will be able to

CO1: Acquire knowledge of different phases and passes of the compiler and parser.
CO2: Understand different parsers design without automated tools.
CO3: Implement the compiler using syntax-directed translation methods.
CO4: Acquire knowledge about run time data structure like symbol table organization and different techniques used in that.

Course Content:		Total Hrs
Unit -I	Phases and passes, Bootstrapping, Finite state machines and regular expressions and their applications to lexical analysis, lexical-analyzer generator, LEX compiler, Formal grammars and their application to syntax analysis, ambiguity, YACC, Context free grammars, derivation and parse trees.	10 hrs
Unit-II	Parsers, Shift reduce parsing, operator precedence parsing, top down parsing, predictive parsers constructing SLR parsing tables, constructing Canonical LR parsing tables, Constructing LALR parsing tables, an automatic parser generator.	10hrs
Unit-III	Syntax-directed Translation, translation of assignment statements, Boolean expressions, postfix translation, translation with a top down parser, Data structure for symbols tables, implementation of simple stack allocation scheme, storage allocation in block structured language.	10hrs
Unit-IV	Error Detection & Recovery, Lexical Phase errors, syntactic phase errors, semantic errors, Code Generation, Code optimization: Machine-Independent Optimizations, Loop optimization, DAG representation of basic blocks.	10hrs

Internal assessment		
Part A	CIA-I:Unit I, II	
	CIA-II: Unit III and IV	

Text Books:

1. Aho, Sethi & Ullman, "Compilers: Principles, Techniques and Tools", Pearson Education.
2. D. M.Dhamdhare, System Programming and Operating Systems,Tata McGraw Hill & Company.
3. K. Muneeswaran, Compiler Design, First Edition, Oxford University Press.
4. J.P. Bennet, "Introduction to Compiler Techniques", Second Edition, McGraw-Hill.

Reference Books:

1. Kenneth C. Louden, Compiler Construction – Principles and Practice, Cengage Learning Indian Edition.

2. Tremblay and Sorenson, The Theory and Practice of Compiler Writing, Tata McGraw Hill & Company.

3. J.P. Tremblay and P.G. Sorrenson, "The Theory and Practice of Compiler Writing", McGraw Hill.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	3	2	2				1		1	3
CO2	1	2	3	2	3				1		1	3
CO3	1	2	3	2	3				1		1	3
CO4	1	2	3	2	3				1		1	3

CSE304- Computer Graphics		
Teaching Scheme	**Examination Scheme**	**Credits**
Theory 3 hrs/week	**End of semester Examination: 60 marks**	Theory-3
	Internal assessment: 40 marks	
		Total-3

Course Prerequisite: Students should have knowledge of computer fundamentals.

Course Objective: The objective of this course is to learn the concepts of various computer graphics techniques and applications by involving the design, development, and solutions to a broad variety of problems found in entertainment, sciences, and engineering.

Course Outcomes: On completion this course, students will be able to

CO1: Understand basic elements of computer graphics.
CO2: Apply various algorithms of computer graphics for real world problems.
CO3: Analyze various transformation algorithms.
CO4: Understand the designing and implementing practical graphic solutions to challenging problems in different application domains.

Course Content:		Total Hrs
Unit -I	Basic of Computer Graphics, Applications of computer graphics, Display devices, Random and Raster scan systems, Graphics input devices, Graphics software and standards.	10 hrs
Unit-II	Graphics Primitives, Points, lines, circles and ellipses, scan conversion algorithms, Fill area primitives including scan-line polygon filling, inside-outside test, boundary and flood-fill, character generation, line attributes, area-fill attributes, character attributes.	10hrs
Unit-III	Two Dimensional Graphics, Transformations (translation, rotation, scaling), matrix representation, composite transformations, reflection and shearing, viewing pipeline and coordinates system, window-to-viewport transformation, point clipping, line clipping, polygon clipping.	10hrs

Unit-IV	3D display methods, polygon surfaces, curved lines and surfaces, spline representation, Bezier curves and surfaces, B-spline curves and surfaces. Introduction to parallel and perspective transformation. Introduction to Colors models and computer animation.	10hrs

Internal assessment		
Part A	CIA-I:Unit I, II	
	CIA-II: Unit III and IV	

Text Books:

1. Computer Graphics C Version, D. Hearn And P. Baker, Pearson Education
2. Computer Graphics, Foley and van Dam, Person Education
3. Computer Graphics for Scientists and Engineers – By Asthana and Sinha

Reference Books:

1. C Graphics & Projects – By B M Havaldar.
2. Principles of Interactive Computer Graphics – By Newman & Sproull.
3. Animation for Beginners, Lisa Lee

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	2	2	2	2				2	2		1
CO2	1	2	2	2	3				2	2		1
CO3	1	2	2	2	3				2	3		1
CO4	1	2	2	2	3				2	3		1

CSE305- Database Management Systems		
Teaching Scheme	**Examination Scheme**	**Credits**
Theory 3 hrs/week	**End of semester Examination: 60 marks**	Theory-3
	Internal assessment: 40 marks	
		Total-3

Course Prerequisite: Data Structure and Operating Systems

Course Objective: This course will give principles and practical solutions for the storage and retrieval of information using a computer system, particularly for large quantities of data, emphasizing relational database management systems.

Course Outcomes: On completion this course, students will be able to

CO1: Understand the Basic concepts of database management systems and design
CO2: Construct conceptual models of a database using ER modelling for real time applications
CO3: Apply the relational data model concepts, SQL concepts and some mathematical concepts used in DBMS.
CO4: Understand the concepts of Normalization, Transactions, recovery Techniques and concurrency

Course Content:	Total Hrs

Unit -I	Overview, Database System vs. File System, Database System Concept, Database Languages, Data Modeling Using the Entity-Relationship Model, ER Model Concepts, Notation for ER Diagram, Mapping Constraints, Keys.	10 hrs
Unit-II	Overview of Data Design Entities, Attributes and Entity Sets, Relationship and Relationship Sets, Participation Constraints, Weak Entities, Generalization, Aggregation, Reduction of an ER Diagrams to Tables.	10hrs
Unit-III	Relational Data Model Concepts, Integrity Constraints, Entity Integrity, Referential Integrity, Keys Constraints, Domain Constraints, Relational Algebra, Relational Calculus, Structured Query Language (SQL).	10hrs
Unit-IV	Functional dependencies, normal forms, first, second, and third normal forms, BCNF, Transaction Processing: ACID Properties, Concurrency Control, and Recovery.	10hrs

Internal assessment		
Part A	CIA-I:Unit I, II	
	CIA-II: Unit III and IV	

Text Books:

1. Korth, Silbertz, Sudarshan," Database Concepts", McGraw Hill
2. Date C J, "An Introduction to Database Systems", Addision Wesley
3. Elmasri, Navathe, "Fundamentals of Database Systems", Addision Wesley
4. O'Neil, Databases, Elsevier Pub.
5. RAMAKRISHNAN"Database Management Systems",McGraw Hill

Reference Books:

1. Korth, Silbertz, Sudarshan," Database Concepts", McGraw Hill
2. Date C J, "An Introduction to Database Systems", Addision Wesley
3. Elmasri, Navathe, "Fundamentals of Database Systems", Addision Wesley
4. O'Neil, Databases, Elsevier Pub.
5. RAMAKRISHNAN"Database Management Systems",McGraw Hill

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1											1
CO2	2	2	1	1	1						1	2
CO3	2	2	2	2	2						2	2
CO4	2	1	2	2							2	2

CSE306- Computer Networks Lab		
Teaching Scheme	**Examination Scheme**	**Credits**
Practical 2 hrs/week	**End of semester Examination: 60 marks**	**Practical-1**
	Internal assessment: 40 marks	
		Total-1
Course Prerequisite: Introduction to programming		
Course Objective: To understand the practical and design aspects of computer networks.		

Course Outcomes: On completion this course, students will be able to

CO1: To understand the practical aspects of computer networking.
CO2: To practically understand the basic commands of computer networking and their options.
CO3: To identify devices and protocols incolved in the design of computer networks.
CO4: To learn to implement socket programming primitives.

Course Content: Representative lab experiments include	Total Hrs

1. To learn handling and configuration of networking hardware like RJ-45 connector, CAT-6 cable, crimping tool, etc.

2. Configuration of NIC Card

3. Configuration of router, hub, switch etc. (using real devices or simulators)

4. Networking Commands amd IP addressing

5. Running and using services/commands like ping, trace route, nslookup, arp, telnet, ftp, etc.

6. Network packet analysis using tools like Wireshark, tcpdump, etc.

7. Address Resolution Protocol.

8. Static Routing.

9. Domain Name Service.

10. Socket programming using UDP and TCP (e.g., simple DNS, data & time client/server, echo client/server, iterative & concurrent servers)

Internal assessment		
Part A	CIA-I:Unit I, II	
	CIA-II: Unit III and IV	

Text Books: 1. W. Richard Stevens, Unix Network Programming, Prentice Hall
2. Network Analysis Using Wireshark 2 Cookbook: Practical Recipes to Analyze and Secure Your Network Using Wireshark 2, 2nd Edition Book by Nagendra Kumar, Yogesh Ramdoss, and Yoram Orzach

Reference Books:

1. Ciubotaru, Bogdan, and Gabriel-Miro Muntean. Advanced Network Programming–Principles and Techniques: Network Application Programming with Java. Springer Science & Business Media, 2013.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	1	2		2	1			1		2	
CO2	2	1	2		2	1			1		2	
CO3	2	1	2		2	1			1		2	
CO4	2	1	2		2	1			1		2	

CSE307- Computer Graphics Lab		
Teaching Scheme	**Examination Scheme**	**Credits**
Practical 2 hrs/week	**End of semester Examination: 60 marks**	**Practical-1**
	Internal assessment: 40 marks	
		Total-1

Course Prerequisite: Students should have knowledge of computer fundamentals.

Course Objective: The objective of this course is to learn the practical aspects of various computer graphics algorithms by involving the design, development, and solutions to a broad variety of problems found in entertainment, sciences, and engineering.

Course Outcomes: On completion this course, students will be able to

CO1: Understand basic elements of computer graphics.
CO2: Apply various algorithms of computer graphics for real world problems.
CO3: Analyze various transformation algorithms.
CO4: Understand the designing and implementing practical graphic solutions to challenging problems in different application domains.

Course Content:		Total Hrs
	1 Implementation of Line, Circle and ellipse attributes. 2 To plot a point (pixel) on the screen. 3 To draw a straight line using DDA algorithm / Bresenham algorithm. 4 To implement mid-point circle generating Algorithm 5 To implement an ellipse generating Algorithm. 6 To implement boundary fill and flood fill algorithms. 7 To implement two Dimensional transformations. 8 To implement 2D line clipping algorithms. 9 To implement spline representation. 10 To study various color models.	

Internal assessment		
Part A	CIA-I:Exp 1-5	
	CIA-II: Exp 6-10	

Text Books:

1. Computer Graphics C Version, D. Hearn And P. Baker, Pearson Education

2. Computer Graphics, Foley and van Dam, Person Education
3. Computer Graphics for Scientists and Engineers – By Asthana and Sinha

Reference Books:

1. C Graphics & Projects – By B M Havaldar.

2. Principles of Interactive Computer Graphics – By Newman & Sproull.
3. Animation for Beginners, Lisa Lee

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2	2	2				2	2	1	1
CO2	1	2	2	2	2				2	2	1	1
CO3	1	2	2	2	3				2	3	1	1
CO4	1	2	2	2	3				2	3	1	1

CSE308- Compiler Design Lab		
Teaching Scheme	**Examination Scheme**	**Credits**
Practical 2 hrs/week	**End of semester Examination: 60 marks**	**Practical-1**
	Internal assessment: 40 marks	
		Total-1

Course Prerequisite: Students should have basic knowledge of theory of automaton.

Course Objective: The objective of this course is to understand the practical aspects of compiler design, its various constituent parts, algorithms and data structures required to be used in the compiler.

Course Outcomes: On completion this course, students will be able to

CO1: Acquire knowledge of different phases and passes of the compiler and parser.
CO2: Understand different parsers design without automated tools.
CO3: Implement the compiler using syntax-directed translation methods.
CO4: Acquire knowledge about run time data structure like symbol table organization and different techniques used in that.

Course Content:	Total Hrs

	1. To identify whether a given string is a keyword or not? 2. To count total no. of keywords in a file (taking file from user) 3. To count total no of operators in a file (taking file from user). 4. To count the total occurrence of each character in a given file (taking file from user). 5. Write a C program to insert, delete and display the entries in the Symbol Table. 6. Write a lex program to count blank spaces, words, lines in a given file. 7. Write a C program to find first of any grammar. 8. To implement LEXICAL ANALYZER for IF Statement. 9. To implement parsing algorithms. 10. To implement Code generator.	

Internal assessment		
Part A	CIA-I: Exp 1-5	
	CIA-II: Exp 6-10	

Text Books:

1. Aho, Sethi & Ullman, "Compilers: Principles, Techniques and Tools", Pearson Education.
2. D.M.Dhamdhare, System Programming and Operating Systems,Tata McGraw Hill & Company.
3. K. Muneeswaran, Compiler Design, First Edition, Oxford University Press.
4. J.P. Bennet, "Introduction to Compiler Techniques", Second Edition, McGraw-Hill.

Reference Books:

1. Kenneth C. Louden, Compiler Construction – Principles and Practice, Cengage Learning Indian Edition.
2. Tremblay and Sorenson, The Theory and Practice of Compiler Writing, Tata McGraw Hill & Company.
3. J.P. Tremblay and P.G. Sorrenson, "The Theory and Practice of Compiler Writing", McGraw Hill.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	2	3	2	2				1		1	3
CO2	1	2	3	2	3				1		1	3
CO3	1	2	3	2	3				1		1	3
CO4	1	2	3	2	3				1		1	3

CSE309- DBMS Lab

Teaching Scheme	Examination Scheme	Credits
Practical 2 hrs/week	**End of semester Examination: 60 marks**	**Practical-1**
	Internal assessment: 40 marks	
		Total-1

Course Prerequisite: Data Structure and Operating Systems

Course Objective: This course will give principles and practical solutions for the storage and retrieval of information using a computer system, particularly for large quantities of data, emphasizing relational database management systems.

Course Outcomes: On completion this course, students will be able to

CO1: Understand the Basic concepts of database management systems and design
CO2: Construct conceptual models of a database using ER modelling for real time applications
CO3: Apply the relational data model concepts, SQL concepts and some mathematical concepts used in DBMS.
CO4: Understand the concepts of Normalization, Transactions, recovery Techniques and concurrency

List of Experiments

1. Installing oracle/ MYSQL
2. Creating Entity-Relationship Diagram using case tools.
3. Writing basic SQL SELECT statements.
4. Restricting and sorting data in SQL.
5. Displaying data from multiple tables using SQL.
6. Implementing Aggregate functions in SQL
7. Manipulating data using SQL
8. Creating and managing tables.
9. Implementing constraints (Primary Key, Foreign Keys)
10. Nested Queries
11. Creating stored procedures
12. Implementation of transactions

Internal assessment

Part A	CIA-I:Unit I, II	
	CIA-II: Unit III and IV	

Text Books:

Reference Books:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1											1
CO2	2	2	1	1	1						1	2
CO3	2	2	2	2	2						2	2
CO4	2	1	2	2							2	2

CSE311- Managerial Economics		
Teaching Scheme	**Examination Scheme**	**Credits**
Theory 3 hrs/week	**End of semester Examination: 60 marks**	Theory-3
	Internal assessment: 40 marks	
		Total-3
Syllabus will be provided by respective department		

CSE312- Data Communication		
Teaching Scheme	**Examination Scheme**	**Credits**
Theory 3 hrs/week	**End of semester Examination: 60 marks**	Theory-3, Tutorial-1
Tutorial-1 hrs/week	**Internal assessment: 40 marks**	
		Total-4

Course Prerequisite: Computer Networks

Course Objective: To equip students with data communication and data transmission fundamentals and techniques.

Course Outcomes: On completion this course, students will be able to

CO1: Understand the basic concepts of data communication and data transmission.
CO2: Apply the various techniques of error detection and correction.
CO3: Understand the concepts of quality of service.
CO4: To understand basic protocol design and performance aspects.

Course Content:		Total Hrs
Unit -I	Introductory Concepts: Network hardware, Network software, topologies, Protocols and standards, OSI model, TCP model, TCP/IP model	10 hrs
Unit-II	Digital and Analog Signals, Periodic Analog Signals, Signal Transmission, Limitations of Data Rate, Digital Data Transmission, Performance Measures, Line Coding, Digital Modulation, Media and Digital Transmission System.	10hrs
Unit-III	Error Detection and Correction, Stop and wait, Go-back-N ARQ, Selective Repeat ARQ, Sliding window, Piggy backing, Pure ALOHA, Slotted ALOHA, CSMA/CD, CSMA/CA, Quality of service, Leaky Bucket and Token Bucket algorithm.	10hrs
Unit-IV	TCP, UDP, Application Layer Protocol Design	10hrs

Internal assessment		
Part A	CIA-I:Unit I, II	
	CIA-II: Unit III and IV	

Text Books:

1. Data Communications and Networking by Behrouz A. Forouzan, McGraw Hill Education; Fifth edition
2. Data and Computer Communications by Stallings William, Pearson Education.

Reference Books:

1. Andrew Tanenbaum "Computer Networks", Prentice Hall.
2. William Stallings, "Data and Computer Communication", Pearson.
3. Kurose and Ross, "Computer Networking- A Top-Down Approach", Pearson.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	2	1	1						2	1
CO2	2	1	2	1	1						2	1
CO3	2	1	2	1	1						2	1
CO4	2	1	2	1	1						2	1

CSE313- Cryptography and Network Security		
Teaching Scheme	**Examination Scheme**	**Credits**
Theory 3 hrs/week	**End of semester Examination: 60 marks**	Theory-3
	Internal assessment: 40 marks	
		Total-3

Course Prerequisite: Computer programming and basic mathematics

Course Objective: To learn the fundamentals of information and network security and various cryptography algorithms.

Course Outcomes: On completion this course, students will be able to

CO1: Understand the fundamentals of information security and various attacks
CO2: Apply various cryptography algorithms in information security.
CO3: Apply the security techniques to secure the network.
CO4: Apply the security techniques in real life applications

Course Content:		Total Hrs
Unit -I	Introduction to security attacks, services and mechanism, Classical encryption techniquessubstitutionciphers and transposition ciphers, cryptanalysis, steganography, Stream and blockciphers. Modern Block Ciphers, Data encryption standard(DES).	10 hrs
Unit-II	Introduction to group, field, finite field of the form GF(p), modular arithmetic, prime and relative prime numbers, Extended Euclidean Algorithm, Advanced Encryption Standard (AES) encryption and decryptionFermat's and Euler's theorem, Primarily testing, Chinese Remainder theorem, Discrete Logarithmic Problem,Principals of public key crypto systems, RSA algorithm, security of RSA.	10hrs
Unit-III	Message Authentication Codes, Secure hashalgorithm (SHA) Digital Signatures: Digital Signatures, Elgamal Digital Signature Techniques, Digitalsignature standards (DSS), proof of digital signature algorithm, Key Management and distribution.	10hrs

Unit-IV	IP Security: Architecture, Authentication header, Encapsulating security payloads, combiningsecurity associations, key management. Introduction to Secure Socket Layer, Secure electronic,transaction (SET) System Security: Introductory idea of Intrusion, Intrusion detection, Viruses and related threats, firewalls	10hrs

Internal assessment		
Part A	CIA-I:Unit I, II	
	CIA-II: Unit III and IV	

Text Books:

1. William Stallings, "Cryptography and Network Security: Principals and Practice", Pearson Education.
2. Behrouz A. Frouzan: Cryptography and Network Security, Tata McGraw Hill
3. C K Shyamala, N Harini, Dr. T.R.Padmnabhan Cryptography and Security ,Wiley

Reference Books:

1. William Stallings, "Cryptography and Network Security: Principals and Practice", Pearson Education.
2. Behrouz A. Frouzan: Cryptography and Network Security, Tata McGraw Hill
3. C K Shyamala, N Harini, Dr. T.R.Padmnabhan Cryptography and Security ,Wiley

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	2	1	2	1					1	2
CO2	2	3	2	1	2	1					1	2
CO3	2	2	2	1	2	1					1	2
CO4	2	3	2	1	2	1					1	2

CSE314- Software Engineering		
Teaching Scheme	**Examination Scheme**	**Credits**
Theory 3 hrs/week	**End of semester Examination: 60 marks**	Theory-3
	Internal assessment: 40 marks	
		Total-3

Course Prerequisite: Students should have basic knowledge of computer fundamentals

Course Objective: The objective of this course is to learn the process and challenges of software development life cycles, Resolve the process of designing software from conventional to modern and Analyze various testing objectives, testing techniques, concepts of re-engineering.

Course Outcomes: On completion this course, students will be able to

CO1: Explain various software characteristics and analyze software Development Models.

CO2: Compare and contrast various methods for software design.

CO3: Formulate testing strategy for software systems, testing, Test driven development.

CO4: Understand the effectiveness of maintenance, re-engineering and reverse engineering at Managerial level.

Course Content:		Total Hrs
Unit -I	Introduction to Software Engineering, Components, Characteristics, Software Crisis, Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes, Software Development Life Cycle (SDLC) Models.	10 hrs
Unit-II	Software Requirement Specifications (SRS), Concept of Software Design, Low Level Design, Modularization, Coupling and Cohesion Measures, introduction to design Strategies, Top-Down, Bottom-Up Design, and hybrid design.	10hrs
Unit-III	Testing Objectives, Acceptance Testing, Regression Testing, Top Down and Bottom-Up Testing Strategies, Structural Testing (White Box Testing), Functional Testing (Black Box Testing).	10hrs
Unit-IV	Maintenance, Categories, Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, introduction to Software Re-Engineering and Reverse Engineering.	10hrs

Internal assessment		
Part A	CIA-I:Unit I, II	
	CIA-II: Unit III and IV	

Text Books:

1.Software Engineering (3rd ed.), K.K Aggarwal & Yogesh Singh, New Age International Publishers.

2. Software Engineering: A Practitioners Approach, RS Pressman, McGraw Hill.
3. Software Engineering, Pankaj Jalote, Wiley

Reference Books:

1. Fundamentals of Software Engineering, Rajib Mall, PHI Publication.

2. Software engineering, 9ª ed. Addison Wesley. Ian Sommerville.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	2	3	2	2	3			2	2	3	2
CO2	1	2	3	2	3	3			2	2	3	3
CO3	1	2	3	2	3	3			2	3	3	3
CO4	1	2	3	2	3	3			2	3	3	3

CSE315- Artificial Intelligence & Machine Learning		
Teaching Scheme	**Examination Scheme**	**Credits**
Theory 3 hrs/week	**End of semester Examination: 60 marks**	Theory-3
	Internal assessment: 40 marks	

		Total-3
Course Prerequisite: Programming, fundamentals of probability and statistics		
Course Objective: To learn the concepts of Artificial Intelligence (AI) and Machine Learning (ML). Role of AI and ML in various applications.		
Course Outcomes: On completion this course, students will be able to		
CO1: Understand the fundamentals human intelligence and machine intelligence. **CO2: Apply the concept of machine intelligence to solve the classic problems of game playing.** **CO3: Understand the concepts of machine learning and its applications in real world.** **CO4: Apply machine learning algorithm in complex problems**		
Course Content:		Total Hrs
Unit -I	Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents. Computer vision, Natural Language Possessing.	10 hrs
Unit-II	Searching for solutions, Uniformed search strategies, Informed search strategies, Local search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha - Beta pruning	10hrs
Unit-III	Supervised and unsupervised learning, Decision trees, Statistical learning models, Learning with complete data - Naive Bayes models, Learning with hidden data – EM algorithm, Reinforcement learning.	10hrs
Unit-IV	Introduction, Design principles of pattern recognition system, Classification Techniques – Nearest Neighbor (NN) Rule, BayesClassifier, Support Vector Machine (SVM), K – means clustering.	10hrs
Internal assessment		
Part A	CIA-I:Unit I, II	
	CIA-II: Unit III and IV	

Text Books:

1. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", Pearson Education.
2. E Charniak and D McDermott, "Introduction to Artificial Intelligence", Pearson Education

Reference Books:

1. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", Pearson Education.
2. E Charniak and D McDermott, "Introduction to Artificial Intelligence", Pearson Education

CO-PO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	2	1	2	1					1	2
CO2	2	2	2	1	2	1					1	2
CO3	2	2	2	1	2	1					1	2
CO4	2	2	2	1	2	1					1	2

CSE316- Cryptography and Network Security Lab		
Teaching Scheme	**Examination Scheme**	**Credits**
Practical 2 hrs/week	**End of semester Examination: 60 marks**	**Practical-1**
	Internal assessment: 40 marks	
		Total-1

Course Prerequisite: Computer programming and basic mathematics

Course Objective: To learn the fundamentals of information and network security and various cryptography algorithms.

Course Outcomes: On completion this course, students will be able to

CO1: Understand the fundamentals of information security and various attacks
CO2: Apply various cryptography algorithms in information security.
CO3: Apply the security techniques to secure the network.
CO4: Apply the security techniques in real life applications

Course Content:	Total Hrs

1. Implement the encryption and decryption of 8-bit data using 'Simplified DES Algorithm'
2. Implement 'Linear Congruential Algorithm' to generate 5 pseudo-random numbers.
3. Implement Rabin-Miller Primality Testing Algorithm.
4. Implement the Euclid Algorithm to generate the GCD of an array of 10 integers.
5. Implement RSA algorithm for encryption and decryption.
6. Configure a mail agent to support Digital Certificates, send a mail and verify the correctness of this system using the configured parameters.
7. Configure SSH (Secure Shell) and send/receive a file on this connection to verify the Correctness of this system using the configured parameters.

Internal assessment		
Part A	CIA-I:First 4 Experiments	
	CIA-II: 5-7	

Text Books:

1. William Stallings, "Cryptography and Network Security: Principals and Practice", Pearson Education.
2. Behrouz A. Frouzan: Cryptography and Network Security, Tata McGraw Hill
3. C K Shyamala, N Harini, Dr. T.R.Padmnabhan Cryptography and Security ,Wiley

Reference Books:

1. William Stallings, "Cryptography and Network Security: Principals and Practice", Pearson Education.
2. Behrouz A. Frouzan: Cryptography and Network Security, Tata McGraw Hill
3. C K Shyamala, N Harini, Dr. T.R.Padmnabhan Cryptography and Security ,Wiley

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1												

CO2												
CO3												
CO4												

CSE317- Software Engineering Lab		
Teaching Scheme	**Examination Scheme**	**Credits**
Practical 2 hrs/week	**End of semester Examination: 60 marks**	**Practical-1**
	Internal assessment: 40 marks	
		Total-1
Course Prerequisite: Students should have basic knowledge of computer fundamentals		
Course Objective: The objective of this course is to learn the practical aspects of software development life cycles, use cases, testing techniques, cost management and study of software requirement specifications.		
Course Outcomes: On completion this course, students will be able to		
CO1 Understand the role and applications of a software program. **:** **CO2** Develop use cases for solving the complex problems **:** **CO3** Understand the concepts of test cases and its applications **:** **CO4** Analyze the efficiency of a software program. **:**		
Course Content:		
	1. To implement requirement elicitation using use cases. 2. To implement program analysis / complexity of a software. 3. To implement Software Requirements Specification (SRS) for a given problem. 4. To implement the DFD model (level-0, level-1 DFD and Data dictionary) of the program. 5. To implement test cases. 6. To implement cost maintenance of any software project. 7. Manage file, using any suitable project management software tool.	
Internal assessment		
Part A	CIA-I: Exp 1-3	
	CIA-II: Exp 4-7	

Text Books:

1.Software Engineering (3rd ed.), K.K Aggarwal & Yogesh Singh, New Age International Publishers.

2. Software Engineering: A Practitioners Approach, RS Pressman, McGraw Hill.
3. Software Engineering, Pankaj Jalote, Wiley

Reference Books:

1. Fundamentals of Software Engineering, Rajib Mall, PHI Publication.

2. Software engineering, 9ª ed. Addison Wesley. Ian Sommerville.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	2	3	2	2	3			2	2	3	2
CO2	1	2	3	2	3	3			2	2	3	3
CO3	1	2	3	2	3	3			2	3	3	3
CO4	1	2	3	2	3	3			2	3	3	3

CSE318- Artificial Intelligence & Machine Learning Lab		
Teaching Scheme	**Examination Scheme**	**Credits**
Practical 2 hrs/week	**End of semester Examination: 60 marks**	**Practical-1**
	Internal assessment: 40 marks	
		Total-1
Course Prerequisite: Programming, fundamentals of probability and statistics		
Course Objective: To learn the concepts of Artificial Intelligence (AI) and Machine Learning (ML). Role of AI and ML in various applications.		
Course Outcomes: On completion this course, students will be able to		
CO1: Understand the fundamentals human intelligence and machine intelligence. **CO2: Apply the concept of machine intelligence to solve the classic problems of game playing.** **CO3: Understand the concepts of machine learning and its applications in real world.** **CO4: Apply machine learning algorithm in complex problems**		
List of Experiments Total Hrs		

1. Introduction to Numpy in Python.
2. Implementations of Pandas library in python
3. Implementation of Matplotlib in python.
4. Implementation of Decision Tree in python.
5. Implementation of K-Means Clustering in python
6. Implementation of Support Vecor machine
7. Implementation of Linear regression
8. Implementations of logistic regression.
9. Implementation of ANN.
10. Implementation of optimization algorithms.

Internal assessment		
Part A	CIA-I:Unit I, II	
	CIA-II: Unit III and IV	

Text Books:

1. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", Pearson Education.
2. E Charniak and D McDermott, "Introduction to Artificial Intelligence", Pearson Education

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1. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", Pearson Education.
2. E Charniak and D McDermott, "Introduction to Artificial Intelligence", Pearson Education

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	2	1	2	1					1	2
CO2	2	2	2	1	2	1					1	2
CO3	2	2	2	1	2	1					1	2
CO4	2	2	2	1	2	1					1	2

Fourth Year

CSE401- Project Design		
Teaching Scheme	**Examination Scheme**	**Credits**
Theory 3 hrs/week	**End of semester Examination: 60 marks**	Theory-3
	Internal assessment: 40 marks	
		Total-3

Course Prerequisite: Students should have knowledge of software engineering fundamentals

Course Objective: The objective of this course is to learn the knowledge on methods and tools to design a software project and to understand the prototype and its interconnections of a model based software and to understand the process flow covering planning and project management.

Course Outcomes: On completion this course, students will be able to

CO1: Understand basics of SRS, Requirements specifications and their various aspects.

CO2: Design, develop, select and evaluate computer applications.

CO3: Prepare a project design prototypes and various types of design strategies.

CO4: Understand the project management, planning, scheduling at managerial level.		
Course Content:		Total Hrs
Unit -I	Project and software, Requirements engineering, types of requirements, interview, Brainstorming sessions, FAST techniques, use cases, Requirements representation and analysis using flow-oriented notations, requirements documentation.	10 hrs
Unit-II	Project design, conceptual v/s technical design, ER diagram, informal to formal design flow, types of metrics, Product metrics, process metrics, advantage and disadvantage of software metrics.	10hrs
Unit-III	Project prototype, strategy, Goodness of a design, Modularity, Modularity v/s cost, Functional Independence, relationship between Cohesion and Coupling, Function-oriented design, Object-oriented design.	10hrs
Unit-IV	Introduction to software project management, Management activities, software project planning and the planning process, Project scheduling.	10hrs

Internal assessment		
Part A	CIA-I:Unit I, II	
	CIA-II: Unit III and IV	
Text Books:		
Reference Books:		

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	2	3	2	2	3			2	2	3	2
CO2	1	2	3	2	3	3			2	2	3	3
CO3	1	2	3	2	3	3			2	3	3	3
CO4	1	2	3	2	3	3			2	3	3	3

CSE402- Project Design Lab		
Teaching Scheme	**Examination Scheme**	**Credits**
Practical 2 hrs/week	**End of semester Examination: 60 marks**	**Practical-1**
	Internal assessment: 40 marks	
		Total-1
Course Prerequisite: Students should have knowledge of software engineering fundamentals		
Course Objective: The objective of this course is to learn the practical knowledge of various use cases, languages and tools to design a project and and to understand the project scheduling, planning and planning process.		

Course Outcomes: On completion this course, students will be able to

CO1: Understand the role and applications of a project.
CO2: Develop use cases for solving real life problems.
CO3: Understand the concepts of test cases and its applications.
CO4: Analyze the cost estimation of a project.

Course Content:

1. To generate and write various use cases for a given problem.
2. To design various projects based on suitable design methods.
3. To implement an analysis method of a project.
4. To implement project metrics by any example.
5. To implement a schedule for project planning.
6. To implement a schedule for the planning process.

Internal assessment		
Part A	CIA-I: Exp 1-3	
	CIA-II: Exp 4-6	

Text Books:

1. Software Engineering (3rd ed.), K.K Aggarwal & Yogesh Singh, New Age International Publishers.
2. Software Engineering: A Practitioners Approach, RS Pressman, McGraw Hill.
3. Software Engineering, Pankaj Jalote, Wiley

Reference Books:

1. Fundamentals of Software Engineering, Rajib Mall, PHI Publication.
2. Software engineering, 9ª ed. Addison Wesley. Ian Sommerville.

PO 1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
1	2	3	2	2	3			2	2	3	2
1	2	3	2	3	3			2	2	3	3
1	2	3	2	3	3			2	3	3	3
1	2	3	2	3	3			2	3	3	3