2.6.1
Programme outcomes and course outcomes for all Programmes offered by the institution are stated and displayed on website and communicated to teachers and students

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Any additional information: Statements of POs, PSOs & COs of all courses and programs

Dept. of Civil Engineering

Course outcomes (Cos) of all courses of all programs offered by the institution

B.Tech. (Civil Engineering)

Semester-I Courses

Course-1

Course Code:	A1MAT001
Course Title:	ENGINEERING MATHEMATICS-I
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	problems.
CO-2	Transforms
CO-3	Apply the concepts of Maxima and Minima for finding extreme values
CO-4	Formulate and solve P.D.E

Course-2

Course Code:	A1PYT001
Course Title:	ENGINEERING PHYSICS
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	State light waves application in optic fiber.
CO-2	List different crystal systems, space lattices, and parameters of unit cell and the Bragg's law of X-ray diffraction.
CO-3	thermodynamic processes and entropy.
CO-4	Explain the system of forces(non-equilibrium)and different types frictions.

Course-3

Course Code:	A1CIT001
Course Title:	COMPUTER PROGRAMMING
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Explain the features of C and write a formal algorithmic solution for the given problem
CO-2	State the significance of primary constructs & methodology of procedural language C
CO-3	Suggest the alternative construct choices in procedural language C.
CO-4	Recall systematic approach of automated solution design, implementation and testing using a procedural language.

Course-4

Course Code:	A1MED001
Course Title:	ENGINEERING DRAWING
Theory / Lab:	Theory / Lab:
L-T-P-C:	1-0-3-3
Course Outcomes:	
CO-1	Draw regular polygons, conic curves to the scale
CO-2	Draw orthographic projections of points, lines.
CO-3	Draw orthographic projections of planes and solids
CO-4	Draw isometric projection from orthographic projections and vice-versa

Course-5

Course Code:	A1CHT001
Course Title:	ENVIRONMENTAL STUDIES
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Identify the need of conservation of the natural resources, ecosystem and its diversity
CO-2	Know the environmental challenges induces due to unplanned anthropogenic activities

CO-3	Identify the environmental impact of developmental activities
CO-4	Explain the environmental legislations of India and the first global initiatives towards sustainable development.

Course-6

Course Code:	A1EHL001
Course Title:	ENGLISH LANGUAGE PRACTICE -I
Theory / Lab:	Lab
L-T-P-C:	1-0-2-2
Course Outcomes:	
CO-1	Student shall have the ability understand the syntactical and grammatical intricacy.
CO-2	Student shall be able to use right structure for right context and meaning.
CO-3	Student shall be able to read and comprehend the content in English well.
CO-4	English well for his/her professional requirement.

Course-7

Course Code:	A1PYL001
Course Title:	ENGINEERING PHYSICS LAB
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	and to determine the numerical aperture and bending loss of the optic fiber.
CO-2	fields due to currents using tangent law.
CO-3	Student will be able to detrmine the specific heat and coeffecient of thermal conductivity for the given materials.
CO-4	Student will be able to detrmine the coeffecient of friction.

Course-8

Course Code:	A1CIL001
Course Title:	COMPUTER PROGRAMMING LABORATORY
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	and expression evaluation for any given problem.
CO-2	Write functions and utilize single & multi-dimensional arrays in C language
CO-3	Create user defined data types implement them for solutions in C language.
CO-4	Appreciate the library support available in standard C for dealing with external files both for read and write purposes.

Semester-II Courses

Course-1

Course Code:	A1MAT002
Course Title:	MATHEMATICAL METHODS
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	which frequently occur in engineering problems
CO-2	forms
CO-3	Student will be able to estimate the missing terms of given data using interpolation.
CO-4	Student will be able to solve Initial value problems through numerical methods.

Course-2

Course Code:	A1CYT001
Course Title:	ENGINEERING CHEMISTRY
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	and soft water, estimation of hardness of water and specification of potable water and purification of sea water through reverse
CO-2	Potentiometry to understand the principle and applications of electrochemistry. Topics on electrochemical cells, batteries and
CO-3	Students gain the knowledge on mechanism of corrosion, factors responsible, types corrosion and methods of protection.
CO-4	polymers to obtain desired plastics and moulding techniques, advanced topics on plastics like conducting polymers and

Course-3

Course Code:	A1EET001
Course Title:	BASIC ELECTRICAL & ELECTRONICS ENGINEERING
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Able to analyze various types of electrical circuits
CO-2	Ability to identify suitable machine for a particular application
CO-3	Have the ability to explain the working principle of different types of semiconductor devices.
CO-4	Have the ability to explain the concepts of Communication Systems.

Course-4

Course Code:	A1CET002
Course Title:	APPLIED MECHANICS
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Solve the problems on plane systems using equilibrium equations
CO-2	Calculate centroid and moment of inertia in engineering applications
CO-3	Analyze plane and space trusses
CO-4	Apply the concepts of kinematics and kinetics in engineering problems

Course-5

Course Code:	A1EHL002
Course Title:	ENGLISH LANGUAGE PRACTICE -II
Theory / Lab:	Lab
L-T-P-C:	1-0-2-2
Course Outcomes:	
CO-1	Student shall have the ability to speak intelligibly with confidence and efficiency.
CO-2	Student shall be able to use phrases, foreign expressions and idioms correctly.
CO-3	Student shall be able to participate well in debates and discussions.
CO-4	Student shall be able to write both Technical and General reports well.

Course-6

Course Code:	A1CYL001
Course Title:	ENGINEERING CHEMISTRY LAB
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	solution.
CO-2	determination.
CO-3	Students will understand in construction of galvanic cell, determination of calorific value, and preparation of biodiesel.

Course-7

Course Code:	A1MEW001
Course Title:	BASIC ENGINEERING WORKSHOP
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Ability to perform simple cutting, grinding, drilling, riveting, plumbing and tinsmith jobs.
CO-2	Identify various components of a building and give lump-sum estimate
CO-3	Install suitable Operating System based on hardware and perform internet connectivity
CO-4	Create circuits with suitable electrical parts based on load calculations and give lump-sum estimate.
CO-5	electronic measuring equipment

Semester-III Courses

Course-1

Course Code:	A1CET201
Course Title:	STRENGTH OF MATERIALS –I
Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	Compute the stresses due to axial, shear and bending moment
CO-2	Determine and draw Shear force and bending moment diagrams for beams
CO-3	Calculate the deflections and slope in statically determinate beams
CO-4	Compute the stresses developed in thin cylinders

Course-2

Course Code:	A1CET202
Course Title:	ELEMENTS OF SURVEYING
Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	Recognize various surveying instruments used for measurement of distances, directions and elevations
CO-2	Calculate distances, areas and volumes using various surveying methods and instruments.
CO-3	Identify and sketch suitable curve for the given data.
CO-4	Know the working principles of Total Station and GPS and list their application.

Course-3

Course Code:	A1CET203
Course Title:	FLUID MECHANICS
Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	To know the fluid properties and measurement of pressure and discharge.
CO-2	To compute the hydrostatic forces on plane and curved surfaces.
CO-3	To apply the fundamental principles of fluid mechanics to various flow problems.
CO-4	To solve the problems on pipe networks and boundary layer.

Course-4

Course Code:	A1CET204
Course Title:	BUILDING MATERIALS AND CONCRETE TECHNOLOGY
Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	Know various engineering properties of building construction materials and suggest their suitability.
CO-2	Identify the functional role of ingredients of concrete and apply this knowledge to concrete mix design.
CO-3	Acquire and apply fundamental knowledge in the fresh and hardened properties of concrete.
CO-4	Design mix proportions for different grades of concrete as per Indian Standards

Course-5

Course Code:	A1MST001
Course Title:	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Able to understand application of economics in decision making.
CO-2	Able to develop and determine cost efficient production through optimization.
CO-3	Able to aware various business environmental factors and the impact
CO-4	Able to do financial analysis of the firm to know its performance from different parameters.

Course-6

Course Code:	A1MAT109
Course Title:	PROBABILITY AND STATISTICS
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3

Course Outcomes:	
CO-1	and computers.
CO-2	and reducing sampling errors.
CO-3	Students will able to get Prediction and control the numerical and time series data occurs in industry and scheduling.
CO-4	production lines.

Course-7

Course Code:	A1CEL201
Course Title:	SURVEYING LABORATORY
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Ability to determine heights, distances and irregular areas using conventional survey instruments.
CO-2	Ability to determine heights, distances and irregular areas using Total Station and GPS
CO-3	To prepare plans and contour maps of the given area.

Course-8

Course Code:	A1CEL202
Course Title:	FLUID MECHANICS LAB
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Able to appreciate the Bernoulli's Theorem by experimental verification
CO-2	Determine losses in pipes by conducting experiments.
CO-3	Estimate coefficient of discharge of flow measuring devices by performing experiments
CO-4	To identify the type of flow in a pipe by conducting Reynold's experiment

Semester-IV Courses

Course-1

Course Code:	A1CET205
Course Title:	STRENGTH OF MATERIALS –II
Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	Determine the principal stresses and strains.
CO-2	Analyse and design shafts and springs subjected to pure torsion and combination of torsion, bending and axial loads.
CO-3	Compute the resultant stresses due to combined axial and bending.
CO-4	Calculate stresses in beams subjected to unsymmetrical bending

Course-2

Course Code:	A1CET206
Course Title:	HYDRAULICS & HYDRAULIC MACHINERY
Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	Solve uniform and non-uniform flow problems
CO-2	Apply dimensional analysis and similitude for various applications.
CO-3	Differentiate various types of dams based on its functions.
CO-4	Design turbines and pumps to meet the field requirements

Course-3

Course Code:	A1CET207
Course Title:	STRUCTURAL ANALYSIS
Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	Calculate bending moment and shear forces in fixed and propped cantilever beams.
CO-2	Apply slope deflection and moment distribution methods for analysis of continuous beams

CO-3	Identify the position of moving loads and compute their effect using the concepts of influence lines for beams.
CO-4	Analyze plane trusses using stiffness method.

Course-4

Course Code:	A1CED208
Course Title:	BUILDING PLANNING & CIVIL ENGINEERING DRAWING
Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	State building Bye-laws, Principles and General Building Requirements as per NBC
CO-2	Describe different conventional signs in drawing plans of structures
CO-3	Plan and drawn Residential buildings and Industrial structures
CO-4	Interpret drawings of RC buildings, Industrial structures and Pipe line drawings

Course-5

Course Code:	A1CET303
Course Title:	ENGINEERING GEOLOGY
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Know the importance of Engineering Geology from Civil Engineering point of view.
CO-2	Identify different rocks and minerals.
CO-3	Apply geophysical methods for groundwater exploration.
CO-4	Select the site for dams, reservoirs and tunnels.

Course-6

Course Code:	A1CEL203
Course Title:	STRENGTH OF MATERIALS LABORATORY
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Determine various mechanical properties of steel.
CO-2	Determine the hardness of the given specimen using BHN.
CO-3	Determine the stiffness and rigidity modulus of the given spring material
CO-4	Determine the impact strength of given steel specimen.
CO-5	brittle materials using CTM

Course-7

Course Code:	A1CEL204
Course Title:	HYDRAULIC MACHINERY LAB
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Able to calculate Impact of Jet on vanes and appreciate its use in turbines and pumps.
CO-2	Determine the Efficiency and Performance Curves for Kaplan, Francis and Pelton turbines.
CO-3	Determine the Efficiency and Performance Curves of Reciprocating and Centrifugal pumps.
CO-4	Determine the flow characteristics of hydraulic jump, broad crested weir.

Semester-V Courses

Course-1

Course Code:	A1CET209
Course Title:	WATER RESOURCES ENGINEERING
Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	Determine various hydrological parameters
CO-2	Apply various methods for estimating and routing of flood runoff.
CO-3	Solve well hydraulics problems

CO-4	Determine crop water requirements.

Course-2

Course Code:	A1CET210
Course Title:	DESIGN REINFORCED CONCRETE STRUCTURES
Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	Apply the design philosophies of working stress method and limit state method for determining design parameters of RC beams
CO-2	Design and detail the reinforced concrete beams using IS code
CO-3	Design and detail the reinforced slabs, columns and footings using IS Code.
CO-4	Determine the anchorage and development length of RC element.

Course-3

Course Code:	A1CET211
Course Title:	TRANSPORTATION ENGINEERING
Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	Recall history of road development in India.
CO-2	Design road geometric elements based on highway surveys.
CO-3	Design elements of flexible and rigid pavements based on highway material properties
CO-4	Conduct traffic surveys and use the data in solving traffic engineering problems

Course-4

Course Code:	A1CET212
Course Title:	GEOTECHNICAL ENGINEERING
Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	Categorize soils based on their physical properties
CO-2	Calculate seepage discharge using a flow net
CO-3	Determine the stresses in soils, settlement and rate of settlement consequent to construction activity
CO-4	Estimate the shear strength using the cohesion and internal friction of soils under different drainage conditions.

Course-5

Course Code:	A1CET213
Course Title:	ENVIRONMENTAL ENGINEERING-I
Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	Estimate quantity of water requirement for a town/city.
CO-2	Identify the water source and select proper intake structure.
CO-3	Design the components of treatment plants
CO-4	Plan and design the water distribution networks.

Course-6

Course Code:	A1CEL205
Course Title:	Concrete Technology Lab
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Test and determine various properties of concrete making materials
CO-2	Test and Determine fresh and hardened properties of concrete
CO-3	Work with NDT equipment

Course-7

Course Code:	A1CEL206
Course Title:	ENGINEERING GEOLOGY LAB

Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Identify Mega-scopic minerals & their physical properties.
CO-2	Identify Mega-scopic rocks & their physical properties.
CO-3	To prepare the maps showing contour, slope and other topographical features.
CO-4	To Solve structural geology problems

Semester-VI Courses

Course-1

Course Code:	A1CET214
Course Title:	DESIGN OF STEEL STRUCTURES
Theory / Lab:	Theory
L-T-P-C:	3-0-1-4
Course Outcomes:	
CO-1	Design the connections of steel components as per Indian standards.
CO-2	Perform plastic analysis of Steel Structures
CO-3	Design and detailing rolled steels sections for axial and flexural members.
CO-4	Design and detailing of built up sections for axial and flexural members.

Course-2

Course Code:	A1CET215
Course Title:	ADVANCED REINFORCED CONCRETE STRUCTURES
Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	Design and detail RCC two way slabs and staircases.
CO-2	Design and detail RCC strip and combined footing.
CO-3	State the basics of Pre-stressing, analyze and design simply supported pre-stressed concrete beams.
CO-4	Estimate various losses in Pre-stressed concrete beams.

Course-3

Course Code:	A1CET216
Course Title:	FOUNDATION ENGINEERING
Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	Compute earth pressure and the stability of slopes in cutting as well as embankments using different theories.
CO-2	Suggest a suitable type of foundation based on soil strength assessed using field tests such as plate load test and/or SPT.
CO-3	Decide the size of foundation based on bearing capacity/ bearing pressure.
CO-4	Identify expansive soils based on soil properties.

Course-4

Course Code:	A1CET217
Course Title:	ENVIRONMENTAL ENGINEERING-II
Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	Plan and design the sewerage systems
CO-2	Analyze the characteristics of the waste water
CO-3	Select suitable method for sewage treatment
CO-4	Identify suitable method of disposal of sewage

Course-5

Course Code:	A1CET306
Course Title:	CONSTRUCTION EQUIPMENT AND METHODS
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3

Course Outcomes:	
CO-1	Select proper construction equipment for the given purpose
CO-2	Describe various construction equipment based on applications, utilization, productivity
CO-3	Identify suitable equipment for concreting and aggregate crushing
CO-4	Know the activities related to safety and quality measures during various modern construction activities

Course-6

Course Code:	A1EET403
Course Title:	MATLAB
Theory / Lab:	Theory
L-T-P-C:	2-0-2-3
Course Outcomes:	
CO-1	Work in MATLAB environment.
CO-2	Know the basic functions and utilities in MATLAB.
CO-3	Write MATLAB programs for simple engineering problems and functions.
CO-4	Solve algebraic equations using MATLAB.

Course-7

Course Code:	A1CEL207
Course Title:	TRANSPORTATION ENGINEERING LAB
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Ability to test various properties of aggregates and determine their suitability for pavement construction.
CO-2	climatic conditions.
CO-3	Design a bituminous mix using Marshal Method.
CO-4	Plan and conduct different types of traffic studies and propose traffic engineering schemes.

Course-8

Course Code:	A1CEL208
Course Title:	GEOTECHNICAL ENGINEERING LAB
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Conduct tests on soils and classify them based on index properties
CO-2	Conduct tests on compaction of fine and coarse grained soils and their in-situ density
CO-3	Conduct tests to determine engineering properties of the soils

Semester-VII Courses

Course-1

Course Code:	A1CET218
Course Title:	ESTIMATION AND CONTRACTS
Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	Calculate Earthwork quantities for roads and canals.
CO-2	Prepare bar bending schedule.
CO-3	Prepare specifications and contract documents for a project
CO-4	Prepare a detailed estimate of a building using long wall – short wall method and centerline method.

Course-2

Course Code:	A1CET308
Course Title:	ADVANCED WATER RESOURCES ENGINEERING
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Design canals and canal structures.
CO-2	Identify various components of diversion head works.

CO-3	Know various investigations required for reservoir planning.
CO-4	Analyze and design dams and spill ways.

Course-3

Course Code:	A1CET307
Course Title:	RAILWAY AIRPORTS AND HARBORS
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Plan, design and maintain a railway track and its elements.
CO-2	Know railway signals, signaling systems and control of train movement
CO-3	List aspects of planning and maintenance of various airport elements.
CO-4	List aspects of planning and maintenance of various harbor elements.

Course-4

Course Code:	A1CET311
Course Title:	PAVEMENT ANALYSIS, DESIGN AND EVALUATION
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Know different factors influencing pavement design.
CO-2	Calculate stresses developed in flexible and rigid pavements.
CO-3	Know the maintenance requirements of flexible and rigid pavements.
CO-4	Compare different pavement management systems.

Course-5

Course Code:	A1CET305
Course Title:	BUILDING CONSTRUCTION AND SERVICES
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Know the terminology related to masonry and wall finishing.
CO-2	Describe different types of roofing systems, flooring services and other different building components
CO-3	Identify suitable services required for effective building utilization.
CO-4	Know the concepts of green buildings

Course-6

Course Code:	A1CET313
Course Title:	GROUND IMPROVEMENT TECHNIQUES
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Choose method of soil densification based on its suitability.
CO-2	List principles of various dewatering techniques for different types of soils.
CO-3	Recognize different geosynthetics for various applications and design the Reinforced earth wall.
CO-4	Describe the techniques for Stabilization and grouting.

Course-7

Course Code:	A1CET315
Course Title:	PROJECT PLANNING AND MANAGEMENT
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Know the concepts of project planning and management.
CO-2	Construct networks using PERT and CPM techniques.
CO-3	Update networks using resource allocation and resource smoothening
CO-4	List different management information systems.

Course-8

Course Code:	A1CET316
Course Title:	URBAN TRANSPORT PLANNING
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Estimate travel demand for an urban area.
CO-2	Collect data for urban transport planning.
CO-3	Prepare and calibrate urban transport model.
CO-4	Evaluate various alternative transportation facilities.

Course-9

Course Code:	A1CET312
Course Title:	ADVANCED STRUCTURAL DESIGN
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Design and detail flat slabs and mat foundations as per Indian Standards.
CO-2	Analyze, design and detail Retaining walls as per Indian Standards.
CO-3	Design and detail water tanks and chimneys as per Indian Standards.
CO-4	Distinguish B and D regions, design and detail deep beams as per Indian Standards

Course-10

Course Code:	A1CET321
Course Title:	REMOTE SENSING AND GIS
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Know the basic concepts of Aerial Photogrametry and Remote Sensing
CO-2	Analyse the images
CO-3	Tell the basic concept of GIS
CO-4	Apply the concepts of spatial analysis

Course-11

Course Code:	A1CET323
Course Title:	SOLID WASTE MANAGEMENT
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Know different types of sources, generation of solid waste
CO-2	Categorize various collection and transport systems of solid waste.
CO-3	Identify suitable methods of solid waste disposal and processing
CO-4	State the concepts of hazardous solid waste management

Course-12

Course Code:	A1CET322
Course Title:	RURAL ROADS
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Know importance and problems associated with rural roads.
CO-2	Know geometric design standards of rural roads
CO-3	Design low cost rural roads.
CO-4	Know about sustainability through use of local and recycled road materials

Course-13

Course Code:	A1CEL209
Course Title:	RS & GIS LAB/STAAD Pro. LAB
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2

Course Outcomes:	
CO-1	able to perform analysis and design of pin and rigid jointed frames using Staad pro.
CO-2	Able to create database for thematic mapping and DEM
CO-3	Apply the knowledge of GIS to solve water resources engineering problems

Course-14

Course Code:	A1CEL210
Course Title:	ENVIRONMENTAL ENGINEERING LAB
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Measure the quality of water and waste water by performing various tests and interpret the results
CO-2	Measure pH and Electrical conductivity of given soil by conducting tests and and interpret the results.

Semester-VIII Courses

Course-1

Course Code:	A1CEP601
Course Title:	Directed Study and Project Work
Theory / Lab:	Project Work
L-T-P-C:	0-0-0-10
Course Outcomes:	
CO-1	Demonstrate a sound technical knowledge of their selected project topic
CO-2	Identify a problem, work out methodology and provide a solution within ethical framework.
CO-3	Design and develop civil engineering solutions to problems utilizing the knowledge acquired.
CO-4	Communicate effectively and emerge as a successful team player.

M.Tech. (Structural Engineering)

Semester-I Courses

Course-1

Course Code:	A1STT101
Course Title:	ADVANCED MATHEMATICS
Theory / Lab:	Theory
L-T-P-C:	3 1 0 4
Course Outcomes:	
CO-1	Solve partial differential equations both analytically and numerically
CO-2	Evaluate the correlation coefficients of grouped data and coefficients of regression
CO-3	Find the optimal solution of linear programming problems , non linear programming problems.

Course-2

Course Code:	A1STT102
Course Title:	THEORY OF ELASTICITY
Theory / Lab:	theory
L-T-P-C:	3 1 0 4
Course Outcomes:	
CO-1	Ability to develop stress-strain relationships using stress tensor and transformation in elastic state
CO-2	elasticity
CO-3	Ability to execute a reasonable choice in parameters of the model (geometry, material properties, boundary conditions)
CO-4	Ability to solve problems of 2D and 3D problems of linear elasticity using boundary value concept

Course-3

Course Code:	A1STT103
Course Title:	ADVANCED REINFORCED CONCRETE
Theory / Lab:	Theory
L-T-P-C:	3 1 0 4
Course Outcomes:	
CO-1	design structural elements satisfying serviceability criteria.

CO-2	Ability to determine Moment- Curvature relation for reinforced concrete flexural members
CO-3	Ability to design slender reinforced concrete columns and develop interaction curves
CO-4	Ability to design Grid floors and flat slabs in reinforced concrete structures.

Course-4

Course Code:	A1STT104
Course Title:	STRUCTURAL DYNAMICS AND EARTHQUAKE RESISTANT DESIGN
Theory / Lab:	Theory
L-T-P-C:	3 1 0 4
Course Outcomes:	
CO-1	Ability to carry out Dynamic analysis of structures with Single and Multi degree of freedom
CO-2	Ability to plan the structure without irregularities which affect their seismic performance.
CO-3	Ability to calculate the seismic loads on structures and design the structure accordingly.
CO-4	Ability to do the ductile detailing of different members of the structure as per IS 13920.

Course-5

Course Code:	A1STT202
Course Title:	INDUSTRIAL STRUCTURES
Theory / Lab:	Theory
L-T-P-C:	3 0 0 3
Course Outcomes:	
CO-1	Ability to knowledge plan functional requirement of industrial structures
CO-2	Ability to calculate wind loads and design a trusses
CO-3	Ability to design Gantry girder, Bunkers, silos, Chimneys and transmission line towers.

Course-6

Course Code:	A1STT203
Course Title:	ADVANCED CONCRETE TECHNOLOGY
Theory / Lab:	Theory
L-T-P-C:	3 0 0 3
Course Outcomes:	
CO-1	Ability to use of new materials in Concretes and understand how they affect the properties of concrete
CO-2	purposes
CO-3	Appreciate RMC MIX design for special concrete
CO-4	Appreciate need for NDT evaluation of concrete and have knowledge on the working principle of some of the methods.

Course-7

Course Code:	A1STT201
Course Title:	ADVANCED STRUCTURAL ANALYSIS
Theory / Lab:	Theory
L-T-P-C:	3 0 0 3
Course Outcomes:	
CO-1	Ability to carry out approximate analysis of framed structures.
CO-2	Ability to analyze non circular sections for torsion
CO-3	Ability to choose appropriate method of analysis for given structure
CO-4	Ability to analyze plane frame, plane truss and space truss using stiffness method of analysis

Course-8

Course Code:	A1STT204
Course Title:	DESIGN OF TALL STRUCTURES
Theory / Lab:	Theory
L-T-P-C:	3 1 0 4
Course Outcomes:	
CO-1	Ability to understand modern concepts evolved in structural systems.
CO-2	Ability to apply IS codal provisions for various types of loadings for tall structures.
CO-3	Ability to understand and differentiate various types of building frames and shear walls.
CO-4	Temperature effects.
CO-5	Ability to analyse a tall structure for its buckling and ability to perform first order and P-Delta analysis.
CO-6	Ability to understand Translational instability, Torsional instability Importance of dampers.

Course-9

Course Code:	A1STT205
Course Title:	DISASTER MANAGEMENT
Theory / Lab:	Theory
L-T-P-C:	3 1 0 4
Course Outcomes:	
CO-1	Ability to understand of the disaster phenomenon and its different contextual aspects, impacts
CO-2	Ability to design, implement and evaluate research on disasters
CO-3	Ability to develop an integrated approach to disaster preparedness & awareness
CO-4	Ability to understand the requirements of an emergency management program.

Course-10

Course Code:	A1STT206
Course Title:	THEORY OF PLATES AND SHELLS
Theory / Lab:	Theory
L-T-P-C:	3 1 0 4
Course Outcomes:	
CO-1	Ability to analyze isotropic and orthotropic plates subjected to bending and twisting.
CO-2	Ability to conceptualize the Navier"s solution and energy method to analyze plates with different end conditions
CO-3	Ability to develop governing differential equation for circular plates and analyze for various loading and boundary conditions
CO-4	Ability to understand the structural behaviour of different types of shells using membrane theory and bending theory.
CO-5	Ability to analyze isotropic and orthotropic plates subjected to bending and twisting

Course-11

Course Code:	A1STL101
Course Title:	ADVANCED STRUCTURAL ENGINEERING LAB
Theory / Lab:	Lab
L-T-P-C:	3 1 0 4
Course Outcomes:	
CO-1	Ability to study flexural and shear behavior of RC beams and their crack pattern
CO-2	Appreciate stress-strain behavior of different grades of concrete
CO-3	Perform Mix design and workability tests of self compacting concrete
CO-4	Skill to apply various repair techniques of RC elements
CO-5	Skill to perform various Non Destructive Testing of RC elements

Semester-II Courses

Course-1

Course Code:	A1STT105
Course Title:	SUBSTRUCTURE DESIGN
Theory / Lab:	Theory
L-T-P-C:	3 0 0 3
Course Outcomes:	
CO-1	Know various samples, sampler techniques and borings methods
CO-2	Ability to evaluate bearing capacity for shallow foundations
CO-3	Ability to evaluate the load carrying capacity of pile foundations

Course-2

Course Code:	A1STT106
Course Title:	FINITE ELEMENT METHOD
Theory / Lab:	Theory
L-T-P-C:	3 1 0 4
Course Outcomes:	
CO-1	Axisymmtric geometries.
CO-2	application in FEM
CO-3	Ability to apply Lagrangean and Serendipity methods to obtain Shape functions
CO-4	Ability to formulate Finite Element Equations for Iso-parametric elements
CO-5	Ability to apply FEM to structural mechanics problems with special emphasis on truss, beam, frame, and plate elements

Course-3

Course Code:	A1STT106
Course Title:	STABILITY OF STRUCTURES
Theory / Lab:	Theory
L-T-P-C:	3 1 0 4
Course Outcomes:	
CO-1	Ability to analyze Beam – columns with different boundary conditions
CO-2	Ability to study Elastic and In-elastic buckling characteristics of various structural elements
CO-3	Ability to solve Torsional and lateral buckling of beams

Course-4

Course Code:	A1STT108
Course Title:	PRE-STRESSED CONCRETE
Theory / Lab:	Theory
L-T-P-C:	3 1 0 4
Course Outcomes:	
CO-1	Ability to analysis and Design of pre-tensioned as well as post-tensioned concrete beams
CO-2	Ability to analyse and design the anchorage systems for pre-stressing at the construction site
CO-3	Ability to design various pre-stressed structures
CO-4	Ability to predict short term and long term deflections in PSC members
CO-5	Ability to design Composite sections

Course-5

Course Code:	A1STT207
Course Title:	STRUCTURAL OPTIMIZATION
Theory / Lab:	Theory
L-T-P-C:	3 0 0 3
Course Outcomes:	
CO-1	Ability to apply the basic ideas in optimization to make the structures as lightly as possible.
CO-2	Ability to apply classical optimization techniques in engineering problems
CO-3	To apply the linear programming techniques in engineering optimization.
CO-4	Ability to perform plastic analysis of structure and design of structural elements based on minimum weight concept.

Course-6

Course Code:	A1STT208
Course Title:	BRIDGE ENGINEERING
Theory / Lab:	Theory
L-T-P-C:	3 1 0 4
Course Outcomes:	
CO-1	Ability to apply various IRC standards for live load impact effect.
CO-2	Ability to design the interior panel of the deck slab using Pigeaud"s method.
CO-3	Ability to design various types of culverts with their reinforcement detailing
CO-4	Ability to design a bridge with plate girders having end bearing and intermediate stiffeners
CO-5	Ability to analyse the stability of abutments and piers
CO-6	Ability to understand the effect of various loads like wind load, seismic load, horizontal forces due to water currents on bridges

Course-7

Course Code:	A1STT209
Course Title:	REPAIR AND EHABILITATION OF STRUCTURES
Theory / Lab:	Theory
L-T-P-C:	3 1 0 4
Course Outcomes:	
CO-1	Ability to study causes of concrete distress and deterioration
CO-2	Knowledge of different materials and techniques for repair
CO-3	Knowledge of repair and rehabilitation of deteriorated members
CO-4	Appreciate need and importance of demolition

Course-8

Course Code:	A1STT210
Course Title:	STRUCTURAL RELIABILITY
Theory / Lab:	Theory
L-T-P-C:	3 0 0 3
Course Outcomes:	
CO-1	Ability to use the basic concepts of statistics in probability.
CO-2	Ability to understand the concept of probability and apply it.
CO-3	Able to compute reliability indices for simple structural engineering problems as beams, trusses.
CO-4	frames.

Course-9

Course Code:	A1STT211
Course Title:	DESIGN OF HYDRAULIC STRUCTURES
Theory / Lab:	Theory
L-T-P-C:	3 1 0 4
Course Outcomes:	
CO-1	Ability to design weirs and barrages
CO-2	Ability to design over flow and non over flow gravity dams
CO-3	Ability to design canal regulating structures (canal drops and regulators)
CO-4	Ability to design cross drainage works
CO-5	Ability to design weirs and barrages

Course-10

Course Code:	A1STT212
Course Title:	PLASTIC ANALYSIS AND DESIGN OF STEEL STRUCTURES
Theory / Lab:	Theory
L-T-P-C:	3 1 0 4
Course Outcomes:	
CO-1	Ability to calculate the concept of plastic moment carrying capacity of structures
CO-2	Ability to formulate mechanism and plastic moment
CO-3	Ability to perform minimum weight design of the structures

Course-11

Course Code:	
Course Title:	COMPUTER APPLICATIONS IN STRUCTURAL ENGINEERING LAB
Theory / Lab:	Lab
L-T-P-C:	3 1 0 4
Course Outcomes:	
CO-1	Ability to design different structures using commercial FE analysis software (STAAD Pro).
CO-2	Ability to develop Excel Spread sheets for various components of structures
CO-3	Ability to Analysis of Simple beams using ANSYS software

Semester-III Courses

Course-1

Course Code:	A1STT109
Course Title:	RESEARCH METHODOLOGIES
Theory / Lab:	Theory
L-T-P-C:	0-0-0-2
Course Outcomes:	
CO-1	Identify appropriate topics for research work.
CO-2	Conduct literature review of the emerging topics in core research area.
CO-3	Frame and design major experimental methods to carry out research.
CO-4	Know of the ethical practices in research, academic integrity and plagiarism.

Course-2

Course Code:	A1STV401
Course Title:	COMPREHENSIVE VIVA
Theory / Lab:	Lab

L-T-P-C:	0-0-0-2
Course Outcomes:	
CO-1	Exhibit strong technical knowledge of various courses covered in the program.
CO-2	Explain clearly technical and practical concepts of the courses covered in the program.
CO-3	Present with confidence the real time application of the concepts covered in the program.

Course-3

Course Code:	A1STR401
Course Title:	Pre-requisite Study
Theory / Lab:	Lab
L-T-P-C:	0-0-0-2
Course Outcomes:	
CO-1	Acquire basic knowledge of the pre-requisite courses that supplement the project thesis work.
CO-2	Aware of the nuances of the important concepts that are to be applied in the project thesis work.
CO-3	Present in the form of a report the concepts that are covered during the study.

Course-4

Course Code:	A1STS501
Course Title:	SEMINAR
Theory / Lab:	Lab
L-T-P-C:	0-0-0-2
Course Outcomes:	
CO-1	Conduct literature review of an emerging area in core research domain.
CO-2	Prepare and submit a concise report of a selected topic in core research domain.
CO-3	Commuicate effectively through a seminar the work carried out on the selected topic.

Course-5

Course Code:	A1STT501
Course Title:	Project Phase-I
Theory / Lab:	Lab
L-T-P-C:	0-0-0-8
Course Outcomes:	
CO-1	Identify research topic in the core research domain.
CO-2	Conduct literature review of the research domain.
CO-3	Frame objectives of the project thesis.
CO-4	Design methodology of the project thesis.

Semester-IV Courses

Course-1

Course Code:	A1STT502
Course Title:	Project Phase-II
Theory / Lab:	Lab
L-T-P-C:	0-0-0-16
Course Outcomes:	
CO-1	Develop experimental methodology for the project thesis.
CO-2	Analyse, test and design solutions for the selected project thesis.
CO-3	Prepare a detailed project thesis report in line with ethical and academic regulations.

Dept. of EEE

Course outcomes (Cos) of all courses of all programs offered by the institution

B.Tech. (Electrical and Electronics Engg)

Semester-I Courses

Course-1	
Course Code:	A1MAT001
Course Title:	ENGINEERING MATHEMATICS-I
Theory / Lab:	Theory
L-T-P-C:	3 - 1* - 0 - 3
Course Outcomes:	
CO-1	Students will be able to apply the knowledge of solving 1st order & 1st degree differential equations in finding orthogonal trajectories of families of curves, Growth& Decay problems
CO-2	Student will be able to find the solution of initial value problems and be able to evaluate improper integrals of particular kind by using Laplace Transforms
CO-3	Students will be able to apply the concepts of Maxima and Minima for finding extreme values
CO-4	Student will be able to formulate and solve P.D.E and be able to apply the knowledge in finding the solutions of one dimensional wave equation and one dimensional heat equation.

Course-2	
Course Code:	A1CYT001
Course Title:	ENGINEERING CHEMISTRY
Theory / Lab:	Theory
L-T-P-C:	3 - 0 - 0 -3
Course Outcomes:	
CO-1	Students gain the knowledge about water used in industries (boilers etc) and for drinking purpose, difference between hard water and soft water, estimation of hardness of water and specification of potable water and purification of sea water through reverse osmosis
CO-2	Students gain the knowledge of galvanic cells, concentration cells, applications of ion selective electrodes, Conductometry and Potentiometry to understand the principle and applications of electrochemistry. Topics on electrochemical cells, batteries and fuel cells make students understand the alternate sources of energy and also help them to tackle problems of corrosion and control
CO-3	Students gain the knowledge on mechanism of corrosion, factors responsible, types corrosion and methods of protection
CO-4	Students gain the knowledge on structure, synthesis properties and applications of polymers, additives to be mixed with polymers to obtain desired plastics and moulding techniques, advanced topics on plastics like conducting polymers and biodegradable polymers, fibre reinforced plastics and bullet proof plastics, synthetic plastics that are essential to latest technology
CO-5	Student gain the knowledge on the determination of calorific value by bomb calorimeter, the proximate and ultimate analysis of coal, Fractional distillation of crude, followed by catalytic cracking to obtain the liquid fuels for the functioning of internal combustion engine, octane and cetane number, which have large focus on oil industry
CO-6	Students gain knowledge on advanced materials like carbon nano tubes and fullerenes, their properties and applications, manufacturing of cement, need for green chemistry, principles of green chemistry solar cells and greenhouse effect and their importance

Course-3	
Course Code:	A1CET001
Course Title:	BASICS OF CIVIL & MECHANICAL ENGINEERING
Theory / Lab:	Theory
L-T-P-C:	3 - 1 - 0 - 3
Course Outcomes:	
CO-1	Student will be able to understand floor area, plinth area, and building materials such as brick, cement, concrete, steel
CO-2	Student will be able to understand the concepts of surveying, infrastructure such as buildings, roads, bridges, dams
CO-3	Student will be able to understand the working and function of various components of systems and subsystems of I.C. Engines, turbines, pumps and refrigerating systems
CO-4	Student will be able to identify various types of mechanical components suitable for power transmission
CO-5	Student will be able to understand Casting, forming and different metal joining processes like Welding, Brazing, Soldering

Course-4	
Course Code:	A1MED001
Course Title:	ENGINEERING DRAWING
Theory / Lab:	Lab

L-T-P-C:	1 - 0 - 3 - 3
Course Outcomes:	
CO-1	Student will be able to construct regular polygons, conic curves and simple scales
CO-2	Student will be able to draw orthographic projections of points, lines, planes and solids
CO-3	Student will be able to produce isometric projection from orthographic projections and vice-versa

Course-5

Course Code:	A1CIT001
Course Title:	COMPUTER PROGRAMMING
Theory / Lab:	Theory
L-T-P-C:	3 - 1* - 0 - 3
Course Outcomes:	
CO-1	Have the ability to write a formal algorithmic solution for the given problem & explain the features of C like types including scalar & vector types, operators, expressions, expression evaluation, operator precedence, sequential, conditional & iterative constructs
CO-2	Have the ability to use modular programming constructs of C while appreciating different ways of exchanging inputs and outputs among modules and different memory allocation strategies in C
CO-3	Have the ability to define & use user defined data types using C constructs and write C programs that handles files
CO-4	Grasp the significance of primary constructs & methodology of procedural language C and appreciate the orthoganality of the same in writing reasonably complicated programs
CO-5	Grasp the significance of type extendibility in C, need for address as a data type and library functions for dealing with files in writing more complicated programs
CO-6	Fully appreciate the art of procedural programming in C and develop programs optimally using the full feature set of C language

Course-6

Course Code:	A1EHL001
Course Title:	ENGLISH LANGUAGE PRACTICE -I
Theory / Lab:	Lab
L-T-P-C:	1 - 0 - 2 - 2
Course Outcomes:	
CO-1	Student shall have the ability understand the syntactical and grammatical intricacy
CO-2	Student shall be able to use right structure for right context and meaning
CO-3	Student shall be able to read and comprehend the content in English well
CO-4	Student shall be able to write well for his/her professional requirement
CO-5	Student shall be able to Speak in English well
CO-6	Student shall be able to understand and analyze the core components of his study well

Course-7

Course Code:	A1CYL001
Course Title:	ENGINEERING CHEMISTRY LAB
Theory / Lab:	Lab
L-T-P-C:	0 - 0 - 3 - 2
Course Outcomes:	
CO-1	Students will gain knowledge on the method of determination of acid/base, total hardness, iron and zinc contents in the sample solution
CO-2	Students will gain knowledge on the principles of conductometric, potentiometric, pH metric and colorimetric methods of determination
CO-3	Students will understand in construction of galvanic cell, determination of calorific value, and preparation of biodiesel

Course-8

Course Code:	A1CIL001
Course Title:	COMPUTER PROGRAMMING LABORATORY
Theory / Lab:	Lab
L-T-P-C:	0 - 0 - 3 - 2
Course Outcomes:	
CO-1	Have the ability to pick and choose the required built-in data-types for the specific problem and utilize the full power of operators and expression evaluation of C Language while writing programs for any given problem
CO-2	Have the ability to use choose and utilize different control constructs in C Language depending on the context of the need while developing a C program for any specific problem
CO-3	Have the ability to divide the parts of a program solution into functions and write a program in C as an inter-play of functions using each other in what is called modular programming
CO-4	Have the ability to fully appreciate the concept and utilization of single and multi-dimensional arrays of different data-types in C
CO-5	Have the ability to appreciate the concept of address variables and understand the benefits and utilization of the same along with under the flexibility provided by dynamic memory allocation and its comparison to static memory allocation

CO-6	Have the ability to appreciate the concept of user defined data types and utilize these concepts to define new composite data types as required for implementing solutions to a problem in a C program

Semester-II Courses

Course-1

Course Code:	A1MAT002
Course Title:	MATHEMATICAL METHODS
Theory / Lab:	Theory
L-T-P-C:	3 - 1* - 0 - 3
Course Outcomes:	
CO-1	Student will be able to obtain the solution of linear system of equations which frequently occur in engineering problems
CO-2	Student will gain the proficiency in finding the Eigen values and Eigen vectors and reduction of quadratic forms to canonical forms
CO-3	Student will be able to estimate the missing terms of given data using interpolation
CO-4	Student will be able to solve Initial value problems through numerical methods.
CO-5	Student will be able to find the solution of Difference equations which arise in discrete time systems

Course-2

Course Code:	A1PYT002
Course Title:	APPLIED PHYSICS
Theory / Lab:	Theory
L-T-P-C:	3 - 0 - 0 - 3
Course Outcomes:	
CO-1	Student will be able to understand the phenomena of interference, diffraction and polarization exhibited by light waves
CO-2	Student shall understand about laser, its characteristics and production with an example and application of laser in specific to optic fiber
CO-3	The student shall understand about different crystal systems, space lattices, and parameters of unit cell and the Bragg's law of X-ray diffraction
CO-4	Student will be able to understand foundation principles of quantum mechanics and semiconductors
CO-5	Student shall understand about response of the materials in presence of electric and magnetic fields and the basic laws of electromagnetic waves

Course-3

Course Code:	A1CHT001
Course Title:	ENVIRONMENTAL STUDIES
Theory / Lab:	Theory
L-T-P-C:	3 - 0 - 0 - 3
Course Outcomes:	
CO-1	Student will have knowledge on the natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources
CO-2	Student will have knowledge on the concepts of the ecosystem and its function in the environment, biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
CO-3	Student will have knowledge on various attributes of the pollution and their impact and measures to reduce or control the pollution along with waste management practices
CO-4	Student will have knowledge on social issues both rural and urban environment and the possible means to combat the challenges
CO-5	Student will have knowledge on the environmental legislations of India and the first global initiatives towards sustainable development, environmental assessment and the stages involved in EIA and the environmental audit

Course-4

Course Code:	A1EET002
Course Title:	ELECTRICAL CIRCUIT ANALYSIS – I
Theory / Lab:	Theory
L-T-P-C:	3 - 1 - 0 - 3
Course Outcomes:	
CO-1	Identify the appropriate 'Network reduction' technique for a particular application
CO-2	Differentiate the Electrical circuit performance with variation of one of its parameters
CO-3	Apply the principles of Magnetism in Electrical circuits
CO-4	Analyze the Electrical network behaviour for various excitation types
CO-5	Design and develop suitable DC or Single-phase Electrical circuit for a particular application
CO-6	Assess the Electrical Network performance by a suitable technique

Course-5

Course Code:	A1MAT104

Course Title:	ENGINEERING MATHEMATICS-II
Theory / Lab:	Theory
L-T-P-C:	3 - 1* - 0 - 3
Course Outcomes:	
CO-1	Student will be able to solve boundary value problems using Fourier series and Fourier transforms
CO-2	Student will be able to find the lengths ,surface area of revolution and volume of revolution for various curves
CO-3	Student will be able to understand the physical significance of vector operators
CO-4	Student will be able to apply vector integral theorems to evaluate Line, Surface and Volume integrals with ease

Course-6

Course Code:	A1MEW001
Course Title:	BASIC ENGINEERING WORKSHOP
Theory / Lab:	Lab
L-T-P-C:	0 - 0 - 3 - 2
Course Outcomes:	
CO-1	Will be aware of the basic engineering trades and be able to execute related work at a rudimentary level
CO-2	Will be able to select and use proper tools for the different tasks
CO-3	Will be able to apply knowledge and skills developed to handle real-life situations in these areas

Course-7

Course Code:	A1EHL002
Course Title:	ENGLISH LANGUAGE PRACTICE -II
Theory / Lab:	Lab
L-T-P-C:	1 - 0 - 2 - 2
Course Outcomes:	
CO-1	Student shall have the ability to speak intelligibly
CO-2	Student shall be able to use phrases, foreign expressions and idioms correctly
CO-3	Student shall be able to participate well in debates and discussions
CO-4	Student shall be able to write both Technical and General reports well
CO-5	Student shall be able prepare resume well and face the interviews confidently
CO-6	Student shall communicate confidently and effectively

Course-8

Course Code:	A1PYL002
Course Title:	APPLIED PHYSICS LAB
Theory / Lab:	0 - 0 - 3 - 2
L-T-P-C:	
Course Outcomes:	
CO-1	Student will be able to experimentally observe interference and diffraction patterns of light waves due to different optical devices and determine the given parameters.
CO-2	Student shall understand the tir process in the optic fiber experimentallyand will be able to determine the numerical aperture and bending loss of the optic fiber
CO-3	Student shall experimentally determine the temperature coefficient of resistance, energy gap, type of charge carriers and concentration of charge carriers in a semiconductor and to study the I-V characteristics of the given p-n junction diode.
CO-4	Student shall experimentally study the magnetic hysteresis and determine related parameters and study the variation of magnetic fields due to currents and to study the frequency response of LCR circuits.

Semester-III Courses

Course-1

Course Code:	A1EET201
Course Title:	Electronic Devices & Circuits - I
Theory / Lab:	Theory
L-T-P-C:	3 - 1 - 0 - 4
Course Outcomes:	
CO-1	Identify the characteristics of basic electronic devices such as diodes, transistors, Field effect transistors
CO-2	Differentiate the effect of Positive and Negative Feedback on various electronic circuits
CO-3	Acquire experience in building and trouble-shooting simple electronic circuits
CO-4	Analyze the DC bias circuitry of BJT and FET
CO-5	Design simple circuits containing non-linear elements such as transistors using the concepts of load lines, operating point
CO-6	Assess performance of various filters which are used in Rectifiers

Course-2

Course Code:	A1EET202
Course Title:	Electrical Circuit Analysis - II
Theory / Lab:	Theory
L-T-P-C:	3 - 1 - 0 - 4

Course Outcomes:	
CO-1	Identify Network response for various Excitation types under different operating conditions
CO-2	Differentiate the Network response for various Excitation types
CO-3	Apply the methods of Synthesizing an Electrical Network
CO-4	Analyze Network behavior under different operating conditions
CO-5	Design and develop a suitable Three-phase circuit for a particular application
CO-6	Assess Harmonics in the Network response

Course-3

Course Code:	A1EET203
Course Title:	Electro Magnetic Field Theory
Theory / Lab:	Theory
L-T-P-C:	3 - 1 - 0 - 4
Course Outcomes:	
CO-1	Identify the appropriate vector analysis concepts for a particular application
CO-2	Differentiate between electrical field intensities due to various charge configurations
CO-3	Identify the fundamental laws of electromagnetic theory and apply these laws in the development of the theory for power transmission lines and electrical machines
CO-4	Analyze the behavior of thesis fields in different medias
CO-5	Design and develop various types of capacitances and inductances for all types of configurations
CO-6	Assess performance of various materials

Course-4

Course Code:	A1EET204
Course Title:	Signals & Systems
Theory / Lab:	Theory
L-T-P-C:	3 - 1 - 0 - 4
Course Outcomes:	
CO-1	Understand the classification of various signals and systems and also to analyze their properties
CO-2	Transform signals in time domain to frequency domain using Fourier series and Fourier transform
CO-3	Know about sampling theorem and its application in re-construction of a signal
CO-4	Analyze filter characteristics and properties of linear time variant and invariant systems
CO-5	Analyze Continuous time signals using Laplace Transforms in the complex frequency plane and discrete time systems using Z-Transforms
CO-6	Interpret signals and analyze system response using convolution integral

Course-5

Course Code:	A1EET205
Course Title:	Electrical Machines - I
Theory / Lab:	Theory
L-T-P-C:	3 - 1 - 0 - 4
Course Outcomes:	
CO-1	Select the appropriate machine for a particular application
CO-2	Distinguish various types of machines with respect to their application
CO-3	Appreciate the applications of DC machines and Transformers
CO-4	Analyze the performance of DC machines and Transformers
CO-5	Design and develop various machines based on requirement
CO-6	Assess performance of various machines

Course-6

Course Code:	A1MAT110
Course Title:	Complex Variables &Statistical methods
Theory / Lab:	Theory
L-T-P-C:	3 - 1* - 0 - 3
Course Outcomes:	
CO-1	Student will be able to construct the conjugate harmonic functions and Orthogonal Trajectories
CO-2	Student will be able to evaluate integrals of complex functions in the given region
CO-3	Student will be able to estimate the population parameters using sample data
CO-4	Student will be able to test the hypothesis for large samples and small samples

Course-7

Course Code:	A1EEL201
Course Title:	Electrical Circuits Laboratory
Theory / Lab:	Lab
L-T-P-C:	0 - 0 - 3 - 2
Course Outcomes:	
CO-1	Identify appropriate Network reduction technique for a particular application
CO-2	Differentiate between various types of Network reduction techniques
CO-3	Apply various methods of circuit analysis and circuit synthesis
CO-4	Analyze various Electrical networks by different methods under various load conditions

CO-5	Design and develop various Electrical circuit models for analysis purpose
CO-6	Assess the performance of Electrical networks under different operating conditions for different excitations

Course-8

Course Code:	A1EEL202
Course Title:	Electrical Machines - I Laboratory
Theory / Lab:	Lab
L-T-P-C:	0 - 0 - 3 - 2
Course Outcomes:	
CO-1	Design and conduct experiments on DC machines and single phase transformers, as well as to analyse and interpret data
CO-2	Understand the basic testing procedures for DC motors for evaluation of their performance
CO-3	Demonstrate load characteristics of Dc generators
CO-4	Illustrate performance of a given single phase transformer
CO-5	Demonstrate separation of eddy current and hysteresis losses in a single phase transformer through suitable experiment
CO-6	Compare various tests available for evaluating the performance of machines

Course-9

Course Code:	A1EHT512
Course Title:	GENERAL APTITUDE
Theory / Lab:	Audit Course - I
L-T-P-C:	2 - 0 - 0 - 0
Course Outcomes:	
CO-1	Students will be able to improve their employability skills

Semester-IV Courses

Course-1

Course Code:	A1EET206
Course Title:	Electronic Devices & Circuits - II
Theory / Lab:	Theory
L-T-P-C:	3 - 1 - 0 - 4
Course Outcomes:	
CO-1	Identify the appropriate semiconductor device for a particular application
CO-2	Differentiate between various types of electronic switching devices
CO-3	Apply the principles of synchronization for various signal generators
CO-4	Analyze the circuits involving discreet components
CO-5	Design and develop circuits to generate square, pulse wave forms using discreet electronic components

Course-2

Course Code:	A1EET207
Course Title:	Electrical Machines - II
Theory / Lab:	Theory
L-T-P-C:	3 - 1 - 0 - 4
Course Outcomes:	
CO-1	Select the appropriate machine for a particular application
CO-2	Distinguish various types of machines with respect to their application
CO-3	Appreciate the applications of AC machines
CO-4	Analyze the performance of AC machines
CO-5	Design and develop various machines based on requirement
CO-6	Assess performance of various machines

Course-3

Course Code:	A1EET208
Course Title:	Power Generation & Control
Theory / Lab:	Theory
L-T-P-C:	3 - 1 - 0 - 4
Course Outcomes:	
CO-1	Able to identify the different components of conventional and renewable power generation
CO-2	Able to explain the working of conventional and renewable power generation plants
CO-3	Able to analyze the effect of Load factor, Demand factor and Diversity factor on the Cost of Generation of Electrical power
CO-4	Able to apply control and compensations schemes on a power system
CO-5	Able to identify different Tariff types applicable to consumers based on their load demand

Course-4

Course Code:	A1EET209
Course Title:	Digital Electronics
Theory / Lab:	Theory

L-T-P-C:	3 - 1 - 0 - 4
Course Outcomes:	
CO-1	Identify the appropriate logic gates for designing digital circuits
CO-2	Differentiate between combination and sequential circuits
CO-3	Apply the theorems of Boolean algebra for minimizing and realizing the Boolean functions
CO-4	Analyze the various Programmable Logic Devices
CO-5	Design and develop various Finite State Machine for implementing Boolean functions

Course-5

Course Code:	A1EET210
Course Title:	Control Systems
Theory / Lab:	Theory
L-T-P-C:	3 - 1 - 0 - 4
Course Outcomes:	
CO-1	Identify the basic elements and structure of control system
CO-2	Explain the concept of time domain Analysis
CO-3	Apply knowledge of s-domain methods to predict system performance
CO-4	Assess the stability of the control system
CO-5	Design Compensators to achieve desired performance
CO-6	Analyse control system using State space methods

Course-6

Course Code:	A1EET301
Course Title:	Data Structures
Theory / Lab:	Theory
L-T-P-C:	2 - 0 - 2 - 3
Course Outcomes:	
CO-1	To describe the usage of various data structures
CO-2	To explain the operations for maintaining common data structures
CO-3	To write programs using linked structures such as List, trees, and graphs
CO-4	To design and apply appropriate data structures for solving computing problems
CO-5	To implement different data structures and related algorithms
CO-6	To choose the appropriate data structure to solve a programming problem

Course-7

Course Code:	A1EEL203
Course Title:	Electronic Devices & Circuits Laboratory
Theory / Lab:	Lab
L-T-P-C:	0 - 0 - 3 - 2
Course Outcomes:	
CO-1	Understand and Analyse the different types of diodes, operation and its characteristics
CO-2	Design and analyse the DC bias circuitry of BJT
CO-3	To analyze and design diode application circuits and amplifier circuits employing BJT, FET devices

Course-8

Course Code:	A1EEL204
Course Title:	Electrical Machines - II Laboratory
Theory / Lab:	Lab
L-T-P-C:	0 - 0 - 3 - 2
Course Outcomes:	
CO-1	Design and conduct experiments on single phase induction motors, three phase induction motors, alternators and synchronous motors, as well as to analyse and interpret data
CO-2	Understand the basic testing procedures for single phase induction motors and three phase induction motors for evaluation of their performance
CO-3	Demonstrate the equivalent circuit parameters of single phase induction motors, three phase induction motors and synchronous machines
CO-4	Illustrate the ways of synchronizing a alternator to infinite bus bars
CO-5	Demonstrate the effect of change of excitation of an alternator
CO-6	Compare various methods available for determining voltage regulation of alternators

Course-9

Course Code:	A1EHT510
Course Title:	SOFT SKILLS – I
Theory / Lab:	Audit Course
L-T-P-C:	1 - 0 - 2 - 0
Course Outcomes:	
CO-1	Students shall develop their interpersonal skills and shall be an effective goal oriented team player
CO-2	Students shall evolve as professional with idealistic, practical and moral values
CO-3	Students shall develop communication and problem solving skills
CO-4	Students develop improve their attitude towards life and understand its influence on their behavior.

Semester-V Courses

Course-1	
Course Code:	A1EET211
Course Title:	Linear &Digital IC Applications
Theory / Lab:	Theory
L-T-P-C:	4 - 0 - 0 - 4
Course Outcomes:	
CO-1	Understand various linear and non-linear Applications of Op-Amp
CO-2	Apply the principles of synthesis to design various types filters
CO-3	Design ADC and DAC with Op-Amps
CO-4	Design circuits to generate various types of signals

Course-2	
Course Code:	A1EET212
Course Title:	Power Electronics
Theory / Lab:	Theory
L-T-P-C:	3 - 1 - 0 - 4
Course Outcomes:	
CO-1	Classify the characteristics of various power semiconductor devices and select the appropriate semiconductor device for a particular application
CO-2	Design triggering circuits for SCR
CO-3	Analyze the operation of single phase and three phase full–wave converters and analyze harmonics in the input current
CO-4	Explain the operation of single phase AC voltage controller and cyclo converter
CO-5	Analyze the operation of different DC-DC converters
CO-6	Explain the working of inverters and application of PWM techniques for voltage control and harmonic mitigation

Course-3	
Course Code:	A1EET213
Course Title:	Power Transmission and Distribution
Theory / Lab:	Theory
L-T-P-C:	3 - 1 - 0 - 4
Course Outcomes:	
CO-1	Determine the electrical & mechanical parameters of the transmission lines
CO-2	Analyse the voltage and current relationship in short, medium and long transmission lines
CO-3	Explain various factors affecting the performance of the transmission lines
CO-4	Demonstrate the performance of various overhead line insulators and UG Cables
CO-5	Demonstrate AC and DC distribution systems
CO-6	Ability to design an earthing for substation

Course-4	
Course Code:	A1EET214
Course Title:	Electrical Measurements & Instrumentation
Theory / Lab:	Theory
L-T-P-C:	3 - 1 - 0 - 4
Course Outcomes:	
CO-1	Classify the electrical measuring instruments
CO-2	Identify the proper method of measurement and instrument for various electrical parameters
CO-3	Differentiate Analog and Digital measuring instruments
CO-4	Explain the construction and working of analog and digital measuring instruments
CO-5	List the uses and applications of signal analysers

Course-5	
Course Code:	A1EET305
Course Title:	Special Electrical Machines
Theory / Lab:	Theory (Core Elective - II)
L-T-P-C:	3 - 0 - 0 - 3
Course Outcomes:	
CO-1	An ability to understand the principle of operation and construction details of Stepper motor, Switched Reluctance motor, PMDC & Permanent Magnet Brushless DC motors and Linear Induction motors
CO-2	Able to analyze the process of Electronics commutation and the generation of Hall signals according to the rotor position of BLDC motors
CO-3	Will develop an ability to analyze the concept of Thrust development in linear induction motors and the transverse & edge effects
CO-4	Ability to analyze the characteristics of different special machines and its application depending on the performance

CO-5	Able to apply the knowledge of single sided & double-sided linear induction motors in electric traction system

Course-6

Course Code:	A1EET309
Course Title:	Artificial Intelligence Techniques
Theory / Lab:	Theory (Core Elective - III)
L-T-P-C:	3 - 0 - 0 - 3
Course Outcomes:	
CO-1	Understand the characteristics and problem solving methods of Artificial Intelligent System
CO-2	Know the importance of neural network and its various functions and models
CO-3	Apply the training and learning algorithms for various networks
CO-4	Understand the fundamentals of genetic algorithms by various selection processes
CO-5	Employ the classic fuzzy sets in fuzzy rule base and decision making
CO-6	Understand the various applications of neural network applications in electrical engineering

Course-7

Course Code:	A1EEL205
Course Title:	Control Systems Laboratory
Theory / Lab:	Lab
L-T-P-C:	0 - 0 - 3 - 2
Course Outcomes:	
CO-1	Determine the transfer function of systems
CO-2	Understand importance of controllers and compensators
CO-3	Understand servo systems
CO-4	Understand and analyze the performance and working of control system components
CO-5	Analyze the time domain and frequency response analysis of control systems
CO-6	Design lag, lead and lag-lead compensators.

Course-8

Course Code:	A1EEL206
Course Title:	IC & PDC Laboratory
Theory / Lab:	Lab
L-T-P-C:	0 - 0 - 3 - 2
Course Outcomes:	
CO-1	Ability to understand the importance of ICs and can select ICs for given Application
CO-2	Ability to design various circuits using discrete elements and ICs
CO-3	Ability to design active filters for given specifications
CO-4	Ability to understand various control circuits
CO-5	Ability design various signal generators like square, wave triangular and etc

Course-9

Course Code:	A1EHT511
Course Title:	SOFT SKILLS – II
Theory / Lab:	Audit Course
L-T-P-C:	1 - 0 - 2 - 0
Course Outcomes:	
CO-1	Students shall develop their interpersonal skills and shall be an effective goal oriented team player
CO-2	Students shall evolve as professional with idealistic, practical and moral values
CO-3	Students shall develop communication and problem solving skills
CO-4	Students develop improve their attitude towards life and understand its influence on their behavior

Semester-VI Courses

Course-1

Course Code:	A1EET215
Course Title:	Power Semiconductor Drives
Theory / Lab:	Theory
L-T-P-C:	4 - 0 - 0 - 4
Course Outcomes:	
CO-1	Identify the appropriate electric drive system for a particular application
CO-2	Differentiate between operations of various types of drives
CO-3	Understand the operation of single and multi quadrant operation of drive
CO-4	Analyze any type of 1Φ & 3Φ rectifiers fed to DC motors as well as chopper fed to DC motors
CO-5	Design and model various closed loop controllers for controlling the electrical drives
CO-6	Assess performance of both D.C/A.C drives

Course-2

Course Code:	A1EET216
Course Title:	Computer Methods in Power Systems & Protection
Theory / Lab:	Theory

L-T-P-C:	4 - 0 - 0 - 4
Course Outcomes:	
CO-1	Understand power system modeling for normal and abnormal conditions
CO-2	Acquire knowledge of solvingpower system problems under normal and abnormal conditions
CO-3	Understand condition of the system when it is subjecting to small signal and large signal dynamics
CO-4	Demonstrate various numerical methods to study load flows, short circuit conditions and stability of power systems
CO-5	Demonstrate computer relaying techniques
CO-6	Understand computer based protection schemes of generators, transformers and transmission lines

Course-3

Course Code:	A1EET217
Course Title:	EMBEDDED PROCESSORS
Theory / Lab:	Theory
L-T-P-C:	3 - 1 - 0 - 4
Course Outcomes:	
CO-1	Recognize various microcontrollers
CO-2	Recall the basics of AVR microcontroller and its applications
CO-3	Recognize the importance of peripheral devices and their interfacing
CO-4	Understand the features and operation of 8051 micro controller
CO-5	Interpret the features and operation of AVR micro controller
CO-6	Implement microcontroller based methods for measurement of electrical quantities, motor control techniques and serial communication buses

Course-4

Course Code:	A1EET310
Course Title:	Digital Control Systems
Theory / Lab:	Theory (Core Elective - IV)
L-T-P-C:	3 - 1 - 0 - 3
Course Outcomes:	
CO-1	Apply Z-Transform and the concept of state space to test the performance of Digital Control Cystems
CO-2	Inspect controllability and observability of Digital control systems
CO-3	Identify Suitable Compensators to achieve the desired performance of System
CO-4	Analyse the performance of Digital control systems
CO-5	Test the stability of Digital control systems
CO-6	Design compensators and controllers by pole placement technique to achieve the desired performance of conventional Methods

Course-5

Course Code:	A1EET314
Course Title:	Utilization of Electrical Energy
Theory / Lab:	Theory (Core Elective - V)
L-T-P-C:	3 - 1 - 0 - 3
Course Outcomes:	
CO-1	Able to identify a suitable motor for electric drives and industrial applications
CO-2	Able to identify most appropriate heating or welding techniques for suitable applications
CO-3	Able to understand various level of luminosity produced by different illuminating sources.
CO-4	Able to estimate the illumination levels produced by various sources and recommend the most efficient illuminating sources and should be able to design different lighting systems by taking inputs and constraints in view
CO-5	Able to determine the speed/time characteristics of different types of traction motors
CO-6	Able to estimate energy consumption levels at various modes of operation

Course-6

Course Code:	A1MET401
Course Title:	INTRODUCTION TO ROBOTICS
Theory / Lab:	Theory (Open Elective - I)
L-T-P-C:	3 - 0 - 0 - 3
Course Outcomes:	
CO-1	Identify components and classification of robot
CO-2	Capable of performing transformation in developing forward and inverse kinematic problems
CO-3	Select actuators and sensors for different robot applications
CO-4	Design work cell and select robots for applications

Course-7

Course Code:	A1CET403
Course Title:	ROAD SAFETY ENGINEERING
Theory / Lab:	Theory (Open Elective - I)
L-T-P-C:	3 - 0 - 0 - 3
Course Outcomes:	

CO-1	Recall the road safety policies in place to prevent accidents
CO-2	Identify different types of road accidents and their causes
CO-3	Summarize different methods to enhance road safety
CO-4	Recall road safety audit procedures

Course-8

Course Code:	A1CIT405
Course Title:	Web Designing and Development
Theory / Lab:	Theory (Open Elective - I)
L-T-P-C:	3 - 0 - 0 - 3
Course Outcomes:	
CO-1	Analyze a web page and identify its elements and attributes
CO-2	Create web pages using XHTML and Cascading Styles sheets
CO-3	Build dynamic web pages
CO-4	Build web applications using PHP
CO-5	Deployment of web applications using server technology
CO-6	Establishing database connectivity

Course-9

Course Code:	A1EEL207
Course Title:	Electrical Measurements & Instrumentation Laboratory
Theory / Lab:	Lab
L-T-P-C:	0 - 0 - 3 - 2
Course Outcomes:	
CO-1	Measure various electrical quantities with accuracy, precision, resolution
CO-2	Calibrate various measuring instruments
CO-3	Verify the errors of different instruments for measurement of electrical quantities

Course-10

Course Code:	A1EEL208
Course Title:	Power Electronics Laboratory
Theory / Lab:	Lab
L-T-P-C:	0 - 0 - 3 - 2
Course Outcomes:	
CO-1	Describe the characteristics of different semiconductor devices and select suitable switch choices for a given application
CO-2	Identify, analyze and design suitable triggering circuits for given application
CO-3	Explain the operation and analysis of different AC to DC converters.
CO-4	Explain the operation and analysis of different AC to AC converters
CO-5	Explain the operation of DC to AC converters and differentiate single phase parallel bridge inverter with PWM inverter

Semester-VII Courses

Course-1

Course Code:	A1ECT219
Course Title:	Principles of Communication Engineering
Theory / Lab:	Theory
L-T-P-C:	4 - 0 - 0 - 4
Course Outcomes:	
CO-1	Have the ability to explain need for modulation
CO-2	Utilize the significance of Sampling to practical solutions in future prospects
CO-3	Have ability to apply the Concepts of Modulation, Demodulation and Multiplexing in professional tasks.
CO-4	Have the ability to understand the basic building blocks in advanced communication systems

Course-2

Course Code:	A1MST001
Course Title:	Managerial Economics & Financial Analysis
Theory / Lab:	Theory
L-T-P-C:	3 - 0 - 0 - 3
Course Outcomes:	
CO-1	Able to understand application of economics in decision making
CO-2	Able to develop and determine cost efficient production through optimization
CO-3	Able to aware various business environmental factors and the impact
CO-4	Able to do financial analysis of the firm to know its performance from different parameters.

Course-3

Course Code:	A1EET316
Course Title:	Power System Operation & Control
Theory / Lab:	Theory (Core Elective - VI)

L-T-P-C:	3 - 0 - 0 - 3
Course Outcomes:	
CO-1	Compute optimal scheduling of thermal power generators with and without transmission line losses
CO-2	Explain hydrothermal scheduling and unit commitment problem
CO-3	Model and analyze single area power system in controlled and uncontrolled case
CO-4	Model and analyze two area power system in controlled and uncontrolled case
CO-5	Explain reactive power control and its compensation
CO-6	Explain the necessity and the effect of computer control in power systems

Course-4

Course Code:	A1EET320
Course Title:	Switchgear and protection
Theory / Lab:	Theory (Core Elective - VII)
L-T-P-C:	3 - 0 - 0 - 3
Course Outcomes:	Explain the importance of protection and usage of grounding techniques and lightning arresters
CO-1	Explain about the operation of electromagnetic relays and their usage in respective applications
CO-2	Explain the principles and operations of different types of static relays and current era of numerical relays
CO-3	Explain the basic principles of arc interruption, circuit breaking principles, operation of various types of circuit breakers
CO-4	Explain various types of faults in generators and transformers and different types of protective schemes
CO-5	Impart knowledge of various protective schemes used for induction motors, feeders and busbars
CO-6	

Course-5

Course Code:	A1EET324
Course Title:	Power Quality
Theory / Lab:	Theory (Core Elective - VIII)
L-T-P-C:	3 - 0 - 0 - 3
Course Outcomes:	
CO-1	Recognize various types of power quality problems, power quality standards defined by various committees
CO-2	Describes the events behind the transients and their classification & effects
CO-3	Distinguish between voltage & current harmonics and harmonics & transients
CO-4	Distinguish between short and long duration voltage variations
CO-5	Relate the Distribution generation(DG) and power quality
CO-6	Monitor and Diagnostic various power quality problems also modelled by using mathematical simulating tools

Course-6

Course Code:	A1MET401
Course Title:	INTRODUCTION TO ROBOTICS
Theory / Lab:	Theory (Open Elective - II)
L-T-P-C:	3 - 0 - 0 - 3
Course Outcomes:	
CO-1	Identify components and classification of robot
CO-2	Capable of performing transformation in developing forward and inverse kinematic problems
CO-3	Select actuators and sensors for different robot applications
CO-4	Design work cell and select robots for applications

Course-7

Course Code:	A1CET403
Course Title:	ROAD SAFETY ENGINEERING
Theory / Lab:	Theory (Open Elective - II)
L-T-P-C:	3 - 0 - 0 - 3
Course Outcomes:	
CO-1	Recall the road safety policies in place to prevent accidents
CO-2	Identify different types of road accidents and their causes
CO-3	Summarize different methods to enhance road safety
CO-4	Recall road safety audit procedures

Course-8

Course Code:	A1CET401
Course Title:	PROJECT PLANNING AND MANAGEMENT
Theory / Lab:	Theory (Open Elective - II)
L-T-P-C:	3 - 0 - 0 - 3
Course Outcomes:	
CO-1	Know the concepts of project planning and management
CO-2	Construct networks using PERT and CPM techniques
CO-3	Update networks using resource allocation and resource smoothening
CO-4	List different management information systems

Course-9

Course Code:	A1EEL209

Course Title:	Power Systems Laboratory
Theory / Lab:	Lab
L-T-P-C:	0 - 0 - 3 - 2
Course Outcomes:	
CO-1	Find the sequence impedance parameters of alternator and transformer
CO-2	Measure the Dielectric strength and leakage current of oil and insulators
CO-3	Draw the Break-down characteristics & power angle characteristics of sphere gap and synchronous machine respectively

Course-10

Course Code:	A1EEL210
Course Title:	Embedded Processors Lab
Theory / Lab:	Lab
L-T-P-C:	0 - 0 - 3 - 2
Course Outcomes:	
CO-1	Do basic arithmetic operations
CO-2	Generate required triggering pulses for various applications
CO-3	Control the motor using embedded processors
CO-4	Interface LCD using 8051 micro controller
CO-5	Measure electrical quantities
CO-6	Communicate with different devices

Semester-VIII Courses

Course-1

Course Code:	A1EEP601
Course Title:	Directed Study & Project
Theory / Lab:	
L-T-P-C:	0 - 0 - 15 - 10
Course Outcomes:	
CO-1	Demonstrate a sound technical knowledge of their selected project topic
CO-2	Undertake problem identification, formulation and solution by considering ethical responsibility
CO-3	Design engineering solutions to complex problems utilizing as system approach
CO-4	Conduct an engineering project that has environmental impact
CO-5	Communicate with engineers and the community at large in written and oral forms
CO-6	Demonstrate the knowledge, skills and attitudes of a professional engineer

M.Tech. (Power Systems)

Semester-I Courses

Course-1

Course Code:	A1EPS201
Course Title:	POWER SYSTEM OPERATION & CONTROL
Theory / Lab:	Theory
L-T-P-C:	4 - 0 - 0 - 4
Course Outcomes:	
CO-1	Understand power-frequency dynamics
CO-2	Apply control and compensations schemes on a power system
CO-3	Adopt contingency analysis and selection methods to improve system security

Course-2

Course Code:	A1EPS202
Course Title:	HVDC TRANSMISSION
Theory / Lab:	Theory
L-T-P-C:	4 - 0 - 0 - 4
Course Outcomes:	
CO-1	Distinguish between HVAC and HVDC transmission
CO-2	Grasp the key technology and system composition in modern HVDC design
CO-3	Analyze various converters used in HVDC Transmission
CO-4	Derive the harmonics in HVDC and design the filters
CO-5	Draw the converter control characteristics
CO-5	Identify the various types of faults in converter and in HVDC lines

Course-3

Course Code:	A1EPS203
Course Title:	MODELING & SIMULATION OF POWER ELECTRONIC SYSTEMS
Theory / Lab:	Theory
L-T-P-C:	4 - 0 - 0 - 4

Course Outcomes:	
CO-1	Understand the process of developing mathematical model of Power Electronic Devices and computer simulation techniques widely used for Power electronic Converters
CO-2	Explains a mathematical model and Simulation of AC-DC and DC-DC Converters
CO-3	Device a mathematical model and Simulation of DC motor drive systems
CO-4	Device a mathematical model and Simulation of Induction Drive Systems
CO-5	Device a mathematical model and Simulation of Synchronous motor drive systems

Course-4

Course Code:	A1EPS205
Course Title:	RENEWABLE ENERGY SOURCES
Theory / Lab:	Theory
L-T-P-C:	4 - 0 - 0 - 4
Course Outcomes:	
CO-1	Describe the principles of renewable energy production from various renewable sources
CO-2	Distinguish between the sustainable energy sources and fossil energy sources
CO-3	Describe the main components of different renewable energy systems
CO-4	Perform simple techno-economical assessments of renewable energy systems
CO-5	Compare different renewable energy technologies and choose the most appropriate based on local conditions
CO-6	Explain the technological basis for harnessing renewable energy sources

Course-5

Course Code:	A1EPS301
Course Title:	EMBEDDED SYSTEMS
Theory / Lab:	Theory
L-T-P-C:	3 - 0 - 0 - 3
Course Outcomes:	
CO-1	Describe the evolution of microprocessors and various types of architectures
CO-2	Explain the architecture and features of 8051, PIC 16F, Atmega & ARM family of processors
CO-3	Demonstrate the concepts learnt to write assembly language programs, simulate and debug in IDEs for 8051
CO-4	Illustrate the concepts learnt to write simple programs in C for AVR microcontrollers
CO-5	Device microcontroller based methods for measurement of electrical quantities, motor control techniques and serial communication buses

Course-6

Course Code:	A1EPS302
Course Title:	DIGITAL SIGNAL PROCESSING
Theory / Lab:	Theory
L-T-P-C:	3 - 0 - 0 - 3
Course Outcomes:	
CO-1	Describe the discrete-time signals analytically and visualize them in the time domain
CO-2	Discuss relation between various types of transforms
CO-3	Use the different transforms to solve the various types of problems
CO-4	Compare FIR filters with IIR filters
CO-5	Design and develop any digital filter
CO-6	Assess performance of various types of digital filters

Course-7

Course Code:	A1EPS303
Course Title:	MODERN CONTROL SYSTEMS
Theory / Lab:	Theory
L-T-P-C:	3 - 0 - 0 - 3
Course Outcomes:	
CO-1	Identify suitable compensator and controllers to achieve desired specifications
CO-2	Predict the controllability and observability of the control system by using state space analysis
CO-3	Analyze Non-linear control systems
CO-4	Apply modern control techniques to assess system behavior
CO-5	Design state feedback controllers and state observe
CO-6	Assess the system stability by using Liapunov method

Course-8

Course Code:	A1EPS304
Course Title:	GENERATION & MEASUREMENTS OF HIGH VOLTAGES
Theory / Lab:	Theory
L-T-P-C:	3 - 0 - 0 - 3
Course Outcomes:	
CO-1	Select the HV equipment for a particular application
CO-2	Distinguish various types of HV measuring devices with respect to their application
CO-3	Appreciate the applications of HV generating and measuring devices
CO-4	Design and develop various HV generating and measuring equipment based on requirement

CO-5	Assess performance of various HV generating and measuring devices

Course-9

Course Code:	A1EPS305
Course Title:	AI TECHNIQUES
Theory / Lab:	Theory
L-T-P-C:	3 - 0 - 0 - 3
Course Outcomes:	
CO-1	Understand the challenges and the usefulness of Artificial Intelligence with design a game playing program
CO-2	Appreciate the issues involved in knowledge bases, reasoning systems, and planning
CO-3	Understand the various learning methods and search algorithms
CO-4	Understand the potential and current research issues in Artificial Intelligence

Course-10

Course Code:	A1EPS306
Course Title:	POWER SYSTEM RESTRUCTURING & DEREGULATION
Theory / Lab:	Theory
L-T-P-C:	3 - 0 - 0 - 3
Course Outcomes:	
CO-1	Understand of operation of deregulated electricity market systems
CO-2	Typical issues in electricity markets
CO-3	To analyze various types of electricity market operational and control issues using new mathematical models

Course-11

Course Code:	A1PSL201
Course Title:	POWER SYSTEMS LABORATORY
Theory / Lab:	Lab
L-T-P-C:	0 - 0 - 3 - 2
Course Outcomes:	
CO-1	Apply power system fundamentals to the design of a system that meet specific needs
CO-2	Design a power system solution based on the problem requirements and realistic Constraints
CO-3	Develop a major design experience in power a system that prepares them for engineering practice
CO-4	Interpret the experimental results and correlating them with the practical power system

Semester-II Courses

Course-1

Course Code:	A1PST105
Course Title:	Power System Dynamics
Theory / Lab:	Theory
L-T-P-C:	4 - 0 - 0 - 4
Course Outcomes:	
CO-1	Acquire knowledge of various mathematical modelling techniques for formulating problems under normal and abnormal conditions
CO-2	Understand condition of the system subjecting to static, small signal and large signal dynamics
CO-3	Demonstrate various numerical methods to solve the formulated problems
CO-4	Illustrate the impact of specific condition of a power system network on its operation
CO-5	Plan proper protection systems, reactive power compensation elements, necessary changes in configurations
CO-6	Compare the response of network for new incorporations and justify the results

Course-2

Course Code:	A1PST106
Course Title:	FLEXIBLE AC TRANSMISSION SYSTEMS
Theory / Lab:	Theory
L-T-P-C:	4 - 0 - 0 - 4
Course Outcomes:	
CO-1	Demonstrate knowledge and understanding of facts concepts and systems
CO-2	Analyze and design reactive power compensation systems
CO-3	Solve real and reactive power flow problems
CO-4	Evaluate the impact of flexible AC transmission systems of modern power systems

Course-3

Course Code:	A1PST107
Course Title:	POWER QUALITY
Theory / Lab:	Theory
L-T-P-C:	4 - 0 - 0 - 4
Course Outcomes:	
CO-1	Recognize various types of power quality problems, power quality standards defined by various committees
CO-2	Describe the events behind the transients and their classification & effects
CO-3	Distinguish between voltage & current harmonics and harmonics & transients

CO-4	Distinguish between short and long duration voltage variations
CO-5	Relate the Distribution generation(DG) and power quality

Course-4

Course Code:	A1PST108
Course Title:	SMART GRID
Theory / Lab:	Theory
L-T-P-C:	4 - 0 - 0 - 4
Course Outcomes:	
CO-1	Students will develop more understanding on the concepts of Smart Grid and its present developments
CO-2	Students will study about different Smart Grid technologies
CO-3	Students will acquire knowledge about different smart meters and advanced metering infrastructure
CO-4	Students will have knowledge on power quality management in Smart Grids
CO-5	Students will develop more understanding on LAN, WAN and Cloud Computing for Smart Grid applications

Course-5

Course Code:	A1PST207
Course Title:	DISTRIBUTION AUTOMATION
Theory / Lab:	Theory
L-T-P-C:	3 - 0 - 0 - 3
Course Outcomes:	
CO-1	Acquire knowledge on characteristics and components of electrical distribution system
CO-2	Understand how automation distribution system is done
CO-3	Demonstrate communication techniques, economic evaluation methods
CO-4	Illustrate the technical benefits of distribution system automation
CO-5	Develop the automation in a distribution network
CO-6	Appraise the distribution forecasting data and conclude future expansions

Course-6

Course Code:	A1PST208
Course Title:	Condition Monitoring of Power Apparatus
Theory / Lab:	Theory
L-T-P-C:	3 - 0 - 0 - 3
Course Outcomes:	
CO-1	Recall the necessity of condition monitoring and reliability and maintenance strategies
CO-2	Assess the condition of various electrical installation based on insulation status and various tests
CO-3	Implement the condition monitoring plan for rotating electrical machines and develop the preventive measures to be taken for any failure in machines
CO-4	Develop basic functional models for condition monitoring system to different kind of power apparatus
CO-5	Identify the cause of damage in the equipment with advanced tools and techniques of condition monitoring
CO-6	Analyse the vibration of rotating electrical machines

Course-7

Course Code:	A1PST209
Course Title:	ADVANCED POWER SYSTEM PROTECTION
Theory / Lab:	Theory
L-T-P-C:	3 - 0 - 0 - 3
Course Outcomes:	
CO-1	To learn about various types of protective relays for power system
CO-2	To acquire an in-depth knowledge on the protection of transmission lines, generators and transformer
CO-3	To understand the concept of digital protection and computer relaying for power system

Course-8

Course Code:	A1PST210
Course Title:	POWER SYSTEM PLANNING & RELIABILITY
Theory / Lab:	Theory
L-T-P-C:	4 - 0 - 0 - 4
Course Outcomes:	
CO-1	Understanding some advanced concepts of power system reliability and planning that will be useful for engineering professional practice in the power sector operation and planning
CO-2	Forecast the long and short term demand
CO-3	Learn generation planning and reliability

Course-9

Course Code:	A1PST211
Course Title:	POWER SYSTEM TRANSIENTS
Theory / Lab:	Theory
L-T-P-C:	3 - 0 - 0 - 3
Course Outcomes:	
CO-1	Understand the phenomena of travelling waves in transients

CO-2	Understand the phenomena of switching transients
CO-3	Understand the voltage distribution in motors ,transformers and generator windings
CO-4	Acquire thorough knowledge of protection in lines ,stations, alternators and drive systems
CO-5	Get an overview of generation and measurement of AC and DC impulse voltages

Course-10

Course Code:	A1PST212
Course Title:	High Voltage Testing Techniques
Theory / Lab:	Theory
L-T-P-C:	4 - 0 - 0 - 4
Course Outcomes:	
CO-1	Able to understand the significance of various tests conducted on high voltage apparatus
CO-2	Able know the methods available for monitoring the health of insulation system
CO-3	Able to understand principles of design and operation of high-voltage testing equipment
CO-4	Able to apply knowledge and technical competence in a wide range of lightening and switching overvoltage protection in HV power station
CO-5	Able to implement methods of investigation of electrical withstand of gas, liquid and solid insulators and appropriate equipment and its measurement
CO-6	Able to elaborate, illustrate, interpret and compare obtained measurement or test results and draws appropriate conclusions

Course-11

Course Code:	A1PSL202
Course Title:	Simulation Laboratory
Theory / Lab:	Theory
L-T-P-C:	0 - 0 - 3 - 2
Course Outcomes:	
CO-1	Understand the mathematical model of Power system components
CO-2	Model various power system components using MATLAB/Simulink and PSCAD
CO-3	Model and understand the steady state, transient behaviour of power system components operated in real-time networks
CO-4	Improve the programming skills in solving Power system operation and control issues using MATLAB
CO-5	Appreciate the advantage of Power system simulation software's in reducing the human effort in terms of computation complexity and computation time
CO-6	Do projects involving the Power system simulation using MATLAB/Simulink and PSCAD

Course-12

Course Code:	
Course Title:	Research Methodologies
Theory / Lab:	
L-T-P-C:	
Course Outcomes:	
CO-1	Carry out Literature Survey
CO-2	Identify appropriate topics for research work in core domain
CO-3	Select and define appropriate research problem and parameters
CO-4	Design the use of major experimental methods for research
CO-5	Use appropriate tools, techniques, and processes of doing research in core domain
CO-6	Demonstrate own contribution to the body of knowledge
CO-7	Become aware of the ethics in research, academic integrity and plagiarism
CO-8	Write a research report and thesis

Dept. of Mechanical Engg

Course ou Course outcomes (Cos) of all courses of all programs offered by the institution

I B.Tech. (Mechanical Engg)

Semester-I Courses

Course-1	
Course Code:	A1MAT001
Course Title:	Engineering Mathematics – I
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Students will be able to apply the knowledge of solving 1st order & 1st degree differential equations in finding orthogonal trajectories of families of curves, Growth & Decay problems
CO-2	Student will be able to find the solution of initial value problems and be able to evaluate improper integrals of particular kind by using Laplace Transforms
CO-3	Students will be able to apply the concepts of Maxima and Minima for finding extreme values
CO-4	Student will be able to formulate and solve P.D.E and be able to apply the knowledge in finding the solutions of one dimensional wave equation and one dimensional heat equation.

Course-2	
Course Code:	A1PYT001
Course Title:	Engineering Physics
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Student will be able to understand the phenomena of interference, diffraction and polarization exhibited by light waves and the characteristics of lasers with an example and its application in specific to optic fiber.
CO-2	The student shall understand about different crystal systems, space lattices, and parameters of unit cell and the Bragg's law of X-Ray diffraction.
CO-3	Student shall understand about response of the materials in presence of electric and magnetic fields.
CO-4	Student will gain knowledge on the basic laws of thermodynamics, work done, thermodynamic processes and entropy
CO-5	Student will be able to understand the system of forces (non equilibrium) and different types frictions.

Course-3	
Course Code:	A1CIT001
Course Title:	Computer Programming
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	have the ability to write a formal algorithmic solution for the given problem & explain the features of C like types including scalar & vector types, operators, expressions, expression evaluation, operator precedence, sequential, conditional & iterative constructs.
CO-2	have the ability to use modular programming constructs of C while appreciating different ways of exchanging inputs and outputs among modules and different memory allocation strategies in C.
CO-3	have the ability to define & use user defined data types using C constructs and write C programs that handles files.
CO-4	grasp the significance of primary constructs & methodology of procedural language C and appreciate the orthoganality of the same in writing reasonably complicated programs
CO-5	grasp the significance of type extendibility in C, need for address as a data type and library functions for dealing with files in writing more complicated programs.
CO-6	Fully appriciate the art of procedural programming in C and develop programs optimally using the full feature set of C language

Course-4	
Course Code:	A1MED001
Course Title:	Engineering Drawing

Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Student will be able to construct regular polygons, conic curves and simple scales
CO-2	Student will be able to draw orthographic projections of points, lines, planes and solids
CO-3	Student will be able to produce isometric projection from orthographic projections & vice-versa

Course-5

Course Code:	A1CHT001
Course Title:	Environmental Studies
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Student will have knowledge on the natural resourses and their importance for the sustenance of the life and recongnize the need to conserve the natural resources
CO-2	Student will have knowledge on the concepts of the ecosystem and its function in the environment, biodiversity of India and the threats to the biodiversity, and conservation practices to protect the biodiversity
CO-3	Student will have knowledge on various attributes of the pollution and their impact and measures to reduce or control the pollution along with the waste management practices
CO-4	Student will have knowledge on social issues both rural and urban environment and the possible means to combat the challenges
CO-5	Student will have knowledge on the enviroment legislations of India and the first global initiatives towards the sustainable development, environmental assessment and the stages involved in EIA and the environemtent audit

Course-6

Course Code:	A1EHL001
Course Title:	English Language Practice-I
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Student shall have the abilitity understand the synthetical and grammatical intricacy
CO-2	Student shall be able to use right structure for right context and meaning
CO-3	Student shall be able to read and comprehend the content in English well
CO-4	Student shall be able to write well for his/her professional requirement
CO-5	Student shall be able to speak in English well
CO-6	Student shall be able to understand and analyse the core components of his study well

Course-7

Course Code:	A1PYL001
Course Title:	Engineering Physics Lab
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Student will be able to experimentally observe interference and diffraction patterns of light waves due to different optical devices and to determine the numerical aperture and bending loss of the optic fiber
CO-2	Student shall experimentally study the magnetic hysteresis and determine related parameters and study the variation of magnetic fields due to currents using tangent law.
CO-3	Student will be able to determine the specific heat and coefficient of thermal conductivity for the given materials.
CO-4	Student will be able to determine the resultant of the system of foces and coefficient of friction.

Course-8

Course Code:	A1CIL001
Course Title:	Computer Programming Lab
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Have the ability to pick and choose the required built in data types for the specific problem and utilize the full power of operators and expression evaluation in C language while writing programs for any given problem
CO-2	Have the ability to use choose and utilize different control constructs in C language depending on the context of the need while developing a C program for any specific problem
CO-3	Have the ability to devide the parts of a program solution in to functions and write a program in C as an inter-play of functions using each other in what is called modular programming
CO-4	Have the abiltity to fully appriciate the concept and utilization of a single and multi-dimensional arrays of different data types in C

CO-5	Have the abiltity to appriciate the concept of address variables and understand the benefits and utilisations of the same along with under the flexibility provided by dynamic memory allocation and its comparison to static memory allocation
CO-6	Have the abiltity to appriciate the concept of user defined data types and utilize these concepts to define new composite data types required for implementing solutions to a problem in a C program

Semester-II Courses

Course-1	
Course Code:	A1MAT002
Course Title:	Mathematical Methods
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Student will be able to obtain the solution of linear system of equations which frequently occur in engineering problems
CO-2	Student will gain the proficiency in finding the Eigen values and Eigen vectors and reduction of quadratic forms to canonical forms
CO-3	Student will be able to estimate the missing terms of given data using interpolation
CO-4	Student will be able to solve Initial value problems through numerical methods.
CO-5	Student will be able to find the solution of Difference equations which arise in discrete time systems.
CO-6	

Course-2	
Course Code:	A1CYT001
Course Title:	Engineering Chemistry
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Students gain the knowledge about water used in industries (boilers etc) and for drinking purpose, difference between hard water and soft water, estimation of hardness of water and specification of potable water and purification of sea water through reverse osmosis
CO-2	Students gain the knowledge of galvanic cells, concentration cells, applications of ion selective electrodes, Conductometry and Potentiometry to understand the principle and applications of electrochemistry. Topics on electrochemical cells, batteries and fuel cells make students understand the alternate sources of energy and also help them to tackle problems of corrosion and control.
CO-3	Students gain the knowledge on mechanism of corrosion, factors responsible, types corrosion and methods of protection.
CO-4	Students gain the knowledge on structure, synthesis properties and applications of polymers, additives to be mixed with polymers to obtain desired plastics and moulding techniques, advanced topics on plastics like conducting polymers and biodegradable polymers, fibre reinforced plastics and bullet proof plastics, synthetic plastics that are essential to latest technology.
CO-5	Student gain the knowledge on the determination of calorific value by bomb calorimeter, the proximate and ultimate analysis of coal, Fractional distillation of crude, followed by catalytic cracking to obtain the liquid fuels for the functioning of internal combustion engine, octane and cetane number, which have large focus on oil industry
CO-6	Students gain knowledge on advanced materials like carbon nano tubes and fullerenes, their properties and applications, manufacturing of cement, need for green chemistry, principles of green chemistry solar cells and greenhouse effect and their importance.

Course-3	
Course Code:	A1EET001
Course Title:	Basic Electrical & Electronics Engineering
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	The students will be able to analyze various types of electrical circuits
CO-2	The sudents will have ability to identify suitable machine for a particular application
CO-3	The students will have the ability to explain the working principle of different types of semiconductor devices
CO-4	The students will have the ability to explain the concepts of Communication Systems

Course-4	
Course Code:	A1MET001
Course Title:	Engineering Mechanics
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	

CO-1	Students will be able to draw free body diagrams for different systems of forces which are balanced and apply equations of equilibrium to know the distribution of forces with and without consideration of friction.
CO-2	Students will be able find moments of inertia of any Area/Volume with definable boundaries and mass moments of inertia of bodies with definable volumes.
CO-3	Students will be able to find the displacement, velocity and accelerations of bodies subjected to unbalanced system of forces.
CO-4	Students will be able to solve the problems of dynamics by alternative methods like work energy method, impulse momentum equation etc.

Course-5

Course Code:	A1MAT104
Course Title:	Engineering Mathematics - II
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Student will be able to solve boundary value problems using Fourier series and Fourier transforms.
CO-2	Student will be able to find the lengths ,surface area of revolution and volume of revolution for various curves.
CO-3	Student will be able to understand the physical significance of vector operators.
CO-4	Student will be able to apply vector integral theorems to evaluate Line, Surface and Volume integrals with ease.

Course-6

Course Code:	A1EHL002
Course Title:	English Language Practice – II
Theory / Lab:	Lab
L-T-P-C:	1-0-2-2
Course Outcomes:	
CO-1	Student shall have the ability to speak intelligibly
CO-2	Student shall be able to use phrases, foreign expressions and idioms correctly
CO-3	Student shall be able to participate well in debates and discussions
CO-4	Student shall be able to write both Technical and General reports well
CO-5	Student shall be able prepare resume well and face the interviews confidently
CO-6	Student shall communicate confidently and effectively

Course-7

Course Code:	A1CYL001
Course Title:	Engineering Chemistry Lab
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Students will gain knowledge on the method of determination of acid/base, total hardness, iron and zinc contents in the sample solution.
CO-2	Students will gain knowledge on the principles of conductometric, potentiometric, pH metric and colorimetric methods of determination.
CO-3	Students will understand in construction of galvanic cell, determination of calorific value, and preparation of biodiesel.

Course-8

Course Code:	A1MEW001
Course Title:	Basic Engineering Workshop
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Will be aware of the basic engineering trades and be able to execute related work at a rudimentary level
CO-2	Will be able to select and use proper tools for the different tasks
CO-3	Will be able to apply knowledge and skills developed to handle real-life situations in these areas

Semester-III Courses

Course-1

Course Code:	A1MET201
Course Title:	Metallurgy and Material Science
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Student can distinguish between different kinds of materials and classify them according their applications

CO-2	Enable to take adequate decision about heat treatment.
CO-3	Latest techniques of heat treatment applicable for non ferrous alloys.
CO-4	Different processing techniques involved in modern materials.

Course-2

Course Code:	A1MET202
Course Title:	Engineering Thermodynamics
Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	Identify open and closed systems and analyze related problems
CO-2	Understanding the concepts such as work interaction, heat transfer and laws of thermodynamics
CO-3	Demonstrate the importance of P-V, T-S and H-S diagrams.
CO-4	Analyze the performance of gas and vapor power cycles and identify methods to improve thermodynamic performance

Course-3

Course Code:	A1MET203
Course Title:	Mechanics of Materials
Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	Design structural members given the dimensions, material properties such as force-displacement relationships, boundary conditions, loading, allowable stresses, and factor of safety
CO-2	Determine the bending, compressive, tensile strength, torsional strength of the Material.
CO-3	Draw the shear force and bending moment diagrams for various beams under different loading conditions, selection of beam for a given application
CO-4	Determine the stresses developed in thin and thick cylinders for given pressure (internally or externally)
CO-5	Determine the deflections of beams under various loading conditions (Double integration and Macaulay's methods

Course-4

Course Code:	A1MET204
Course Title:	Fluid Mechanics and Hydraulic Machines and Systems
Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	Identify the type of fluid flow and know the different properties of fluids along with the units.
CO-2	Formulate the principles of conservations of mass, momentum, and energy as applied to a variety of internal and external flows. ii. Formulate the principles of conservations of mass, momentum, and energy as applied to a variety of internal and external flows.
CO-3	Evaluate the performance characteristics of pumps and turbines

Course-5

Course Code:	A1MEST001
Course Title:	Managerial Economics and Financial Analysis
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	An ability to apply the knowledge of managerial and economic concepts.
CO-2	An ability to design a system according to the resourcesavailability to meet the organizational needs.
CO-3	An ability to use the techniques and skills and methods ofmanagement to resolve the issues at organizational levels as wellas at global level
CO-4	An ability to identify managerial problems with optimum solutions.
CO-5	An Ability to apply the tools and techniques.
CO-6	An ability to design a system according to the resources availability to meet the organizational needs.
CO-7	Helps, in preparation of the financial-statements in accordance with the Generally Accepted Accounting Principles

Course-6

Course Code:	A1MEL201
Course Title:	Material Testing Lab
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Evaluate Young Modulus, torsional strength, hardness and tensile strength of given specimens

CO-2	Determine the strength of coarse aggregates
CO-3	Find the compressive strength of concrete cubes and bricks
CO-4	Find stiffness of open coiled and closed coiled springs
CO-5	Determine the wear characteristics of ferrous, non-ferrous and composite materials for different parameters

Course-7

Course Code:	A1EEL211
Course Title:	Basic Electrical and Electronics Engineering Lab
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Student will be able to select suitable motor for a particular application.
CO-2	Student will be able to design and analyse the performance of dc and ac machines.
CO-3	Will be able to select a suitable device for a required application
CO-4	Will be able to determine different parameters and different ranges of operation.
CO-5	Will be able to design and analyze the performance of a rectifier for a required application.

Course-8

Course Code:	A1MEL203
Course Title:	Computer Aided Engineering Drawing Lab
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	The student can clearly differentiate different types of projections
CO-2	Skills of freehand sketching to aid in the visualization process and to efficiently communicate ideas graphically will be developed.
CO-3	The student can solve problems related to orthographic projections, sections of solids, development of surfaces etc.
CO-4	The student is able to draw 2D and 3D drawings of an object using software
CO-5	The student can discuss knowledgeably concepts of Solid Modeling and Design
CO-6	The student can represent Dimensions for 2D and 3D drawings

Semester-IV Courses

Course-1

Course Code:	A1MAT109
Course Title:	Probability and Statistics
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Students will be able to apply probabilistic tools to study systems with random components in many areas of communication networks, electro physics and computers
CO-2	Students will be able to find the probabilities using discrete and continuous distributions
CO-3	Students will be able to predict and control the numerical and time series data occurs in industry and scheduling
CO-4	Student will able to evaluate the performance measures of the systems in networks, transportation systems, production lines with statistical methods of Regression and SQC.

Course-2

Course Code:	A1MET205
Course Title:	Kinematics of Machinery
Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	The students will be able to identify and differentiate different types of pairs and their usage in different types of mechanisms in achieving a desired motion
CO-2	The students will be able to enunciate concepts behind mechanisms which produce straight line motion, steering mechanisms and universal joint
CO-3	The students will be able to draw velocity and acceleration diagrams of various mechanisms.
CO-4	The students will be able to enunciate different types of cam and followers, their design and practical application.
CO-5	The students will be able to enunciate different types of gears, their terminology and practical application

Course-3

Course Code:	A1MET206
Course Title:	IC Engines and Compressors

Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	The Students will be able to describe the operating principles of SI and CI engines
CO-2	The sudents will be able to Differentiate and analyze the Air- Standard, Fuel Air and Actual Cycles
CO-3	The students will be able to Explain about normal combustion and abnormal combustion of IC engine
CO-4	The students will be able to Estimate Engine performance characteristics and prepare heat balance sheet for IC engine.
CO-5	The students will be able to Calculate and analyze the performance of reciprocating compressor
CO-6	The students will be able to Explain and Differentiate between axial and centrifugal compressors

Course-4

Course Code:	A1MED207
Course Title:	Machine Drawing
Theory / Lab:	Theory
L-T-P-C:	2-0-4-4
Course Outcomes:	
CO-1	Students are able to identify the conventional representation of different materials and can prepare the sectional views of different components.
CO-2	Students are capable of identify different types of tolerances, fits and surface roughness and can prepare production drawings of different components like connecting rod, stuffing box etc.,
CO-3	Students can differentiate temporary and permanent fasteners, and can prepare drawings of screwed, riveted joints, pipe joints and bearings.
CO-4	Students have proficiency to prepare assembly drawings of different machine components

Course-5

Course Code:	A1MET208
Course Title:	Manufacturing Processes
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Classify products simply in terms of their basic shape.
CO-2	Describe the difference between the hot and cold working of metals and give the advantages of each.
CO-3	Indicate which types of manufacturing process are suited to producing different shapes of product.
CO-4	Indicate which processes are likely to be used for producing a particular product using a specific material or class of material.
CO-5	Student able to know about different welding techniques for joining of different materials and can judge the type of welding to be done.
CO-6	Outline the concept of surface engineering for improving the properties of a component.

Course-6

Course Code:	A1MET209
Course Title:	Industrial Engineering and Management
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Understand the role of human relations in the management of operations
CO-2	Can apply the tools of operations and project management
CO-3	Apply fundamental management science to technical problem solving
CO-4	Do analysis of projects, operations and firms by having depth in knowledge

Course-7

Course Code:	A1MEL204
Course Title:	Fluid Mechanics and Hydraulic Machines Lab
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Conduct experiments and analyze the performance characteristics of pumps and turbines
CO-2	Distinguish different flow measuring devices and its applications
CO-3	Estimate major and minor losses in different types of pipe fittings

Course-8

Course Code:	A1MEL205
Course Title:	Production / Metallurgy Lab
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	

CO-1	Must be capable of selecting suitable pattern as per the component and follow necessary steps to prepare a mould cavity.
CO-2	Must be in a position to select type of welded joint and fabrication method for desired application keeping abreast with internal soundness
CO-3	Can select suitable sheet metal operations required for completion of a specific product and also design suitable die layout.
CO-4	To prepare failure analysis report.

Semester-V Courses

Course-1

Course Code:	A1MET210
Course Title:	Dynamics of Machinery
Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	analyze screw jack, bearings, brakes, dynamometers and clutches
CO-2	analyze governors and flywheels
CO-3	do static and dynamic balancing of rotating and reciprocating mass systems
CO-4	prepare physical and mathematical models of mechanical systems for vibration analysis
CO-5	apply gyroscopic principle to aero plane, ships, motor car, and motor cycle

Course-2

Course Code:	A1MET211
Course Title:	Design of Machine Members – I
Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	Apply design procedure to engineering problems, including the consideration of technical and manufacturing constraints.
CO-2	Select suitable material in design applications.
CO-3	Design permanent joints like riveted and welded joints.
CO-4	Design the machine member like fasteners, shafts, shaft couplings and springs subjected to static and dynamic loads.

Course-3

Course Code:	A1MET212
Course Title:	Computer Aided Design
Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	Understand the applications of computer for geometric modeling and analysis
CO-2	Understand CAD process and also interaction with other tools via neutral file formats
CO-3	Use mathematical representation techniques behind the generation of 2D curves and transformations imposed over models in CAD tools
CO-4	Use mathematical representation techniques behind the generation of surface entities in CAD tools
CO-5	Use representation techniques behind the generation of 3D solids in CAD tools
CO-6	Understand the concept of FEM and analysis involved for analyzing field problems as a part of CAD process

Course-4

Course Code:	A1MET213
Course Title:	Machining Processes
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Evaluate performance of a tool in terms of forces generated and life
CO-2	Describe the operation of any conventional machine tool and explain the design rationale behind it
CO-3	Identify and describe a wide range of tools available in the industry and select suitable tools for a specific machining setup
CO-4	Select appropriate work holding systems for a given requirement and describe the design rationale behind it
CO-5	Select the appropriate machining parameters depending upon the workpiece and operating constraints
CO-6	Describe the functioning of CNC machines currently used in industry, define the operating method for a given job and elucidate the design approach for critical CNC machine modules

Course-5

Course Code:	A1MET214
Course Title:	Steam and Gas Turbines
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Get an insight of various components of steam power plant
CO-2	Able to demonstrate the working of HP & LP boilers and its accessories
CO-3	Solve problems on steam nozzles and able to calculate the size of nozzle.
CO-4	Get an insight of various components and principles of steam turbines
CO-5	Able to understand the function of steam condenser and its limitations
CO-6	Able to explain the working principles and performance improvement methods of gas turbines

Course-6

Course Code:	A1MET301
Course Title:	Automobile Engineering
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Identify automobile components and select the automobiles for different applications
CO-2	Select the appropriate fuel supply, cooling systems for a particular field of automobile
CO-3	Distinguish between different electrical systems & transmission systems
CO-4	Identify the different suspension systems and braking systems for different automobiles
CO-5	Able to understand national and international standards of emissions and their control
CO-6	Select the and safety measures for automobiles

Course-7

Course Code:	A1MET305
Course Title:	Alternate Sources of Energy
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	students will be able to know the different methods of measurement and collection of solar radiation
CO-2	students will be understand the methods of storage of solar energy and applications
CO-3	students will be select sites for wind farm and working of different types of wind generators.
CO-4	students will be demonstrate different biomass energy conversion technologies.
CO-5	students will be understand the working of OTEC and TIDAL power plants
CO-6	students will be understand the concepts and applications of fuel cells, thermoelectric convertor and MHD generator.

Course-8

Course Code:	A1MET306
Course Title:	Advanced Mechanics of Materials
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Formulate mathematical relations for members under various loading.
CO-2	Analyze failure methodology of irregular sections.
CO-3	Analyze members failed under various loading using experimental data.
CO-4	Apply the knowledge of contact stress applications in various mechanical applications.

Course-9

Course Code:	A1MET307
Course Title:	Non Destructive Testing
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Importance of different non-destructive techniques and underlying principles
CO-2	Different NDT and NDE principles used in industries
CO-3	Need for ND testing over conventional techniques
CO-4	NDE techniques in Welding to find the no. of defects

Course-10

Course Code:	A1MEL206
Course Title:	Thermal Engineering Lab
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	The Students will be able to Draw the valve timing and port timing diagrams of IC engines and analyze the deviations from the ideal diagrams

CO-2	The sudents will be able to Conduct the experiments on various IC engines and calculate brake power, brake thermal efficiency and brake specific fuel consumption
CO-3	The students will be able to Prepare heat balance sheet and analyze how the heat is distributed to various components
CO-4	The students will be able to Analyze the performance of two stage reciprocating air compressor
CO-5	The students will be able to Calculate friction power of engine using Morse, Motoring test, retardation test and Willian's line methods
CO-6	The students will be able to Explain the functioning of different components of the boiler

Semester-VI Courses

Course-1	
Course Code:	A1MET215
Course Title:	Heat Transfer
Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	Compute temperature distribution and heat transfer rate in one dimensional steady heat conduction with and without heat generation
CO-2	Analyse heat transfer through fins and transient heat conduction problems.
CO-3	Interpret and analyse forced and free convective heat transfer in different engineering applications.
CO-4	Describe the heat transfer mechanism of boiling and condensation.
CO-5	Design heat exchangers using LMTD and NTU methods.
CO-6	Formulate and analyse radiation heat exchange between two surfaces.

Course-2	
Course Code:	A1MET216
Course Title:	Design of Machine Members–II
Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	Able to deign curved beams such as crane hooks, machine frames and C- clamps.
CO-2	Able to design power transmission elements such as gears, belts, chains, pulleys and ropes.
CO-3	Able to select the suitable bearing based on the application of the loads and predict the life of the bearing.
CO-4	Able to design engine parts such as cylinder, piston, connecting rod, crank shaft and gearbox.

Course-3	
Course Code:	A1MET217
Course Title:	Manufacturing Systems
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	identify the various elements and their activities in the Computer Integrated Manufacturing Systems
CO-2	explain the concepts of GT for the product development.
CO-3	to relate concepts such as 'Just in Time manufacturing' and 'Lean manufacturing'
CO-4	apply Lean and Agile manufacturing management and technological approaches in modern manufacturing systems

Course-4	
Course Code:	A1MET310
Course Title:	Robotics
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	identify components and classification of robot
CO-2	capable of performing transformation in developing forward and inverse kinematic and dynamic problems
CO-3	select actuators and sensors for different robot applications
CO-4	design work cell and select robots for applications

Course-5	
Course Code:	A1MET311
Course Title:	Advanced Machining Processes
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	

CO-1	Students will be having a proper understanding on basic concepts and difference between conventional and unconventional machining process
CO-2	Gains domain knowledge on Abrasive and water jet machining Methods and their implementation in respective industry.
CO-3	Understand the application of electro chemical machining and their principles in practice.
CO-4	Understand the practical aspects of the industry by using the Electro discharge machining and their , and its principles
CO-5	Estimate the material removal rate and cutting force, in an industrially useful manner, for practical machining processes like electro beam and laser beam machining process.
CO-6	Gains the domain knowledge on use of plasma machining in various industries and its influence on cost

Course-6

Course Code:	A1MET312
Course Title:	Industrial Safety
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	student should be able to learn about basics of safety management.
CO-2	student should be able to demonstrate safe operational procedures in industries.
CO-3	student should be able To be able to identify the occupational related health issues.
CO-4	student should be able to be able to identify the safe operating conditions.
CO-5	student should be able to be able to explain about different Factory regulations.
CO-6	student should be able to be able to apply different firefighting methods

Course-7

Course Code:	A1MET313
Course Title:	Refrigeration and Air Conditioning
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	student should be able to understand the need of Air refrigeration and its applications
CO-2	student should be able to demonstrate the working of vapor compression refrigeration system
CO-3	student should be able to identify and explain the components of refrigerating systems and refrigerants
CO-4	student should be able to demonstrate the working of vapor absorption refrigerating system
CO-5	student should be able to sketch different Psychometric Processes on psychrometric chart
CO-6	student should be able to explain the difference between summer, winter and year-round air conditioning systems

Course-8

Course Code:	A1MET314
Course Title:	Finite Element Methods
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	student will be able to prepare a finite element model and apply proper boundary conditions for solving various problems in engineering field
CO-2	student will be able to solve one dimensional problems using FEM
CO-3	students will be able to solve two dimensional problems and axisymmetric problems using CST and LST element
CO-4	student will able to perform thermal and dynamic analysis using 1-D and 2-D elements

Course-9

Course Code:	A1CET402
Course Title:	Air Pollution and Control
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	student should be able to decide the ambient air quality based on the analysis of air pollutants
CO-2	student should be able to judge the plume behaviour in a prevailing environmental condition
CO-3	student should be able to design particulate and gaseous control measures for an industry
CO-4	student should be able to apply the concept of ambient air quality in maintaining the air pollutant levels in the atmosphere

Course-10

Course Code:	A1CHT401
Course Title:	Non-Conventional Sources of Energy
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3

Course Outcomes:	
CO-1	should be able to explain the working of solar collectors and various applications
CO-2	should be able to explain different types of wind mills for power generation and the biomass sources
CO-3	should be able to explain the generating of power from geothermal energy and ocean energy.
CO-4	should be able to explain about different direct energy conversion devices.

Course-11

Course Code:	A1EET403
Course Title:	MATLab
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	student should be able to design a physical system
CO-2	student should be able to change a physical system as per requirement
CO-3	student should be able to experiment a physical system

Course-12

Course Code:	A1MEL207
Course Title:	Machine Tools and Metrology Lab
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	identify attend of course student is able to identify and select suitable cutting tools and tool material as per requirement for specific machining
CO-2	sequence of operations or process plan required for accomplishing a specific work
CO-3	select suitable machines for accomplishment of specific task
CO-4	select suitable accessories and attachment
CO-5	understand the importance of calibration of measuring instrument while machining

Course-13

Course Code:	A1MEL208
Course Title:	CAD/CAE Lab
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	generate 3D model from engineering drawings by using any 3D modelling CAD tool
CO-2	assemble number of 3D CAD parts as per the assembly drawing
CO-3	perform structural analysis by identifying appropriate elements, meshing and other tasks using FEA tool
CO-4	perform Thermal analysis by identifying appropriate elements, meshing and other tasks using FEA tool
CO-5	perform coupled field analysis by identifying appropriate elements, meshing and other tasks using FEA tool

Semester-VII Courses

Course-1

Course Code:	A1MET218
Course Title:	Operations Research
Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	Students must be able to understand different OR models, linear programming techniques and application of those techniques for business and industrial problems.
CO-2	Students must be able to understand different allocation methods like Transportation, Assignment and Replacement methods. Apply those techniques to the real life problems.
CO-3	Students must be able to understand different replacement techniques and apply those techniques for the replacement of items and different machine components in the industry.
CO-4	Students must be able to understand waiting line theory in relation with working process distribution, inventories and order back losses.
CO-5	Students must be able to understand different inventory models like uniform demand, non-uniform demand with finite and infinite production rates and to apply for real life problems.
CO-6	Students must be able to understand different simulation models and dynamic programming models for inventory, queuing problems, etc.,

Course-2

Course Code:	A1MET317
Course Title:	Power Plant Engineering
Theory / Lab:	Theory

L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Able to understand the layout and functioning of steam power plant
CO-2	Understand the working of Diesel and Gas turbine power plant.
CO-3	Able to explain the working principle of different types of Hydro electric power plant.
CO-4	Able to understand the working of Nuclear power generation and different types of reactors.
CO-5	Able to explain the working of various non-conventional power generations.
CO-6	Able to understand the economics of power generation and distribution

Course-3

Course Code:	A1MET318
Course Title:	Mechanical Vibrations and Condition Monitoring
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	analyze any single degree of freedom systems.
CO-2	analyze any multi degree freedom systems.
CO-3	analyze any multi degree of freedom systems using numerical methods.
CO-4	understand the reasons for selecting particular maintenance strategies
CO-5	understand the effective methodologies for implementing Condition Monitoring Techniques.
CO-6	identify the optimum maintenance strategy for different types of equipment

Course-4

Course Code:	A1MET319
Course Title:	Automation in Manufacturing
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Students will be able to identify the various elements of manufacturing automation
CO-2	Students will be able to analyze the performance of automated transfer and assembly lines
CO-3	Students will be able to demonstrate understanding of different handling and storage systems
CO-4	Students will be able to demonstrate understanding of different automation support systems and their applications

Course-5

Course Code:	A1MET320
Course Title:	Production Planning and Control
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Describe the way of integrating different departments to execute PPC functions
CO-2	To make forecasts in the manufacturing and service sectors using selected quantitative and qualitative techniques
CO-3	Understand importance and function of inventory systems in the industries.
CO-4	Optimize their plans in and around with the perfect planning and control on their objectives.
CO-5	Acquire abilities and capabilities in the areas of advanced manufacturing methods, quality assurance and shop floor management
CO-6	Design and validate technological solutions to defined problems

Course-6

Course Code:	A1MET321
Course Title:	Computational Fluid Dynamics
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Understand CFD methods and its applications.
CO-2	Develop mathematical formulations for fluid flow.
CO-3	Apply different discretization techniques for fluid flow and heat transfer
CO-4	Solve various PDE using different numerical methods
CO-5	Apply CFD to incompressible flows.
CO-6	Acquire skills to implement FVM for fluid flow and heat transfer.

Course-7

Course Code:	A1MET322
Course Title:	Creep, Fatigue And Fracture Mechanics
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	students can understand the importance of dislocations and their on physical properties of materials.

CO-2	This course will facilitate to understand the importance of creep, fatigue, impact and their combined action in analyzing engineering problems /failures.
CO-3	Able to learn how to engineer the material properties to meet certain specifications.
CO-4	Able to prepare a report on failure analysis of engineering components and also become the platform for material selection.

Course-8

Course Code:	A1MET323
Course Title:	Product Lifecycle Management
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Describe the product design process
CO-2	Identify and illustrate the role of PLM in enhancing productivity
CO-3	Describe the implementation of PLM
CO-4	Execute PLM implementation at a basic level

Course-9

Course Code:	A1MET325
Course Title:	Engineering in Motion
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Ability to explain the principles of different locomotives and the parameters influence their design and performance.
CO-2	Ability to demonstrate the thermodynamic principles, components and circuits used in aircrafts.
CO-3	Ability to design different propulsive systems and find out the performance of jet propulsive systems
CO-4	Ability to evaluate the fluid circuits and cryogenic engines for their performance
CO-5	Ability to apply the principles of rocket propulsion and differentiate the jet propulsion and rocket propulsion.
CO-6	Ability to understand the basics, fluid circuits, components of the ship and their working principles

Course-10

Course Code:	A1MET327
Course Title:	Surface Engineering
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Demonstrate a sound knowledge for the systematic application of alternative technologies used to fabricate coating systems
CO-2	Analyze complex service failure problems and determine the correct surface engineering solution
CO-3	Demonstrate knowledge of why the surface treatment affects the bulk properties of the material.
CO-4	Select the most suitable surface engineering techniques that would give the required properties

Course-11

Course Title:	A1MET329
Course Title:	Waste Heat Recovery and Co-Generation
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Able to understand the need of waste heat recovery
CO-2	Able to explain various waste heat recovery systems
CO-3	Able to design waste heat boiler
CO-4	Able to demonstrate the working of combined cycle power plant
CO-5	Able to state different applications of co-generation
CO-6	Able to understand the importance of financial and environmental considerations in co-generation systems.

Course-12

Course Title:	A1MET330
Course Title:	Introduction to Nanotechnology
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Identify the significance of nano materials
CO-2	Know various methods that synthesize nano materials
CO-3	Use various characterization techniques and properties of nano materials
CO-4	Use of carbon based nanomaterials for various industrial applications
CO-5	Design and demonstrate MEMS / NEMS devices for various applications

Course-13

Course Title:	A1MET331
Course Title:	Material Characterization Techniques
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Understanding the importance of different characterization techniques and underlying principles
CO-2	Importance of structure-property correlation in deciding the performance of a material for particular application
CO-3	Evaluating the thermodynamic properties of a material by characterization facilities like thermal analysis and gravimetric analysis
CO-4	Understanding the material's structure at different levels of magnification by characterization facilities like LM, SEM etc

Course-14

Course Code:	A1MET332
Course Title:	Instrumentation and Metrology
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Apply the fundamental principles of measurements and instrumentation methodology to solve practical problems related to experimental measurement and data analysis.
CO-2	Demonstrate the working principles of various instruments and calibration methods
CO-3	Able to analyze the working of an instrument and error analysis
CO-4	Ability to design the limit gauges.
CO-5	To understand the need of optical measuring instruments and operating the instruments.
CO-6	Understand the terminology and symbols pertaining to surface texture measurement.

Course-15

Course Code:	A1CET401
Course Title:	Road Safety Engineering
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	able to identify different types of road accidents and causes
CO-2	know the road transport policies to prevent accidents
CO-3	able to conduct road safety audits
CO-4	able to evaluate accident hotspots and recommend corrective measures

Course-16

Course Code:	A1EET404
Course Title:	Electrical Wiring, Estimation & Costing
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	able to understand various types of materials required for wiring
CO-2	prepare an estimate of quantity and cost of the material for a electrical project
CO-3	able to prepare detail estimate and costing of Residential, Industrial and commercial Electrical Installations following IE Act-2003
CO-4	able to prepare estimates for repairs and maintenance of electrical devices and equipment
CO-5	Know importance of earthing and selection of earthing

Course-17

Course Code:	A1MEL209
Course Title:	Heat Transfer Laboratory
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Demonstrate the fundamental principles of heat transfer in practice.
CO-2	Design and test practical heat transfer systems like heat exchangers, condensers, evaporators
CO-3	Develop empirical correlations for predicting heat rates for a given system
CO-4	Apply the concepts of heat transfer for measuring various material properties
CO-5	Use different empirical correlations for predicting heat transfer coefficient
CO-6	Analyze temperature distribution in different heat transfer systems

Course-18

Course Code:	A1MEL210
Course Title:	Robotics and CNC Laboratory
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	

CO-1	Calibrate sensors, acquire data; analyze using software & integrate.
CO-2	Interface sensors with microprocessors and Mechatronics subsystems using PLC.
CO-3	Program & operate 6 axis robo arm
CO-4	Troubleshoot, operate CNC right starting from CAD part programming.

Semester-VIII Courses

Course-1	
Course Code:	A1MEP601
Course Title:	Directed Study & Major Project
Theory / Lab:	Project
L-T-P-C:	0-0-0-10
Course Outcomes:	
CO-1	Identify, formulate, research literature and define an engineering problem
CO-2	Identify the pre requisites to find solution for the engineering problem defined and acquire the required knowledge and skills
CO-3	Constitute and work in multidisciplinary teams to synthesize the ideas
CO-4	Design and develop effective and ethical solutions for engineering problems for the society by keeping in view the human health and environmental issues
CO-5	Communicate/present solution for an engineering problem by means of effective reports and documentation
CO-6	Plan manage financial, infrastructural and human resources effectively and execute the project

M.Tech. (Product Design and Manufacturing)

Semester-I Courses

Course-1	
Course Code:	A1PDT101
Course Title:	Product Design
Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	Use the product life cycle and technology life cycle in development of new product
CO-2	Use the Product Design, as a means to manage the development of an idea from concept through to production
CO-3	Apply creative process techniques in synthesizing information, problem-solving and critical thinking.
CO-4	Select an appropriate product development approaches
CO-5	Know the principles, planning, technologies, types of rapid proto typing

Course-2	
Course Code:	A1PDT102
Course Title:	Computer Aided Design
Theory / Lab:	Theory
L-T-P-C:	3-1-0-4
Course Outcomes:	
CO-1	Understand the applications of computer for geometric modeling and analysis
CO-2	Understand CAD process and also interaction with other tools via neutral file formats
CO-3	Use mathematical representation techniques behind the generation of 2D curves and transformations imposed over models in CAD tools
CO-4	Use mathematical representation techniques behind the generation of surface entities in CAD tools
CO-5	Use representation techniques behind the generation of 3D solids in CAD tools
CO-6	Understand the concept of FEM and analysis involved for analyzing field problems as a part of CAD process

Course-3	
Course Code:	A1PDT103
Course Title:	Materials and Processes selection
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Identify the properties of various steels.
CO-2	Know the applications nano composites.
CO-3	Identify the materials used at various applications.
CO-4	Select the suitable materials using material property charts.
CO-5	Select the shape of the materials using material property charts.

Course-4	
Course Code:	A1PDT104

Course Title:	Advanced Manufacturing Technology
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Select suitable casting technique for given component to be manufactured.
CO-2	Classify various types of welding techniques, understand the requirements of sound weld and select suitable joining technique for given pieces for welding
CO-3	Understand the importance of sheet metal operations and economics of sheet metal parts and forming processes.
CO-4	Understand the need of micromachining and steps involved in it
CO-5	Understand the significance of powder metallurgy as unique methods for manufacturing composites and ceramics

Course-5

Course Code:	A1PDT201
Course Title:	Project Management
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Manage the selection and initiation of individual projects and their portfolios
CO-2	Apply skills immediately to the efficiency of the business operation
CO-3	Develop a project scope considering factors like customer requirements and Internal/ External goals
CO-4	Describe a project life cycle and can skillfully map each stage of the cycle
CO-5	Able to demonstrate effective project execution and control techniques for successful projects

Course-6

Course Code:	A1PDT206
Course Title:	Flexible manufacturing systems
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Select, Develop and implement Flexible Manufacturing system
CO-2	Analyze and design material handling and storage systems
CO-3	Select suitable modelling and control techniques
CO-4	Solve Scheduling problems occur in FMS systems
CO-5	Utilize different management techniques for FMS systems

Course-7

Course Code:	A1PDL101
Course Title:	Advanced Manufacturing Laboratory
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Demonstrate the various stages required for manufacturing a sound casting
CO-2	Understand the outfit of welding set up and steps involved in characterizing a sound weld.
CO-3	Identify various parts of dynamometer and successfully apply it for finding different forces during machining of a component.
CO-4	Develop comprehensive knowledge on die design by incorporating allowances
CO-5	Effectively use CAM software for product development

Semester-II Courses

Course-1

Course Code:	A1PDT105
Course Title:	Design for Manufacturing and Assembly
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Understand the steps involved in DFMA and its advantages of applying DFMA during product design
CO-2	Select suitable material and shapes for a given component
CO-3	Understand different manufacturing processes and select suitable material and right technique for component to be produced
CO-4	Understand different types joints and select suitable joint for given application
CO-5	Analyze different modes of failure and steps involved in optimizing design

Course-2

Course Code:	A1PDT106
Course Title:	Computer Aided Manufacturing

Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Demonstrate the various stages required for manufacturing a sound casting
CO-2	Understand the outfit of welding set up and steps involved in characterizing a sound weld.
CO-3	Identify various parts of dynamometer and successfully apply it for finding different forces during machining of a component.
CO-4	Develop comprehensive knowledge on die design by incorporating allowances
CO-5	Effectively use CAM software for product development

Course-3

Course Code:	A1PDT107
Course Title:	Digital Manufacturing
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Understand the basic technologies needed for Digital Manufacturing
CO-2	Develop powder based technologies for physical model developments
CO-3	Develop Material jetting and sheet metal based technologies for physical model developments
CO-4	Develop tooling for digital manufacturing
CO-5	Define the range of technologies capable of translating virtual solid model data into physical models

Course-4

Course Code:	A1PDT108
Course Title:	Product life cycle management
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Understand the concept of PLM and elements in it
CO-2	Distinguish the difference between product data and product workflow and effective usage of PLM Strategy
CO-3	Identify various phases of PLM and methods required for developing product
CO-4	Demonstrate the widely used PLM tools
CO-5	Recognize the components of product organizational structure and system components in lifecycle

Course-5

Course Code:	A1PDT208
Course Title:	Finite element analysis
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Prepare a finite element model and apply proper boundary conditions for solving various problems in engineering field.
CO-2	Formulate the higher order elements in 1D, 2D, 3D
CO-3	Solve the one dimensional structural problems
CO-4	Solve the two dimensional structural problems
CO-5	Solve heat conduction and fluid flow problems, Analyze the FEM model using finite element software.

Course-6

Course Code:	A1PDT210
Course Title:	Surface processing techniques
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Demonstrate a sound knowledge for the systematic application of alternative technologies used to fabricate coating systems
CO-2	Analyze complex service failure problems and determine the correct surface engineering solution
CO-3	Demonstrate knowledge of why the surface treatment affects the bulk properties of the material
CO-4	Select the most suitable surface engineering techniques that would give the required properties
CO-5	Demonstrate knowledge of plasma assisted surface treatments

Course-7

Course Code:	A1PDL102
Course Title:	CAE Laboratory
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2

Course Outcomes:	
CO-1	Perform structural analysis by identifying appropriate elements, meshing and other tasks using FEA tool.
CO-2	Perform Thermal analysis by identifying appropriate elements, meshing and other tasks using FEA tool.
CO-3	Perform coupled field analysis by identifying appropriate elements, meshing and other tasks using FEA tool.
CO-4	Perform Fluid Flow analysis by identifying appropriate elements, meshing and other tasks using FEA tool.

Semester-III Courses

Course-1

Course Code:	A1PDT109
Course Title:	Research Methodologies
Theory / Lab:	Theory
L-T-P-C:	2-0-0-2
Course Outcomes:	
CO-1	Identify and present the role and importance of research in Engineering
CO-2	Identify and present the issues and concepts salient to the research process
CO-3	identify and present the complex issues inherent in selecting a research problem, selecting an appropriate research design, and implementing a research project
CO-4	Identify and present the concepts and procedures of sampling, data collection, analysis and reporting

Course-2

Course Code:	A1PDV401
Course Title:	Comprehensive Viva Voce
Theory / Lab:	Viva Voce
L-T-P-C:	0-0-0-2
Course Outcomes:	
CO-1	Comprehend and present the knowledge acquired through the completion of specialized courses by oral interation

Course-3

Course Code:	A1PDR401
Course Title:	Self Study (Pre-Requisite)
Theory / Lab:	Theory/Tool
L-T-P-C:	0-0-0-2
Course Outcomes:	
CO-1	Identify the pre requisites to find solution for the engineering problem defined and acquire the required knowledge and skills

Course-4

Course Code:	A1PDS501
Course Title:	Seminar
Theory / Lab:	Seminar
L-T-P-C:	0-0-0-2
Course Outcomes:	
CO-1	Identify and present the need & neccessity of the cutting edge technologies
CO-2	Generate review reports on the cutting edge technologies

Semester-IV Courses

Course-1

Course Code:	A1PDP502
Course Title:	Project Phase-II
Theory / Lab:	Project
L-T-P-C:	0-0-0-16
Course Outcomes:	
CO-1	Identify, formulate, research literature and define an engineering problem
CO-2	Identify the pre requisites to find solution for the engineering problem defined and acquire the required knowledge and skills
CO-3	Constitute and work in multidisciplinary teams to synthesize the ideas
CO-4	Design and develop effective and ethical solutions for engineering problems for the society by keeping in view the human health and environmental issues
CO-5	Communicate/present solution for an engineering problem by means of effective reports and documentation
CO-6	Plan manage financial, infrastructural and human resources effectively and execute the project

Dept. of ECE

Course outcomes (Cos) of all courses of all programs offered by the institution

B.Tech. (ECE)

Semester-I Courses

Course-1	
Course Code:	A1MAT001
Course Title:	ENGINEERING MATHEMATICS-I
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Students will be able to apply the knowledge of solving 1st order & 1st degree differential equations in finding orthogonal trajectories of families of curves, Growth & Decay problems
CO-2	Student will be able to find the solution of initial value problems and be able to evaluate improper integrals of particular kind by using Laplace Transforms
CO-3	Students will be able to apply the concepts of Maxima and Minima for finding extreme values
CO-4	Student will be able to formulate and solve P.D.E and be able to apply the knowledge in finding the solutions of one dimensional wave equation and one dimensional heat equation

Course-2	
Course Code:	A1PYT002
Course Title:	APPLIED PHYSICS
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Student will be able to understand the phenomena of interference, diffraction and polarization exhibited by light waves.
CO-2	Student shall understand about laser, its characteristics and production with an example and application of laser in specific to optic fiber.
CO-3	The student shall understand about different crystal systems, space lattices, and parameters of unit cell and the Bragg‘s law of X-ray diffraction
CO-4	Student will be able to understand foundation principles of quantum mechanics and semiconductors.
CO-5	Student shall understand about response of the materials in presence of electric and magnetic fields and the basic laws of electromagnetic waves.

Course-3	
Course Code:	A1CET001
Course Title:	BASICS OF CIVIL & MECHANICAL ENGINEERING
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Student will be able to understand floor area, plinth area, and building materials such as brick, cement, concrete, steel.
CO-2	Student will be able to understand the concepts of surveying, infrastructure such as buildings, roads, bridges, dams.
CO-3	Student will be able to understand the working and function of various components of systems and subsystems of I.C. Engines, turbines, pumps and refrigerating systems.
CO-4	Student will be able to identify various types of mechanical components suitable for power transmission
CO-5	Student will be able to understand Casting, forming and different metal joining processes like Welding, Brazing, Soldering

Course-4	
Course Code:	A1ECT001
Course Title:	FUNDAMENTALS OF ELECTRONIC CIRCUITS AND DEVICES
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	

CO-1	Students have the ability to develop and solve mathematical representations for simple RLC circuits.
CO-2	Students will be able to simplify various circuits using Mesh and Nodal Analysis.
CO-3	Students will understand the working principle of different types of semiconductor diodes.
CO-4	Students will be able to design and analyze various Rectifiers with and without filters.

Course-5

Course Code:	A1CHT001
Course Title:	ENVIRONMENTAL STUDIES
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Student will have knowledge on the natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources
CO-2	Student will have knowledge on the concepts of the ecosystem and its function in the environment, biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
CO-3	Student will have knowledge on various attributes of the pollution and their impact and measures to reduce or control the pollution along with waste management practices
CO-4	Student will have knowledge on social issues both rural and urban environment and the possible means to combat the challenges
CO-5	Student will have knowledge on the environmental legislations of India and the first global initiatives towards sustainable development, environmental assessment and the stages involved in EIA and the environmental audit

Course-6

Course Code:	A1EHL001
Course Title:	ENGLISH LANGUAGE PRACTICE -I
Theory / Lab:	Lab
L-T-P-C:	Lab
Course Outcomes:	
CO-1	Student shall have the ability understand the syntactical and grammatical intricacy
CO-2	Student shall be able to use right structure for right context and meaning.
CO-3	Student shall be able to read and comprehend the content in English well
CO-4	Student shall be able to write well for his/her professional requirement
CO-5	Student shall be able to Speak in English well
CO-6	Student shall be able to understand and analyze the core components of his study well

Course-7

Course Code:	A1PYL002
Course Title:	APPLIED PHYSICS LAB
Theory / Lab:	Lab
L-T-P-C:	L
Course Outcomes:	
CO-1	Student will be able to experimentally observe interference and diffraction patterns of light waves due to different optical devices and determine the given parameters.
CO-2	Student shall understand the tir process in the optical fiber experimentallyand will be able to determine the numerical aperture and bending loss of the optic fiber.
CO-3	Student shall experimentally determine the temperature coefficient of resistance, energy gap, type of charge carriers and concentration of charge carriers in a semiconductor and to study the I-V characteristics of the given p-n junction diode.
CO-4	Student shall experimentally study the magnetic hysteresis and determine related parameters and study the variation of magnetic fields due to currents and to study the frequency response of LCR circuits.

Course-8

Course Code:	A1MEW001
Course Title:	BASIC ENGINEERING WORKSHOP
Theory / Lab:	Lab
L-T-P-C:	L
Course Outcomes:	
CO-1	Will be aware of the basic engineering trades and be able to execute related work at a rudimentary level.
CO-2	Will be able to select and use proper tools for the different tasks.
CO-3	Will be able to apply knowledge and skills developed to handle real-life situations in these areas.

Semester-II Courses

Course-1

Course Code:	A1MAT002
Course Title:	MATHEMATICAL METHODS
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Student will be able to obtain the solution of linear system of equations which frequently occur in engineering problems.
CO-2	Student will gain the proficiency in finding the Eigen values and Eigen vectors and reduction of quadratic forms to canonical forms
CO-3	Student will be able to estimate the missing terms of given data using interpolation.
CO-4	Student will be able to solve Initial value problems through numerical methods.
CO-5	Student will be able to find the solution of Difference equations which arise in discrete time systems.

Course-2

Course Code:	A1MED001
Course Title:	ENGINEERING DRAWING
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Student will be able to construct regular polygons, conic curves and simple scales
CO-2	Student will be able to draw orthographic projections of points, lines, planes and solids.
CO-3	Student will be able to produce isometric projection from orthographic projections and vice-versa.

Course-3

Course Code:	A1CYT001
Course Title:	ENGINEERING CHEMISTRY
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Students gain the knowledge about water used in industries (boilers etc) and for drinking purpose, difference between hard water and soft water, estimation of hardness of water and specification of potable water and purification of sea water through reverse osmosis.
CO-2	Students gain the knowledge of galvanic cells, concentration cells, applications of ion selective electrodes, Conductometry and Potentiometry to understand the principle and applications of electrochemistry. Topics on electrochemical cells, batteries and fuel cells make students understand the alternate sources of energy and also help them to tackle problems of corrosion and control.
CO-3	Students gain the knowledge on mechanism of corrosion, factors responsible, types corrosion and methods of protection.
CO-4	Students gain the knowledge on structure, synthesis properties and applications of polymers, additives to be mixed with polymers to obtain desired plastics and moulding techniques, advanced topics on plastics like conducting polymers and biodegradable polymers, fibre reinforced plastics and bullet proof plastics, synthetic plastics that are essential to latest technology.
CO-5	Student gain the knowledge on the determination of calorific value by bomb calorimeter, the proximate and ultimate analysis of coal, Fractional distillation of crude, followed by catalytic cracking to obtain the liquid fuels for the functioning of internal combustion engine, octane and cetane number, which have large focus on oil industry.
CO-6	Students gain knowledge on advanced materials like carbon nano tubes and fullerenes, their properties and applications, manufacturing of cement, need for green chemistry, principles of green chemistry solar cells and greenhouse effect and their importance.

Course-4

Course Code:	A1ECT201
Course Title:	ELECTRONIC DEVICES AND CIRCUITS
Theory / Lab:	Theory

L-T-P-C:	T
Course Outcomes:	
CO-1	Students have the ability to apply the biasing concepts to determine stability factors.
CO-2	Students gain an understanding of construction, working and operation of FETs and Special semiconductor devices.
CO-3	Students have the ability to analyze small signal model to determine amplifier circuit parameters.
CO-4	Students gain an idea of feedback amplifiers and oscillators.
CO-5	Students get exposure to the concepts of Power and Tuned amplifiers.

Course-5

Course Code:	A1ECT202
Course Title:	NETWORK ANALYSIS
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Have the ability to analyze Network Analysis methods using Graph theory.Have the ability to analyze Network Analysis methods using Graph theory.
CO-2	Have the ability to understand the basics of Coupled circuits and Resonance.
CO-3	Have the Knowledge to apply circuit theorems to simplify and find solutions to electrical circuits.
CO-4	Have the ability to analyze the concepts of Two-port Networks.
CO-5	Have the ability to solve circuits knowing the transient behavior.

Course-6

Course Code:	A1EHL002
Course Title:	ENGLISH LANGUAGE PRACTICE -II
Theory / Lab:	Lab
L-T-P-C:	L
Course Outcomes:	
CO-1	Student shall have the ability to speak intelligibly.
CO-2	Student shall be able to use phrases, foreign expressions and idioms correctly.
CO-3	Student shall be able to participate well in debates and discussions.
CO-4	Student shall be able to write both Technical and General reports well.
CO-5	Student shall be able prepare resume well and face the interviews confidently.
CO-6	Student shall communicate confidently and effectively.

Course-7

Course Code:	A1CYL001
Course Title:	ENGINEERING CHEMISTRY LAB
Theory / Lab:	Lab
L-T-P-C:	L
Course Outcomes:	
CO-1	Students will gain knowledge on the method of determination of acid/base, total hardness, iron and zinc contents in the sample solution.
CO-2	Students will gain knowledge on the principles of conductometric, potentiometric, pH metric and colorimetric methods of determination.
CO-3	Students will understand in construction of galvanic cell, determination of calorific value, and preparation of biodiesel.

Course-8

Course Code:	A1ECL201
Course Title:	ELECTRONIC DEVICES AND CIRCUITS LAB
Theory / Lab:	Lab
L-T-P-C:	L
Course Outcomes:	
CO-1	Gain an understanding of the operation of diodes and their applications.
CO-2	Have the ability to sketch input and output characteristics of BJT, FET, SCR and UJT.
CO-3	Have the ability to design amplifier using BJT and FET and observe frequency response.

Semester-III Courses

Course-1

Course Code:	A1MST001
Course Title:	MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS
Theory / Lab:	Theory

L-T-P-C:	T
Course Outcomes:	
CO-1	Able to understand application of economics in decision making.
CO-2	Able to develop and determine cost efficient production through optimization.
CO-3	Able to aware various business environmental factors and the impact.
CO-4	Able to do financial analysis of the firm to know its performance from different parameters.

Course-2

Course Code:	A1CIT001
Course Title:	COMPUTER PROGRAMMING
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Understand the basic terminology used in computer programming.
CO-2	Write, compile and debug programs in C language.
CO-3	Design programs involving decision structures, loops and functions.
CO-4	Understand the dynamics of memory by the use of pointers.
CO-5	Create/update basic data files.

Course-3

Course Code:	A1EET219
Course Title:	ELECTRICAL TECHNOLOGY
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Able to explain the operation of DC generator and analyze the characteristics of DC generator.
CO-2	Able to explain the operation of DC motor and analyze their characteristics.
CO-3	Capable to develop equivalent circuit and evaluate the performance of transformers.
CO-4	Able to analyze characteristics of induction motor and understand starting methods of 3-phase induction motor.
CO-5	Capable to understand the operation of various special machines.

Course-4

Course Code:	A1ECT204
Course Title:	SIGNALS AND SYSTEMS
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Have the ability to explain basics of signals and their representation.
CO-2	Have the ability to explain signal transmission through LTI systems.
CO-3	Grasp the significance of convolution and correlation operations on signals.
CO-4	Grasp the significance of sampling process and reconstruction.
CO-5	Have the ability to analyze the signals using Fourier transform, Laplace transform and Z-transform.

Course-5

Course Code:	A1ECT205
Course Title:	SWITCHING THEORY AND LOGIC DESIGN
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Have the ability to convert numerical information in different forms.
CO-2	Have the ability to solve Boolean expressions into the simple realizable expressions and circuits.
CO-3	Grasp the significance of the concepts of flip-flops, registers, counters and PLD‘s.
CO-4	Have the ability to design and analyze combinational circuits and sequential circuits and to use standard combinational functions/building blocks to build larger complex circuits.

Course-6

Course Code:	A1MAT110
Course Title:	Complex Variables & Statistical Methods
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	

CO-1	Student will be able to construct the conjugate harmonic functions and Orthogonal Trajectories.
CO-2	Student will be able to evaluate integrals of complex functions in the given region
CO-3	Student will be able to estimate the population parameters using sample data.
CO-4	Student will be able to test the hypothesis for large samples and small samples.

Course-7

Course Code:	A1CIL001
Course Title:	COMPUTER PROGRAMMING LAB
Theory / Lab:	Lab
L-T-P-C:	L
Course Outcomes:	
CO-1	Understand the importance of the software development process - from specification to design to implementation to testing and review
CO-2	Develop problem-solving skills to translate user described problems into programs written using the C language
CO-3	Design programs involving decision structures, loops and functions.
CO-4	Understand the dynamics of memory by the use of pointers
CO-5	Write programs to create/update basic data files

Course-8

Course Code:	A1ECL202
Course Title:	ELECTRICAL TECHNOLOGY &NETWORKS LAB
Theory / Lab:	Lab
L-T-P-C:	L
Course Outcomes:	
CO-1	Determine Q factor for a RLC Circuit.
CO-2	Determine time response of a first order RC/RL networks.
CO-3	Grasp the significance of different network theorems.
CO-4	Determine the efficiency of DC shunt machine.
CO-5	Determine the performance characteristics of DC shunt motor.
CO-6	Determination the efficiency and regulation characteristics of single phase transformers.

Semester-IV Courses

Course-1

Course Code:	A1ECT206
Course Title:	ELECTROMAGNETIC WAVES AND TRANSMISSION LINES
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Understand and analyze different laws and theorems of electrostatic and steady magnetic fields.
CO-2	Grasp the importance of the Maxwell equations in different forms.
CO-3	Get the knowledge of wave theory and its propagation through various mediums
CO-4	Describe the principles of operation of transmission lines and electromagnetic wave propagation through transmission lines.

Course-2

Course Code:	A1ECT207
Course Title:	PULSE AND DIGITAL CIRCUITS
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Analyze the response of various Linear and Non-linear circuits for different inputs.
CO-2	Apply the fundamental concepts of Wave Shaping for various Switching Circuits and Logic gates.
CO-3	Understand the design and analysis of Multivibrators.
CO-4	Analyze Various time base circuits, Synchronization Concepts and Sampling Gates.

Course-3

Course Code:	A1ECT208
Course Title:	ANALOG COMMUNICATIONS
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	

CO-1	Explain the frequency spectrum of analog modulated signals.
CO-2	Explain the simple systems for generating and demodulating analog modulated signals.
CO-3	Grasp the significance effects of noise for different modulation techniques by considering signal to noise ratio(SNR).
CO-4	Fully appreciate the basic principles involved in the different types of radio transmitters and receivers.
CO-5	Explain the simple systems for generating and demodulating pulse modulated signals.

Course-4

Course Code:	A1ECT209
Course Title:	RANDOM VARIABLES AND STOCHASTIC PROCESS
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Understand concepts of random variable and operations on single random variable.
CO-2	Perform operations on multiple random variables.
CO-3	Explain the statistical properties of random processes.
CO-4	Explain the spectral characteristics of random processes.
CO-5	Analyze linear systems with random inputs and modeling of noise sources.

Course-5

Course Code:	A1CIT201
Course Title:	DATA STRUCTURES
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Have the ability to compare different searching and sorting methods and perform basic operations on stacks and queues.
CO-2	Have the ability to implement linked lists, trees and graph ADTs for various applications.
CO-3	Grasp the significance of creating, solving, and designing, testing, debugging and applying of linear and non-linear data structures.
CO-4	Fully appreciate the art of different data structures and applying the knowledge of data structures to various applications.

Course-6

Course Code:	A1ECT301
Course Title:	PROGRAMMING IN MATLAB
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Know the MATLAB environment.
CO-2	Understand the MATLAB programming fundamentals
CO-3	Write Programs using commands.
CO-4	Write Programs using functions.
CO-5	Handle polynomials, and use 2D Graphic commands.

Course-7

Course Code:	A1ECT302
Course Title:	COMPUTER ARCHITECTURE & ORGANIZATION
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Explain about computer architecture and organization.
CO-2	Explain hardwired and micro programmed control unit.
CO-3	Understand different types of addressing modes and memory organization.
CO-4	Understand different modes of data transfer techniques.
CO-5	Grasp the significance of parallel processing, pipelining and inter processor Communication.

Course-8

Course Code:	A1ECL203
Course Title:	ANALOG COMMUNICATIONS LAB
Theory / Lab:	Lab
L-T-P-C:	L

Course Outcomes:	
CO-1	Demonstrate analog modulation and demodulation.
CO-2	Demonstrate pulse modulation and demodulation.
CO-3	Verify the functionality of AGC, PLL, Pre-Emphasis, De-emphasis circuits.
CO-4	Use MATLAB and Simulink software.
CO-5	Simulate modulation and demodulation of analog and pulse signals.

Course-9

Course Code:	A1ECL204
Course Title:	PULSE AND DIGITAL CIRCUITS LAB
Theory / Lab:	Lab
L-T-P-C:	L
Course Outcomes:	
CO-1	Understanding of how a high pass or low pass circuit behaves with varying time constants.
CO-2	Analyze the non-linear wave shaping circuits with and without reference voltages.
CO-3	Design waveform generating circuits and their applications

Semester-V Courses

Course-1

Course Code:	A1ECT210
Course Title:	CONTROL SYSTEMS
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Formulate the mathematical model and transfer function of mechanical & electrical Systems.
CO-2	Understand the time response of systems and analyze the stability of the systems.
CO-3	Know the stability of open loop and closed loop control systems using classical time and frequency domain techniques.
CO-4	Know the controllability and Observability of control systems using state space techniques

Course-2

Course Code:	A1ECT211
Course Title:	DIGITAL COMMUNICATIONS
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Have the ability to apply the knowledge of basic building blocks in digital communication systems.
CO-2	Have the ability to apply the knowledge of analog to digital conversion by using various pulse digital modulation techniques.
CO-3	Apply the knowledge of the optimum receivers for various digital carrier modulation techniques.
CO-4	Have ability to apply the knowledge of the effect of probability bit error in various digital modulation techniques and measure of information in the received signal.
CO-5	Have ability to apply the knowledge of the concepts of Source coding and channel coding.

Course-3

Course Code:	A1ECT212
Course Title:	ANTENNA WAVE PROPAGATION
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	The students will have knowledge on basic working and radiation mechanism of antennas.
CO-2	The student will understand various antennas, antenna arrays and radiation patterns.
CO-3	Students will be aware of various techniques involved in antenna parameter measurements.
CO-4	Students will identify the different types of radio-wave propagation in the atmosphere.

Course-4

Course Code:	A1ECT213

Course Title:	LINEAR AND DIGITAL IC APPLICATIONS
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Have an ability to design circuit using operational amplifier for various applications
CO-2	Have an ability to design active filters and understand the concepts of 555 timer & PLL, A/D & D/A converters.
CO-3	Have an ability to design and analyze the various combinational circuits using digital ICs and their applications.
CO-4	Have an ability to design and analyze the various sequential circuits using digital ICs and their applications.
CO-5	Students shall know the significance of modeling of combinational & Sequential digital IC‘s using VHDL.

Course-5

Course Code:	A1ECT214
Course Title:	MICROPROCESSORS AND MICROCONTROLLERS
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Have the ability to explain and demonstrate the architecture of 8086 microprocessor & 8051 microcontroller.
CO-2	Have the ability to explain and demonstrate assembly language programs in 8086 for various applications.
CO-3	Analyze the concepts in interfacing of peripheral devices to 8086 microprocessor.
CO-4	Analyze the architecture and organization of 8051 and PIC Microcontrollers

Course-6

Course Code:	A1CIT206
Course Title:	OBJECT ORIENTED PROGRAMMING THROUGH JAVA
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Have the ability to know OOP principles and Basics of Java & its features.
CO-2	Have the ability to construct programs on inheritance, polymorphism and packages.
CO-3	Have the ability to know Exception handling, Interface, Multithreading and Applet concepts.
CO-4	Have the ability to know Event handling and Swing mechanisms.
CO-5	Understand the significance of code reusability and grouping of similar programs at one place.
CO-6	Comprehend the significance of controlling different implementations under same interface, handling abnormal situations, concurrency and internet programs.
CO-7	Be through with the art of constructing good quality real time projects.

Course-7

Course Code:	A1ECT303
Course Title:	ELECTRONIC CIRCUIT ANALYSIS
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Have the ability to design and analyze amplifier circuit parameters using small signal high frequency hybrid model.
CO-2	Apply the knowledge of single and multistage amplifiers for real time applications.
CO-3	Have the ability to analyze tuned amplifiers.
CO-4	Apply the knowledge of regulator circuits for real time applications.
CO-5	Apply the knowledge and applications of switching and IC voltage regulator circuits.

Course-8

Course Code:	A1ECT304
Course Title:	VI USING LAB VIEW
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Understand the basics and need of VI.
CO-2	Have the ability to create Vis using LabVIEW software.
CO-3	Fully appreciate the data acquisition techniques.
CO-4	Grasp the significance of different interfacing techniques.

CO-5	Have the ability to design some real time application using LabVIEW software

Course-9

Course Code:	A1ECL205
Course Title:	DIGITAL COMMUNICATIONS LAB
Theory / Lab:	Lab
L-T-P-C:	L
Course Outcomes:	
CO-1	The students will be able the ability to explain and demonstrate the conversion of analog to digital signals.
CO-2	The students grasp the significance of digital modulation techniques.
CO-3	The students develop the ability to explain and perform the Source coding and Channel coding techniques.

Course-10

Course Code:	A1ECL206
Course Title:	IC APPLICATIONS LAB
Theory / Lab:	Lab
L-T-P-C:	L
Course Outcomes:	
CO-1	Have the ability to demonstrate various applications using Op-amp, construct waveform generation circuits.
CO-2	Have the ability to explain various multivibrators
CO-3	Students will acquire the significance of functionality of A/D and D/A converters.
CO-4	Students will acquire the significance of functionality of various Digital ICs .
CO-5	Have the ability to demonstrate various applications using Op-amp, construct waveform generation circuits.

Semester-VI Courses

Course-1

Course Code:	A1ECT215
Course Title:	DIGITAL SIGNAL PROCESSING
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	The students will be able to explain different discrete time signals and systems.
CO-2	The students can analyze the response of different discrete time systems for various inputs
CO-3	The students grasp the significance in designing digital FIR filters using different techniques.
CO-4	The students grasp the significance in designing digital IIR filters using different techniques.
CO-5	The students learn design procedures used for filter banks and architecture of DSP processor.

Course-2

Course Code:	A1ECT216
Course Title:	VLSI DESIGN
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Fully appreciate the concepts of different MOS technologies.
CO-2	Grasp the significance of Basic Electrical Properties Of MOS circuit Design Processes.
CO-3	Have the ability to explain basic circuit concepts & scaling of MOS circuits.
CO-4	Gain the knowledge on the subsystem design.
CO-5	Grasp the significance of the Programmable logic devices, memories and FPGAs.

Course-3

Course Code:	A1CIT376
Course Title:	Basics of Operating Systems
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Have the ability to explain in detail the purpose of the operating system, kernel structure and its interface with application software and to explain in detail the different process management related aspects of typical operating systems

CO-2	Have the ability to describe in detail the different ways and detail in which the memory management and file management services are provided in a typical operating systems.
CO-3	Have the ability to describe in detail the I/O management and protection and security services provided by a typical operating system.
CO-4	Grasp the significance of importance, role and details of basic operating system structure, process management services and memory management services
CO-5	Grasp the significance of different ways in file system and file management services are provided by operating systems and how operating system take care of protection and security services
CO-6	Fully appreciate the role, different alternate ways in which operating systems are implemented and different variations on the common services provided by operating systems.

Course-4

Course Code:	A1ECT305
Course Title:	COMPUTER NETWORKS
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	The students develop the ability to explain different Network Protocols like OSI,TCP/IP.
CO-2	The students can fully appreciate data transfer from one system to another by using different mediums.
CO-3	The students will be able to explain and demonstrate Routing & Congestion Control.
CO-4	The students will be able to explain and demonstrate Connection Oriented and connection less oriented service protocols.
CO-5	The student grasp the significance of different application layer protocols.

Course-5

Course Code:	A1ECT306
Course Title:	ELECTRONIC SWITCHING SYSTEMS
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Ability to understand design of different switching systems.
CO-2	Ability to design solutions for switching networks for given number of incoming-outgoing trunks.
CO-3	Ability to understand the impact of digital switching systems.
CO-4	Ability to explain different switching systems such as electronic space division switching and time division switching.
CO-5	Ability to analyze services provided by Integrated Services Digital Network.

Course-6

Course Code:	A1ECT307
Course Title:	INFORMATION THEORY AND CODING
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Ability to apply the mathematical knowledge of probability to measure information discrete message source.
CO-2	Ability to compute the capacity and efficiency of discrete and continuous time channels in presence and absence of added noise.
CO-3	Ability to apply source encoding algorithms to ensure transmission of information of a discrete message source using minimum number of bits.
CO-4	Ability to ensure error free transmission of information of a discrete message source using suitable channel encoding techniques.
CO-5	Ability to ensure error free transmission of information of a discrete message source using efficient channel encoding techniques with minimum redundancy.

Course-7

Course Code:	A1ECT308
Course Title:	EMBEDDED AND REAL TIME OPERATING SYSTEMS
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	The students develops the ability to explain the construction and working of Embedded Systems.

CO-2	Fully appreciate the various basic building blocks of Embedded Systems.
CO-3	The students understand the different techniques in design, implementation, and debuggin.
CO-4	Students will gain an understanding of the fundamentals of real time models based on RTOS.
CO-5	The students will grasp the significance of various Hardware software co-design processes.

Course-8

Course Code:	A1ECT309
Course Title:	CELLULAR MOBILE COMMUNICATION
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Learners will acquire the ability to explain the basic elements of cellular communication.
CO-2	Pupils will grasp the significance of different types of interferences in cellular communication.
CO-3	Students will demonstrate skills related to various Interference minimization techniques.
CO-4	Students will attain knowledge on different types of path loss components.
CO-5	Learners will explore and appreciate the efficient way of modern wireless communication systems.

Course-9

Course Code:	A1ECT310
Course Title:	WIRELESS SENSORS AND NETWORKS
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Students will have the ability to understand the challenges of wireless sensor networks and technologies.
CO-2	Learners will have the ability to understand the different architectures and hardware components of wireless sensor networks.
CO-3	Pupils will Grasp the importance of Topology control of wireless senor networks.
CO-4	Students will acquire the ability to understand the communication protocols
CO-5	Learners will have the ability to understand the sensor network platforms and tools.

Course-10

Course Code:	A1ECT311
Course Title:	ARTIFICIAL INTELLIGENCE AND NEURAL NETWORKS
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Students will have the ability to explain AI and its agents
CO-2	Learning will fully appreciate the various search strategies and knowledge representation techniques
CO-3	Pupils will have the ability to explain characteristics of neural networks
CO-4	Pupils will grasp the significance of feed forward neural networks.
CO-5	Pupils will grasp the significance of feedback neural networks.

Course-11

Course Code:	A1ECT312
Course Title:	OPTICAL COMMUNICATION
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Students will have the ability to explain the various functional blocks in optical communication
CO-2	Students will apply the knowledge of optical sources and detectors
CO-3	Learners will develop analytical skills related to the concepts of fibers, connectors and splicer‘s used for optical communication.
CO-4	Pupils will grasp the significance of different types of losses in optical communication.
CO-5	Learners will gain knowledge on different types of signal distortion and the ways of measuring distortion loss in a fiber.

Course-12

Course Code:	A1CHT401
Course Title:	NON-CONVENTIONAL SOURCES OF ENERGY
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Ability to explain the working of solar collectors and various applications
CO-2	Ability to explain different types of wind mills for power generation and the biomass sources.
CO-3	Ability to explain the generating of power from geothermal energy and ocean energy
CO-4	Ability to explain about different direct energy conversion devices.

Course-13

Course Code:	A1CIT405
Course Title:	Web Design & Development
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Understanding importance of html &JavaScript in view of designing a front end for webpage
CO-2	Understand the importance of data transporting and validation of data using javascripts
CO-3	Understanding http package and access of web pages &php
CO-4	Connecting with database using mysql.

Course-14

Course Code:	A1ECT311
Course Title:	ARTIFICIAL INTELLIGENCE AND NEURAL NETWORKS
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Students will have the ability to explain AI and its agents.
CO-2	Learning will fully appreciate the various search strategies and knowledge representation techniques.
CO-3	Pupils will have the ability to explain characteristics of neural networks
CO-4	Pupils will grasp the significance of feed forward neural networks.
CO-5	Pupils will grasp the significance of feedback neural networks.

Course-15

Course Code:	A1ECL207
Course Title:	MICROPROCESSORS AND MICROCONTROLLERS LAB
Theory / Lab:	Lab
L-T-P-C:	L
Course Outcomes:	
CO-1	The students develop the ability to explain the assembly language programs and convert them into machine language
CO-2	The students grasp the significance of writing the programs in assembly language and their execution using MASM software.
CO-3	The students develop the ability to interface peripherals with 8086 microprocessor
CO-4	The students will be able to appreciate the programming of a microcontroller using a development environment that includes debuggers, editing tools, and compilers.

Course-16

Course Code:	A1ECL208
Course Title:	DIGITAL SYSTEM DESIGN LAB
Theory / Lab:	Lab
L-T-P-C:	L
Course Outcomes:	
CO-1	The students develop the ability to explain the VerilogHDL Programs and execute using Xilinx Vivado Suite software.
CO-2	The students will be able to design and analyze various combinational and sequential logic circuits.
CO-3	The students grasp the significance to perform the analysis with appropriate synthesizer using Xilinx Vivado Synthesizer
CO-4	The students come to terms with the understanding of how to verify the implemented logic with Nexys-4 DDR FPGA hardware module/kit.

Semester-VII Courses

Course-1

Course Code:	A1ECT217
Course Title:	MICROWAVE ENGINEERING
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	The students will have knowledge on Microwave Spectrum, frequency bands and the applications of Microwaves.
CO-2	The students will be able to Understand TE, TM modes in rectangular and circular waveguides.
CO-3	The student will be able to understand the applications microwave components.
CO-4	The student will be able to understand principle and operations of microwave sources.
CO-5	The student will be able to learn how to make measurements of power ,VSWR, frequency and related to microwave engineering.

Course-2

Course Code:	A1ECT218
Course Title:	ELECTRONIC MEASUREMENTS AND INSTRUMENTATION
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Have the ability to explain the performance characteristics and the various errors of measuring instruments
CO-2	The various construction and functioning of signal generators, wave analyzers and CRO used for various measurements of electrical and non-electrical quantities for real time applications.
CO-3	Have the ability to analyze the working of various measurement bridges, transducers for physical parameters measurement
CO-4	Utilizing the knowledge on the significance of data acquisition systems used for Industrial Applications

Course-3

Course Code:	A1ECT313
Course Title:	RADAR SYSTEMS
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Have the ability to understand the basic working principle of radar and target detection procedure.
CO-2	Have the ability to explain the radar Transmitter, Receiver and the selection of suitable antennas for transmitting and receiving the signal and the use of radomes.
CO-3	Get the knowledge of different types of Radars their applications and limitations.
CO-4	Grasps the significance of the effect of noise, uses of matched filters and signal processing.

Course-4

Course Code:	A1ECT314
Course Title:	SATELLITE COMMUNICATIONS
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	The students will be able to understand the basic construction and working of satellites for communication.
CO-2	The students gain the ability to analyze the link budget equations to provide sufficient margin for performance in variety of common satellite orbits for a communication satellite system.
CO-3	The students will be able to understand the design of multiple-access satellite communications networks.
CO-4	The students grasps the significance of engineering impact of the various satellite components on performance

Course-5

Course Code:	A1ECT315
Course Title:	DIGITAL TELEVISION
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Acquisition of the fundamentals in Television transmission.

CO-2	Acquire the applications in HDTV for future prospects.
CO-3	Have the ability to understand compression standards.
CO-4	Have the ability to learn the concepts of HDTV and DTV standards.

Course-6

Course Code:	A1ECT316
Course Title:	DIGITAL IMAGE PROCESSING
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	The ability to explain the representation of gray & colour image model and various image transformations.
CO-2	The students will be able to appreciate the various image enhancement techniques in time domain and frequency domain.
CO-3	The students got acquainted with the differences between image restoration and reconstruction.
CO-4	The students appreciate the various segmentation techniques.
CO-5	The students grasp the significance of various image coding techniques.

Course-7

Course Code:	A1ECT317
Course Title:	RF CIRCUIT DESIGN
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	The student will be able to design and analysis of modern RF components and
CO-2	circuits.
CO-3	The students will be able to know Transmission lines, Single and Multiport networks
CO-4	and applications of Smith Chart.

Course-8

Course Code:	A1ECT318
Course Title:	BIOMEDICAL INSTRUMENTATION
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Students will fully appreciate the importance of the Biomedical Engineering and instrumentation field of study.
CO-2	Students have the ability to explain the basic mechanisms and principles of biomedical sensors and grasp the significance of issues encountered in attempting to take measurements from a living body.
CO-3	Students have the ability to explain the Physiology, and techniques for measuring various parameters in the Cardiovascular , Respiratory & Nervous Systems in the body.
CO-4	Students have the ability to explain the diagnostic techniques, Bio-Telemetry and the instruments used in Patient care and monitoring.
CO-5	Students will grasp the significance of Amplifiers, study the Electrical safety of Medical Equipment & Hazard Prevention

Course-9

Course Code:	AIECT319
Course Title:	EMI/EMC
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Have the ability to classify different types of electromagnetic interferences.
CO-2	Have the ability to understand sources of electromagnetic noise and types.
CO-3	Grasp the importance of radiated/conducted interference measurements.
CO-4	Have the ability to understand the techniques of cabling, grounding and bonding and

Course-10

Course Code:	A1ECT320
Course Title:	ANALOG IC DESIGN
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Have the ability to explain the MOS devices and modeling techniques.
CO-2	Grasp the significance of analog CMOS sub circuits.

CO-3	Have the ability to explain the design and analyze CMOS amplifiers.
CO-4	Have the ability to understand the CMOS operational amplifiers.

Course-11

Course Code:	A1ECT321
Course Title:	DIGITAL IC DESIGN
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Grasp the significance of MOS Inverter and its characteristics.
CO-2	Have the ability to understand the static and dynamic CMOS logic circuits.
CO-3	Have the ability to explain and analyze the combinational and sequential logic circuits.
CO-4	Grasp the significance of SRAM and DRAM Design

Course-12

Course Code:	A1CET401
Course Title:	Project Planning and Management
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Know the concepts of project planning and management.
CO-2	Construct networks using PERT and CPM techniques.
CO-3	Update networks using resource allocation and resource smoothening
CO-4	List different management information systems

Course-13

Course Code:	A1MET310
Course Title:	Robotics
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Identify components and classification of robot
CO-2	Capable of performing transformation in developing forward and inverse kinematic and dynamic problems
CO-3	Select actuators and sensors for different robot applications
CO-4	Design work cell and select robots for applications

Course-14

Course Code:	A1MBT311
Course Title:	Internet Marketing
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	An overall understanding of the dimensions of marketing
CO-2	Ability to develop strategies to leverage the potential of internet marketing
CO-3	An ability to develop and leverage web marketing models
CO-4	An Understanding of online consumer behavior and ethics in digital marketing.

Course-15

Course Code:	A1ECL209
Course Title:	MICROWAVE ENGINEERING LAB
Theory / Lab:	Lab
L-T-P-C:	L
Course Outcomes:	
CO-1	The students will be able to explain and demonstrate different microwave components and sources in a microwave bench.
CO-2	The students will be able to measure various parameters of different microwave components.
CO-3	Fully appreciate the concepts of V-I characteristics of different optical sources
CO-4	The students can explain the significance of measurement techniques like Data rate measurement, Numerical Aperture and Bending Losses of optical fiber.

Course-16

Course Code:	A1ECL210
Course Title:	DIGITAL SIGNAL PROCESSING LAB
Theory / Lab:	Lab
L-T-P-C:	L

Course Outcomes:	
CO-1	The course simulates basic signal processing operations like convolution and correlation using MATLAB.
CO-2	The student acquires the knowledge of implementing DSP operations like DFT and FFT using MATLAB.
CO-3	The student develops the ability to simulate power spectral density of a given signal using MATLAB.
CO-4	It equips the learner to simulate response of IIR and FIR filters using MATLAB.
CO-5	The student will implement real time IIR and FIR filters using TMS320C6713 DSP processor.

Semester-VIII Courses

Course-1

Course Code:	A1ECP601
Course Title:	Directed Study
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Demonstrate sound technical knowledge in the concepts required for project
CO-2	Exhibit knowledge in tools required for executing the project

Course-2

Course Code:	A1ECP602
Course Title:	Project
Theory / Lab:	Lab
L-T-P-C:	P
Course Outcomes:	
CO-1	Demonstrate a sound technical knowledge of the selected project topic
CO-2	Exhibit the knowledge of problem identification, formulation and solution
CO-3	Design engineering solutions to complex problems
CO-4	Communicate with engineers and the community at large in written and oral forms
CO-5	Demonstrate the knowledge, skills and attitudes of a professional engineer

M.Tech. (VLSI)

Semester-I Courses

Course-1

Course Code:	A1VLT101
Course Title:	VLSI TECHNOLOGY
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Fully appreciate the concepts of different MOS technologies
CO-2	Grasp the significance of Basic Electrical Properties Of MOS and BiCMOS Circuit Design Processes
CO-3	Have the ability to explain basic circuit concepts & scaling of MOS circuits
CO-4	Gain the knowledge on the subsystem design
CO-5	Grasp the significance of the architecture design , floor planning ,chip design

Course-2

Course Code:	A1VLT102
Course Title:	ANALOG IC DESIGN
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Have the ability to explain various MOS devices and modeling techniques
CO-2	Grasp the significance of analog CMOS sub circuits.
CO-3	Have the ability to explain the design and analyze CMOS amplifiers.
CO-4	Have the ability to understand the CMOS operational amplifiers
CO-5	Grasp the significance of comparators

Course-3

Course Code:	A1VLT103
Course Title:	DIGITAL IC DESIGN

Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Grasp the significance of MOS Inverter and its characteristics.
CO-2	Have the ability to understand the static and dynamic CMOS logic circuits
CO-3	Have the ability to explain and analyze the combinational and sequential logic circuits
CO-4	Grasp the significance of SRAM and DRAM Design

Course-4

Course Code:	A1VLT104
Course Title:	CPLD AND FPGA ARCHITECTURES AND APPLICATIONS
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Have the ability to explain the field programmable logic technologies.
CO-2	Grasp the importance of Programming Technologies & Programmable Interconnects of FPGAs
CO-3	Grasp the significance of architectures of SRAM & Anti-Fuse Programmed FPGAs
CO-4	Have the ability to design of digital logic circuits.
CO-5	Have the ability to explain the field programmable logic technologies.

Course-5

Course Code:	A1VLT201
Course Title:	DIGITAL SYSTEM DESIGN
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Students fully appreciate about minimization techniques like k-map, QM method and CAMP Algorithm
CO-2	Students grasp the significance of State diagrams, reliable ASM charts and design of sequential circuits using ROMs, PLAs, CPLD and FPGAs.
CO-3	Students have the ability to minimize digital circuits through PLA minimization and Folding.
CO-4	Students have the ability to design and analyze various Test Generation methods.
CO-5	Students will gain an understanding of Fault Diagnosis in Sequential Circuits.

Course-6

Course Code:	A1VLT202
Course Title:	MOS DEVICE MODELING
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Grasp the knowledge about basic device physics.
CO-2	Grasp the knowledge about MOSFET devices.
CO-3	Have the ability to understand and analyze CMOS Performance Factors.
CO-4	Grasp the knowledge on Bipolar devices and Bipolar device design.
CO-5	Have the ability to understand about performance factors of CMOS and Bipolar devices.

Course-7

Course Code:	A1VLT203
Course Title:	SYSTEM MODELING AND SIMULATION
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Grasp the knowledge about basic simulation modeling.
CO-2	Have the ability to grasp the knowledge about software simulation models and their applications.
CO-3	Grasp the knowledge on time and event driven models and simulations.
CO-4	Have the ability to grasp the knowledge on discrete and continuous time MARKOV process.
CO-5	Have the ability to understand system optimization and modeling and simulation methodology.

Course-8

Course Code:	A1VLT204
Course Title:	DIGITAL DESIGN WITH VERILOG HDL
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Fully appreciate the about concepts of different types of models using Verilog HDL
CO-2	Grasp the significance of combinational and sequential logic designs using Verilog HDL
CO-3	Have the ability to explain the design and analyze digital logic design using Verilog HDL

CO-4	Have the ability to understand the Synthesis techniques using combinational and sequential logic circuit designs
CO-5	Grasp the significance of testing of digital logic circuits with CAD Tools

Course-9

Course Code:	A1VLT205
Course Title:	VLSI SIGNAL PROCESSING
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Grasp the significance of DSP algorithms and convolution
CO-2	Grasp the significance of different techniques of folding and unfolding
CO-3	Gain the knowledge on the systolic array design methodology
CO-4	Grasp the significance of scaling and power consumption

Course-10

Course Code:	A1VLT206
Course Title:	LOGIC SYNTHESIS AND VERIFICATION
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Grasp the significance of hardware modeling languages and the optimization problems
CO-2	Grasp the significance of minimization techniques and their problems
CO-3	Have the ability to understand the sequential circuits optimization and the combinational networks
CO-4	Grasp the significance of cell library binding algorithms with rules
CO-5	Have the ability to understand about Performance Factors of different synthesis Techniques

Course-11

Course Code:	A1VLL101
Course Title:	FPGA LABORATORY
Theory / Lab:	Lab
L-T-P-C:	L
Course Outcomes:	
CO-1	Grasp the significance of hardware modeling languages and the optimization problems
CO-2	Grasp the significance of minimization techniques and their problems
CO-3	Have the ability to understand the sequential circuits optimization and the combinational networks
CO-4	Grasp the significance of cell library binding algorithms with rules
CO-5	Have the ability to understand about Performance Factors of different synthesis Techniques

Semester-II Courses

Course-1

Course Code:	A1VLT105
Course Title:	LOW POWER VLSI DESIGN
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Fully appreciate about concepts of different Fundamentals Of Low Power VLSI Design
CO-2	Grasp the significance of Low-Power Design Approaches,Low-Power Design through voltage scaling
CO-3	Have the ability to explain Low Voltage Low Power Adders
CO-4	Gain the knowledge on the Low Voltage Low Power Multipliers
CO-5	Grasp the significance of the Low-Voltage Low-Power Memories

Course-2

Course Code:	A1VLT106
Course Title:	CMOS MIXED SIGNAL VLSI DESIGN
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Fully appreciate about the concepts of switched capacitor circuits
CO-2	Grasp the significance of Phased Locked Loop (PLL).
CO-3	Have the ability to explain the Data Converter Fundamentals.
CO-4	Have the ability to understand the Nyquist Rate A/D Converters
CO-5	Grasp the significance of Oversampling Converters

Course-3

Course Code:	A1VLT107
Course Title:	TESTING AND TESTABILITY
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Fully appreciate about the concepts of Digital and Analog VLSI Testing and Fault Modelling.
CO-2	Grasp the significance of Algorithms for True value Simulation and Fault Simulation.
CO-3	Have the ability to explain Controllability and Observability Measures and Scan Design Techniques
CO-4	Have the ability to understand the BIST Process , Pattern Generation , Response Compaction
CO-5	Grasp the significance of Boundary Scan Test Instruction and BSDL Description Components

Course-4

Course Code:	A1VLT108
Course Title:	VLSI PHYSICAL DESIGN AUTOMATION
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Fully appreciate about the design and analyze the VLSI design cycle and physical design steps.
CO-2	Grasp the significance about partitioning, floor planning, pin assignment and placement algorithms.
CO-3	Have the ability to analyze the global and detailed routing algorithms.
CO-4	Have the ability to understand the physical design automation of FPGAS and MCMS.
CO-5	Grasp the significance of ESD protection, chip input and output circuits.

Course-5

Course Code:	A1VLT207
Course Title:	CUSTOM IC DESIGN
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Grasp the significance of introduction of ASIC designs
CO-2	Grasp the significance of data logic cells and library design
CO-3	Have the ability to explain the low level design and schematic entry and programmable ASIC s
CO-4	Have the ability to understand the introduction to full custom IC design
CO-5	Grasp the significance of advanced techniques for specialised building blocks

Course-6

Course Code:	A1VLT208
Course Title:	HARDWARE SOFTWARE CO-DESIGN
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Grasp the significance of Co-design issues and Co-synthesis algorithms
CO-2	Have the ability to analyze on Prototyping and Emulation
CO-3	Have the ability to explain about analyze Complication techniques and tools for embedded processor architecture
CO-4	Have the ability to understand Design specification and verification
CO-5	Grasp the significance about languages for system level specification and design 1 along with design 2

Course-7

Course Code:	A1VLT209
Course Title:	DSP PROCESSORS AND ARCHITECTURES
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Grasp the fundamentals of Digital Signal Processing.
CO-2	Have the ability to understand Architecture for programmable DSP Devices.
CO-3	Have the ability to explain the programmable Digital Signal Processors (TMS320C54XX).
CO-4	Grasp the information on Analog Devices Family of DSP Devices.
CO-5	Have the ability to explain about the Interfacing Memory and I/O Peripherals to Programmable DSP Devices.

Course-8

Course Code:	A1VLT210
Course Title:	SCRIPTING LANGUAGES
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Have the ability to explain about the concepts of scripting
CO-2	Grasp the significance of PERL and advanced PERL
CO-3	Have the ability to explain the Tool Command Language .
CO-4	Have the ability to understand Advanced TCL
CO-5	Grasp the significance of Tool Kit, Java script, OOP concepts

Course-9

Course Code:	A1VLT211
Course Title:	OPTIMIZATION TECHNIQUES AND APPLICATIONS TO VLSI
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Fully appreciate the about concepts of Statistical Modeling
CO-2	Grasp the significance of Statistical Performance, Power and Yield Analysis
CO-3	Have the ability to explain the Convex Sets, Convex Functions and Convex Optimization Problems.
CO-4	Have the ability to understand the Standard Cell And Macro Cell Placement
CO-5	Grasp the significance of FPGA Technology Mapping and Automatic Test Generation

Course-10

Course Code:	A1VLT212
Course Title:	SEMICONDUCTOR MEMORY DESIGN AND TESTING
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Students fully appreciate about Volatile memories in aspects of cell architectures, designs, technologies and applications.
CO-2	Students fully appreciate about Non-Volatile memories in aspects of cell architectures, designs, technologies and applications.
CO-3	Students grasp the significance of to fault modeling and testing of the volatile memory and non-volatile memory
CO-4	Students will gain an understanding of Advanced Memory Technologies.

Course-11

Course Code:	A1VLL102
Course Title:	CUSTOM IC DESIGN LABORATORY
Theory / Lab:	Lab
L-T-P-C:	L
Course Outcomes:	
CO-1	Have the ability to explain the VLSI Design Methodologies using Mentor GraphicsTools
CO-2	Grasp the significance of various design logic Circuits in full-custom IC Designand ASIC Design Flow
CO-3	Have the ability to explain the Physical Verification in Layout Extraction
CO-4	Fully Appreciate the design and analyze of analog, digital and mixed signal simulation
CO-5	Grasp the Significance of Pre-Layout Simulation and Post-Layout Simulation

Semester-III Courses

Course-1

Course Code:	A1VLT109
Course Title:	Research Methodologies
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Understand the role and importance of research in the engineering stream.
CO-2	Identify and discuss the issues and concepts salient to the research process.
CO-3	Identify the complex issues inherent in selecting a research problem, selecting an appropriate research design, and implementing a research project
CO-4	Demonstrate the procedures of sampling, data collection, analysis and reporting

Course-2

Course Code:	A1VLV401

Course Title:	Comprehensive Viva-Voce
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Demonstrate knowledge in the program domain
CO-2	Exhibit professional etiquette suitable for career progression

Course-3

Course Code:	A1VLR401
Course Title:	Self-Study (Pre-requisite)
Theory / Lab:	Theory
L-T-P-C:	T
Course Outcomes:	
CO-1	Demonstrate sound technical knowledge in the concepts required for project
CO-2	Exhibit knowledge in tools required for executing the project

Course-4

Course Code:	A1VLS501
Course Title:	Seminar
Theory / Lab:	Theory
L-T-P-C:	P
Course Outcomes:	
CO-1	Demonstrate good communication skills
CO-2	Exhibit knowledge in general and domain areas

Course-5

Course Code:	A1VLP501
Course Title:	Project Phase – I
Theory / Lab:	Theory
L-T-P-C:	P
Course Outcomes:	
CO-1	Demonstrate a sound technical knowledge of the selected project topic
CO-2	Exhibit the knowledge of problem identification, formulation and solution
CO-3	Design engineering solutions to complex problems
CO-4	Communicate with engineers and the community at large in written and oral forms
CO-5	Demonstrate the knowledge in publishing papers in reputed journals

Semester-IV Courses

Course-1

Course Code:	A1VLP502
Course Title:	Project Phase – II
Theory / Lab:	Theory
L-T-P-C:	P
Course Outcomes:	
CO-1	Demonstrate a sound technical knowledge of the selected project topic
CO-2	Exhibit the knowledge of problem identification, formulation and solution
CO-3	Design engineering solutions to complex problems
CO-4	Communicate with engineers and the community at large in written and oral forms
CO-5	Demonstrate the knowledge in publishing papers in reputed journals

Dept. of CSE

B.Tech. (Computer Science and Engg)

Semester-I Courses

Course-1	
Course Code:	**A1MAT001**
Course Title:	**ENGINEERING MATHEMATICS-I**
Theory / Lab:	T
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Students will be able to apply the knowledge of solving 1st order & 1st degree differential equations in finding orthogonal trajectories of families of curves, Growth & Decay problems
CO-2	Student will be able to find the solution of initial value problems and be able to evaluate improper integrals of particular kind by using Laplace Transforms
CO-3	Students will be able to apply the concepts of Maxima and Minima for finding extreme values
CO-4	Student will be able to formulate and solve P.D.E and be able to apply the knowledge in finding the solutions of one dimensional wave equation and one dimensional heat equation

Course-2	
Course Code:	A1CYT001
Course Title:	**ENGINEERING CHEMISTRY**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Students gain the knowledge about water used in industries (boilers etc) and for drinking purpose, difference between hard water and soft water, estimation of hardness of water and specification of potable water and purification of sea water through reverse osmosis.
CO-2	Students gain the knowledge on mechanism of corrosion, factors responsible, types corrosion and methods of protection.
CO-3	Students gain the knowledge on structure, synthesis properties and applications of polymers, additives to be mixed with polymers to obtain desired plastics and moulding techniques, advanced topics on plastics like conducting polymers and biodegradable polymers, fibre reinforced plastics and bullet proof plastics, synthetic plastics that are essential to latest technology.
CO-4	Student gain the knowledge on the determination of calorific value by bomb calorimeter, the proximate and ultimate analysis of coal, Fractional distillation of crude, followed by catalytic cracking to obtain the liquid fuels for the functioning of internal combustion engine, octane and cetane number, which have large focus on oil industry.
CO-6	Students gain knowledge on advanced materials like carbon nano tubes and fullerenes, their properties and applications, manufacturing of cement, need for green chemistry, principles of green chemistry solar cells and greenhouse effect and their importance.

Course-3	
Course Code:	A1CET001
Course Title:	**BASICS OF CIVIL & MECHANICAL ENGINEERING**
Theory / Lab:	T
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Student will be able to understand floor area, plinth area, and building materials such as brick, cement, concrete, steel.
CO-2	Student will be able to understand the concepts of surveying, infrastructure such as buildings, roads, bridges, dams
CO-3	Student will be able to understand the working and function of various components of systems and subsystems of I.C. Engines, turbines, pumps and refrigerating systems
CO-4	Student will be able to identify various types of mechanical components suitable for power transmission
CO-5	Student will be able to understand Casting, forming and different metal joining processes like Welding, Brazing, Soldering

Course-4	
Course Code:	A1CHT001
Course Title:	**ENVIRONMENTAL STUDIES**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	

CO-1	Student will have knowledge on the natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources
CO-2	Student will have knowledge on the concepts of the ecosystem and its function in the environment, biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
CO-3	Student will have knowledge on various attributes of the pollution and their impact and measures to reduce or control the pollution along with waste management practices
CO-4	Student will have knowledge on social issues both rural and urban environment and the possible means to combat the challenges
CO-5	Student will have knowledge on the environmental legislations of India and the first global initiatives towards sustainable development, environmental assessment and the stages involved in EIA and the environmental audit

Course-5

Course Code:	A1ECT001
Course Title:	**FUNDAMENTALS OF ELECTRONIC CIRCUITS AND DEVICES**
Theory / Lab:	T
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Student shall have the ability understand the syntactical and grammatical intricacy
CO-2	Student shall be able to use right structure for right context and meaning
CO-3	Student shall be able to read and comprehend the content in English well
CO-4	Student shall be able to write well for his/her professional requirement
CO-5	Student shall be able to Speak in English well
CO-6	Student shall be able to understand and analyze the core components of his study well

Course-6

Course Code:	A1EHL001
Course Title:	**ENGLISH LANGUAGE PRACTICE -I**
Theory / Lab:	T
L-T-P-C:	1-0-2-2
Course Outcomes:	
CO-1	Student shall have the ability understand the syntactical and grammatical intricacy
CO-2	Student shall be able to read and comprehend the content in English well
CO-3	Student shall be able to write well for his/her professional requirement
CO-4	Student shall be able to Speak in English well
CO-5	Student shall be able to understand and analyze the core components of his study well

Course-7

Course Code:	A1CYL001
Course Title:	**ENGINEERING CHEMISTRY LAB**
Theory / Lab:	L
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Will be aware of the basic engineering trades and be able to execute related work at a rudimentary level
CO-2	Will be able to select and use proper tools for the different tasks
CO-3	Will be able to apply knowledge and skills developed to handle real-life situations in these areas

Course-8

Course Code:	A1MEW001
Course Title:	**BASIC ENGINEERING WORKSHOP**
Theory / Lab:	T
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Student will be able to obtain the solution of linear system of equations which frequently occur in engineering problems
CO-2	Student will gain the proficiency in finding the Eigen values and Eigen vectors and reduction of quadratic forms to canonical forms
CO-3	Student will be able to estimate the missing terms of given data using interpolation.
CO-4	Student will be able to solve Initial value problems through numerical methods.
CO-5	Student will be able to find the solution of Difference equations which arise in discrete time systems

Semester-II Courses

Course-1

Course Code:	A1MAT002
Course Title:	**MATHEMATICAL METHODS**

Theory / Lab:	L
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Student will be able to obtain the solution of linear system of equations which frequently occur in engineering problems
CO-2	Student will gain the proficiency in finding the Eigen values and Eigen vectors and reduction of quadratic forms to canonical forms
CO-3	Student will be able to estimate the missing terms of given data using interpolation
CO-4	Student will be able to solve Initial value problems through numerical methods
CO-5	Student will be able to find the solution of Difference equations which arise in discrete time systems.

Course-2

Course Code:	A1MED001
Course Title:	**ENGINEERING DRAWING**
Theory / Lab:	T
L-T-P-C:	1-0-3-3
Course Outcomes:	
CO-1	Student will be able to construct regular polygons, conic curves and simple scales
CO-2	Student will be able to draw orthographic projections of points, lines, planes and solids
CO-3	Student will be able to produce isometric projection from orthographic projections and vice-versa

Course-3

Course Code:	A1PYT002
Course Title:	**APPLIED PHYSICS**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Student will be able to understand the phenomena of interference, diffraction and polarization exhibited by light waves
CO-2	Student shall understand about laser, its characteristics and production with an example and application of laser in specific to optic fiber.
CO-3	The student shall understand about different crystal systems, space lattices, and parameters of unit cell and the Bragg‘s law of X-ray diffraction
CO-4	Student will be able to understand foundation principles of quantum mechanics and semiconductors.
CO-5	Student shall understand about response of the materials in presence of electric and magnetic fields and the basic laws of electromagnetic waves.

Course-4

Course Code:	A1CIT001
Course Title:	**COMPUTER PROGRAMMING**
Theory / Lab:	T
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Have the ability to write a formal algorithmic solution for the given problem & explain the features of C like types including scalar & vector types, operators, expressions, expression evaluation, operator precedence, sequential, conditional &iteative constructs
CO-2	Have the ability to use modular programming constructs of C while appreciating different ways of exchanging inputs and outputs among modules and different memory allocation strategies in C
CO-3	Have the ability to define & use user defined data types using C constructs and write C programs that handle files
CO-4	Grasp the significance of primary constructs & methodology of procedural language C and appreciate the orthoganality of the same writing reasonably complicated programs
CO-5	Grasp the significance of type extendibility in C, need for address as a data type andlibrary functions for dealing with files in writing more complicated programs
CO-6	Fully appreciate the art of procedural programming in C and develop programsoptimally using the full feature set of C language

Course-5

Course Code:	A1EHL002
Course Title:	**ENGLISH LANGUAGE PRACTICE -II**
Theory / Lab:	T
L-T-P-C:	1-0-2-2
Course Outcomes:	
CO-1	Student shall have the ability to speak intelligibly
CO-2	Student shall be able to use phrases, foreign expressions and idioms correctly
CO-3	Student shall be able to participate well in debates and discussions
CO-4	Student shall be able to write both Technical and General reports well

CO-5	Student shall be able prepare resume well and face the interviews confidently
CO-6	Student shall communicate confidently and effectively

Course-6

Course Code:	A1CIL001
Course Title:	**COMPUTER PROGRAMMING LAB**
Theory / Lab:	L
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Have the ability to pick and choose the required built-in data-types for the specific problem and utilize the full power of operators and expression evaluation of CLanguage while writing programs for any given problem.
CO-2	Have the ability to use choose and utilize different control constructs in C Languagedepending on the context of the need while developing a C program for any specific problem.
CO-3	Have the ability to divide the parts of a program solution into functions and write a program in C as an inter-play of functions using each other in what is calledmodular programming
CO-4	Have the ability to fully appreciate the concept and utilization of single and multidimensional arrays of different data-types in C.
CO-5	Have the ability to appreciate the concept of address variables and understand thebenefits and utilization of the same along with under the flexibility provided by dynamic memory allocation and its comparison to static memory allocation.
CO-6	Have the ability to appreciate the concept of user defined data types and utilize these concepts to define new composite data types as required for implementing solutions to a problem in a C program.
CO-7	Have the ability to appreciate the library support available in standard C for dealingwith external files both for read and write purposes and use them as required while developing C Programs.

Course-7

Course Code:	A1PYL002
Course Title:	**APPLIED PHYSICS LAB**
Theory / Lab:	L
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Student will be able to experimentally observe interference and diffraction patterns of light waves due to different optical devices and determine the given parameters.
CO-2	Student shall understand the tir process in the optic fiber experimentallyand will be able to determine the numerical aperture and bending loss of the optic fiber.
CO-3	Student shall experimentally determine the temperature coefficient of resistance, energy gap, type of charge carriers and concentration of charge carriers in a semiconductor and to study the I-V characteristics of the given p-n junction diode
CO-4	Student shall experimentally study the magnetic hysteresis and determine related parameters and study the variation of magnetic fields due to currents and to study the frequency response of LCR circuits.

Course-8

Course Code:	A1EHT101
Course Title:	**PROFESSIONAL COMMUNICATION**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	students apply the principles and functions of corporate communication
CO-2	Students receive input on various business and professional genres that serve as a basis for completion of their letter, short business report, meeting simulaion and minutes of a meeting
CO-3	Students analyze effective written and spoken communication in organization
CO-4	Acquiring the skills required from linguistic perspective for preparing themselves for their prospective careers in business and management domain.

Semester-III Courses

Course-1

Course Code:	A1CIT201
Course Title:	**DATA STRUCTURES**
Theory / Lab:	T
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Have the ability to compare different searching and sorting methods and perform basic operations on stacks and queues (Knowledge Outcome)

CO-2	Have the ability to implement linked lists and trees and use them in various applications (Knowledge Outcome)
CO-3	Have the ability to implement various tree and graph ADTs and to use them solve common graph problems (Knowledge Outcome)
CO-4	Grasp the significance of creating, solving, and designing, testing, debugging and applying of linear data structures. (Understanding Outcome)
CO-5	Grasp the significance of creating, solving, and designing, testing, debugging and applying of non-linear data structures. (Understanding Outcome)
CO-6	Fully appreciate the art of different data structures and applying the knowledge of data structures to various applications. (Applying)

Course-2

Course Code:	A1CIT202
Course Title:	**Mathematical Foundations of Computer Science**
Theory / Lab:	T
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Students will be able to formulate and validate the logical expressions for a variety of applications and will able to understand the fundamental results of number theory.
CO-2	Students will be able to design relational databases, design finite automata to recognize string patterns and be able to solve problems using mathematical induction
CO-3	Students will be able to formulate all possible permutations and combinations for problems in hand and also solve recurrence relations for various problems
CO-4	Students can grasp the significance of mathematical and predicate logic, number theory and set theory in computer science applications.
CO-5	Students can grasp the significance of having knowledge of combinatorics and recurrence relations which help in effective design of various software applications
CO-6	Students can fully appreciate the feature set and essence of various principles of mathematics which can be applied in real time computer science applications

Course-3

Course Code:	A1CIT203
Course Title:	**Digital Logic Design**
Theory / Lab:	T
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Have the ability to deal with different number systems and perform basic arithmetic operations, explain in detail Boolean algebra operations, basic gates for implementing different Boolean operations, forms of representing Boolean expressions and minimizing them.
CO-2	Have the ability to describe, analyze and build combinational and sequential circuits and explore some of the most widely used combinational circuits
CO-3	Have the ability to describe, analyze and build common synchronous sequential circuits like registers, counters and PLAs and also describe the design procedure and issues involved in asynchronous sequential circuits.
CO-4	Grasp the significance of number systems, Boolean algebra and combinational circuit design and how they might be applied for designing circuits for any given problem.
CO-5	Grasp the significance of sequential circuits, distinguishing them from combinational circuits and the procedure to be used for coming up with sequential circuits (synchronous and asynchronous)
CO-6	Fully appreciate the basics of logic design, digital gates to support basis Boolean operations and the process of designing different circuits for required logical functions that have state and no state.

Course-4

Course Code:	A1CIT204
Course Title:	**UNIX & Shell Programming**
Theory / Lab:	T
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Have the ability to write and explain various utilities/commands, supported by UNIX, in order to solve simple and complex problems.
CO-2	Have an ability to write and explain shell scripts using various commands and filters in order to search and modify files.
CO-3	Have an ability to write and explain programs using various types of system calls in order to handle files, directories and processes.
CO-4	Grasp the significance of various utilities and shell scripts supported by UNIX in developing programming solutions.
CO-5	Grasp the significance of and in fact appreciate the role of korn shell programming concepts and file management techniques

CO-6	Fully appreciate the techniques involved in handling files, directories and korn shell programming concepts in UNIX.

Course-5

Course Code:	A1CIT205
Course Title:	**Data Communications**
Theory / Lab:	T
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Have the ability to explain data communication standards, OSI Model and its functionality and services of each layer.
CO-2	Have the ability to explain about transmission media and the switching.
CO-3	Have the ability to explain about various errors detection and correction techniques.
CO-4	Grasp the significance of transmission media and transmission mechanisms that are required to communicate the data.
CO-5	Grasp the significance of applying various error detection and correction techniques in various protocols for effective communication
CO-6	Fully appreciate the conglomeration of equipment‘s and the underlying transmission principles required for establishing a communication system

Course-6

Course Code:	A1MST001
Course Title:	**MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Able to understand application of economics in decision making
CO-2	Able to develop and determine cost efficient production through optimization.
CO-3	Able to aware various business environmental factors and the impact.
CO-4	Able to do financial analysis of the firm to know its performance from different parameters.

Course-7

Course Code:	A1CIL201
Course Title:	**Data Structures Lab**
Theory / Lab:	L
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	students will get hands onexposure to design and implement simple recursive and non-recursive algorithms
CO-2	Students will get hands on exposure to linear and non linear algorithms
CO-3	Students will get hands on exposure to identify and apply the suitable data structures for the given real world problem

Course-8

Course Code:	A1CIL202
Course Title:	**Unix & Shell Programming Lab**
Theory / Lab:	L
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	An ability to understand the basic features of UNIX and be able to login to a remote machine in order to work with commands in all possible ways with a clear exposure on UNIX file system
CO-2	An ability to write an expression that can be used in conjunction with sed in order to match and remember a particular pattern and also have an exposure of using awk effectively
CO-3	An ability to write a foreground or background shell script that accepts input through command line or through console in order to perform various computations with a use of several operators and also could learn the usage of awk scripts in conjunction with shell.
CO-4	An ability to write C programs with an implementation of system call interface provided by UNIX to simulate the working of basic commands like ls, cp and mv.

Semester-IV Courses

Course-1

Course Code:	A1CIT206
Course Title:	**Object Oriented Programming**
Theory / Lab:	T
L-T-P-C:	4-0-0-4
Course Outcomes:	

CO-1	Have the ability to explain benefits of object oriented programming and how and why they make it easy to model real world, explain and discuss the basic language features of JAVA and its design goals.
CO-2	Have the ability to explain and discuss JAVA support of object oriented concepts like abstraction, encapsulation, inheritance and polymorphism and JAVA rich features on exception handling and multi-threading
CO-3	Have the ability to explain and discuss JAVA API library particularly the input/output, utilities and user interface packages and how they can be used to implement rich applications in JAVA.
CO-4	Grasp the significance of object oriented programming and how JAVA makes it easy and facilitates good object oriented programming
CO-5	Grasp the significance of advanced language features like exception handling, multi- threading and event driven programming and appreciate the JAVA API support for using these features of the language.
CO-6	Fully appreciate the art of object oriented programming and have the know-how to utilize the rich API provided by JAVA platform to develop applications of significant complexity with relative ease.

Course-2

Course Code:	A1CIT207
Course Title:	**Operating Systems**
Theory / Lab:	T
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Have the ability to explain in detail the purpose of the operating system, kernel structure and its interface with application software and to explain in detail the different process management related aspects of typical operating systems
CO-2	Have the ability to describe in detail the different ways and detail in which the memory management and file management services are provided in a typical operating system.
CO-3	Have the ability to describe in detail the I/O management and protection and security services provided by a typical operating system
CO-4	Grasp the significance of importance, role and details of basic operating system structure, process management services and memory management services
CO-5	Grasp the significance of different ways in file system and file management services are provided by operating systems and how operating systems take care of protection and security services.
CO-6	Fully appreciate the role, different alternate ways in which operating systems are implemented and different variations on the common services provided by operating systems.

Course-3

Course Code:	A1CIT208
Course Title:	**Data Base Management Systems**
Theory / Lab:	T
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Will have the ability to explain different model for data organization and basic set theory concepts that lead to entity relationship modeling that is basis for RDBMS along with relational algebra and relational calculus notations.
CO-2	Will have the ability to explain and describe the different query and manipulations constructs available in SQL standard for data querying and manipulation, and how to design a good relational database eliminating redundancies using normalization.
CO-3	Will have the ability to explain and describe the transaction management and recovery aspects of typical commercial RDBMS and how data storage of RDBMS is implemented using external data structures.
CO-4	Grasp the significance of relational data modeling and structured querying on top of typical RDBNMS along with advantages of RDBMS and more specifically of DBMS over file systems.
CO-5	Grasp the significance of structured approach to RDBMS design, the transactional and recovery features of RDBMS and data structures used for external data storage of RDBMS in a file.
CO-6	Full appreciate the need, working and feature set of relational database management systems.

Course-4

Course Code:	A1CIT209
Course Title:	**Computer Architecture**
Theory / Lab:	T
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Have the ability to explain the concept of stored program computer & the different representations forms for basic data types, ALU & instruction design all the way from macro instruction design to micro instructions to ALU circuit design and different ways of designing control unit.
CO-2	Have the ability to demonstrate complete understanding of algorithms for basic arithmetic operations on different types of data and memory design aspects of computer design.

CO-3	Have the ability to demonstrate sound understanding input/output organization including modes of transfer, advanced processor design aspects like pipelining and vector processing, and multiprocessor design principles
CO-4	Grasp the significance of basic computer organization including designing and building ALU, Instruction Design and corresponding control unit design & algorithms for basic arithmetic operations on all data types.
CO-5	Grasp the significance of memory devices, memory design principles in modern computers, Basic arithmetic operation algorithms and I/O organization of computer, concepts involved in super scalar processor design, and concepts involved and multi- processor design.
CO-6	Fully appreciate the concepts design & development of modern stored program computers.

Course-5

Course Code:	A1CIT210
Course Title:	**Formal Languages and Automata Theory**
Theory / Lab:	T
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Have the ability to explain the basic notations and concept of regular expressions and finite automation and other equivalent machines.
CO-2	Have the ability to explain and describe in detail regular languages and their properties, context free grammars and their languages and hierarchy of languages as classified by Chomsky.
CO-3	Have the ability to explain in detail pushdown automation and its equivalence to context free grammars, Turing machines and the whole theory of computability
CO-4	Grasp the significance of regular grammars and all their equivalent automations and expressions and some case studies on where they are useful
CO-5	Grasp the significance of context free grammars, their equivalent automata, Turing machine and their generality and equality to abstract computer and whole theory of computability.
CO-6	Fully appreciate the formal basis for design of any formal language and how we can think of machines that can automatically verify validity of a string against a grammar and the theory behind defining what is computable and what is not.

Course-6

Course Code:	A1CIL203
Course Title:	**Object Oriented Programming Lab**
Theory / Lab:	L
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Have the ability to explain benefits of object oriented programming and how and why they make it easy to model real world, explain and discuss the basic language features of JAVA and its design goals.
CO-2	Have the ability to explain and discuss JAVA support of object oriented concepts like abstraction, encapsulation, inheritance and polymorphism and JAVA rich features on exception handling and multi-threading
CO-3	Have the ability to explain and discuss JAVA API library particularly the input/output, utilities and user interface packages and how they can be used to implement rich applications in JAVA.
CO-4	Grasp the significance of object oriented programming and how JAVA makes it easy and facilitates good object oriented programming
CO-5	Grasp the significance of advanced language features like exception handling, multi- threading and event driven programming and appreciate the JAVA API support for using these features of the language.

Course-7

Course Code:	A1CIL204
Course Title:	**Data Base Management Systems Lab**
Theory / Lab:	L
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Will have the ability to explain different model for data organization and basic set theory concepts that lead to entity relationship modeling that is basis for RDBMS along with relational algebra and relational calculus notations.
CO-2	Will have the ability to explain and describe the different query and manipulations constructs available in SQL standard for data querying and manipulation, and how to design a good relational database eliminating redundancies using normalization.
CO-3	Will have the ability to explain and describe the transaction management and recovery aspects of typical commercial RDBMS and how data storage of RDBMS is implemented using external data structures.
CO-4	Grasp the significance of relational data modeling and structured querying on top of typical RDBNMS along with advantages of RDBMS and more specifically of DBMS over file systems.

CO-5	Grasp the significance of structured approach to RDBMS design, the transactional and recovery features of RDBMS and data structures used for external data storage of RDBMS in a file.
CO-6	Full appreciate the need, working and feature set of relational database management systems.

Semester-V Courses

Course-1

Course Code:	A1CIT211
Course Title:	**COMPILER DESIGN**
Theory / Lab:	T
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	To introduce the major concept areas of language translation and compilerdesign
CO-2	To develop an awareness of the function and complexity of compilers.
CO-3	To provide practical, hands on experience in compiler design
CO-4	Identify the similarities and differences among various parsing techniques and grammar transformation techniques

Course-2

Course Code:	A1CIT212
Course Title:	**COMPUTER NETWORKS**
Theory / Lab:	T
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Independently understand basic computer network technology.
CO-2	Identify the different types of network topologies and technology
CO-3	Enumerate the layers of OSI model and TCP/IP.
CO-4	Understand the addressing mechanism and networking Frame structure.

Course-3

Course Code:	A1CIT213
Course Title:	**MICRO PROCESSORS & INTERFACING**
Theory / Lab:	T
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	The student will learn the internal organization of some popular microprocessors/microcontrollers
CO-2	The student will learn hardware and software interaction and integration.
CO-3	Have the ability to program using 8086 assembly langauge.
CO-4	Have the ability to interface peripheral devices with microprocessor.
CO-5	Full appreciate the architecture, instructions, and interfacing methods and design 8086 based microprocessor systems.

Course-4

Course Code:	A1CIT214
Course Title:	**WEB TECHNOLOGIES**
Theory / Lab:	T
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Ability to integrate the MYSQL and PHP to develop an application.
CO-2	Ability to use open source languages and open source databases like PHP and MYSQL to develop the application
CO-3	Create web pages using Xml and CSS techniques and building web pages
CO-4	Ability to fully appreciate the art of open source software language‘s and software‘s. And develop projects optimally using the full feature set of open source software‘s.

Course-5

Course Code:	A1CIL205
Course Title:	**Compiler Design & Computer Networks Lab**
Theory / Lab:	L
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	To apply the knowledge of lex tool & yacc tool to develop a scanner & parser
CO-2	To design & implement a front end of the compiler.
CO-3	To develop program for implementing symbol table and for solving parser problems.
CO-4	To develop basic understanding of framing method.
CO-5	To compute the shortest paths
CO-6	To use the packet tracer to simulate various networks.

Semester-VI Courses

Course-1	
Course Code:	A1CIT215
Course Title:	**Design & Analysis of Algorithms**
Theory / Lab:	T
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Understand the data structures and analyze worst-case running times of algorithms using asymptotic analysis
CO-2	Describe the divide-and-conquer, dynamic, greedy paradigms and explain when an algorithmic design situation calls for it.
CO-3	Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems, when appropriate. Synthesize new graph algorithms and algorithms that employ graph computations as key components,and analyze them
CO-4	Explain the different ways to analyze randomized algorithms (expected running time, probability of error). Recite algorithms that employ randomization.Explain the difference between a randomized algorithm and an algorithm with probabilistic inputs
CO-5	Analyze randomized algorithms. Employ indicator random variables and linearity of expectation to perform the analyses. Recite analyses of algorithms that employ this method of analysis
CO-6	

Course-2	
Course Code:	A1CIT216
Course Title:	**SOFTWARE ENGINEERING**
Theory / Lab:	T
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Students will have the ability to select most appropriate process model for the given project
CO-2	Students will have the ability to author software requirements specification document which includes gathering, analyzing, validating requirements and to arrive at software architecture and design using various design concepts and architectural styles and patterns
CO-3	Students will have the ability to design the software from object oriented perspective, arrive at User Interface design, and plan various test strategies and process & product metrics based on requirements and design.
CO-4	Students will have the ability to understand software development phase wise metrics, identify, estimate and manage risks involved in the project and maintain the quality of the software product to its best.
CO-5	Students will grasp the significance of Software Quality Assurance (Reviews,Testing, Metricsetc) and Risk Reduction activities
CO-6	Students will fully appreciate end to end software engineering processes and activities.

Course-3	
Course Code:	A1CIT217
Course Title:	**Object Oriented Analysis and Design & Design Patterns**
Theory / Lab:	T
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Identify the purpose and methods of use of common object-oriented design patterns
CO-2	Select and apply these patterns in their own designs for simple programs
CO-3	Represent the data dependencies of a simple program using UML
CO-4	Represent user and programmatic interactions using UML
CO-5	Create design documentation outlining the testable and complete design of a simple program
CO-6	Produce plans to limit risks specific to software designed for use in a particular context.

Semester-VII Courses

Course-1	
Course Code:	A1CIT218
Course Title:	**DESIGN OF UNIX OPERATING SYSTEM**
Theory / Lab:	T
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Work confidently in Unix environment
CO-2	Write shell scripts to automate various tasks

CO-3	Master the basics of unix administration

Course-2	
Course Code:	A1CIL209
Course Title:	**OOAD & DP Lab**
Theory / Lab:	L
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Understand Object Oriented Software Development Process
CO-2	Gain exposure to Object Oriented Methodologies & UML Diagrams
CO-3	To apply Object Oriented Analysis Processes for projects

Course-3	
Course Code:	A1CIL210
Course Title:	**OPERATING SYSTEMS LAB**
Theory / Lab:	L
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	To provide an understanding of the design aspects of operating system
CO-2	To learn the fundamentals of shell scripting/programming
CO-3	To provide an understanding of basic LINUX environment

Semester-VIII Courses

Course-1	
Course Code:	A1CIP601
Course Title:	Directed Study
Theory / Lab:	Project
L-T-P-C:	0-0-0-2
Course Outcomes:	
CO-1	Demonstrate the ability of self-learning that leads to continous and life long learning needs.
CO-2	Demonstrate team work and professional ethics.
CO-3	Conduct study on modern tool usage for implementing a project idea.
CO-4	Develop communication skills and problem solving skills.
CO-5	Identify citizen centric problem that can be addressed with the skill set earned in the course.

Course-2	
Course Code:	A1CIP602
Course Title:	Project
Theory / Lab:	Project work
L-T-P-C:	0-0-0-8
Course Outcomes:	
CO-1	Demonstrate a sound technical knowledge of their selected project topic
CO-2	Undertake problem identification, formulation and solution by considering ethical responsibility
CO-3	Design engineering solutions to complex problems utilizing as system approach
CO-4	Conduct an engineering project that has environmental impact
CO-5	Communicate with engineers and the community at large in written and oral forms
CO-6	Demonstrate the knowledge, skills and attitudes of a professional engineer

Elective Courses

Course-1	
Course Code:	A1CIT311
Course Title:	**DATA WAREHOUSING & DATA MINING**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Understand why there is a need for data warehouse in addition to traditional operational database systems
CO-2	Identify components in typical data warehouse architectures
CO-3	Design a data warehouse and understand the process required to construct One
CO-4	Understand why there is a need for data mining and in what ways it is different from traditional statistical techniques
CO-5	Understand the details of different algorithms made available by popular commercial data mining software
CO-6	Solve real data mining problems by using the right tools to find interesting Patterns

Course-2

Course Code:	A1CIT322
Course Title:	**ROUTING & SWITCHING CONCEPTS**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Ability to understand the difference between OSI model and TCP/IP protocol suite.
CO-2	Ability to choose a particular routing protocol (static or dynamic) and be able to configure the routers.
CO-3	Ability to understand the role of switch at layer 2 and be able to configure, switch port security, VLAN's, VTP etc.
CO-4	Ability to design networks and configure the intermediate devices along with basic security features.
CO-5	Fully appreciate the role of a network engineer in designing small to medium scale networks.

Course-3

Course Code:	A1CIT332
Course Title:	**SERVICE ORIENTED ARCHITECTURE**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Should be able to explain in detail the basic paradigm and merits of service oriented architecture.
CO-2	Should be able to explain the considerations and circumstances for building applications using service oriented architecture.
CO-3	Should be able to fully understand the concept of enterprise service bus
CO-4	Should be able to appreciate the design concepts, and common services involved in design of SOA driven applications
CO-5	Should have a reasonable grasp of all the technologies involved in developing service oriented architecture applications

Course-4

Course Code:	A1CIT316
Course Title:	**DATA SCIENCES & ANALYTICS**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Define and explain the key concepts and models relevant to data science, including data cleaning and integration, data-intensive distributed computing, data mining algorithms, and data visualization.
CO-2	Design, implement, and evaluate the core algorithms underlying an end-to-end data science workflow, including the experimental design, data collection, mining,analysis, and presentation of information derived from large datasets.
CO-3	Apply "best practices" in data science, including facility with modern tools.

Course-5

Course Code:	A1CIT321
Course Title:	**MOBILE COMPUTING**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Able to think and develop new mobile application
CO-2	Able to take any new technical issue related to this new paradigm and come up with a solution(s).
CO-3	Able to develop new ad hoc network applications and/or algorithms/protocols
CO-4	Able to understand & develop any existing or new protocol related to mobile environment.

Course-6

Course Code:	A1CIT331
Course Title:	**MIDDLEWARE TECHNOLOGIES**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Describe the benefits and architecture of Client Server Technology
CO-2	Understand the concepts of CORBA and RMI technologies
CO-3	Apply the components of C# .Net technology to given applications
CO-4	Classify the architecture of CORBA and mapping the CORBA with existing
CO-5	Programming languages like Java

Course-7

Course Code:	A1CIT344
Course Title:	**COMPUTER GRAPHICS**

Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Explain the Computer Graphics display technologies
CO-2	Analyse the basic output primitive drawing algorithms along with 2D transformation concepts to display the objects
CO-3	Apply the polygon filling algorithms to fill polygons with required colour
CO-4	Derive the projection transformations and explain the 3D object representation models

Course-8

Course Code:	A1CIT332
Course Title:	**SERVICE ORIENTED ARCHITECTURE**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Should be able to explain in detail the basic paradigm and merits of service oriented architecture.
CO-2	Should be able to explain the considerations and circumstances for building applications using service oriented architecture
CO-3	Should be able to fully understand the concept of enterprise service bus
CO-4	Should be able to appreciate the design concepts, and common services involved in design of SOA driven applications
CO-5	Should have a reasonable grasp of all the technologies involved in developing service oriented architecture applications

Course-9

Course Code:	A1CIT312
Course Title:	**GRID & CLUSTER COMPUTING**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Able to appreciate the necessity of grid computing and thus its evaluation
CO-2	Able to understand where the grid computing could be effectively utilized by illustrations of applications of grid computing
CO-3	Able to select a proper technology and toolkit for using grid computing

Course-10

Course Code:	A1CIT325
Course Title:	**FIREWALL & VPN**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Understand Foundations of Network Security
CO-2	Network Security Implementation and management
CO-3	VPN technologies and VPN Management
CO-4	Firewall Implementation

Course-1

Course Code:	A1CIT336
Course Title:	**CLOUD & UTILITY COMPUTING**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Understanding the key dimensions of the challenge of Cloud Computing
CO-2	Assessment of the economics , financial, and technological implications for selecting cloud computing for own organization
CO-3	Assessing the financial, technological, and organizational capacity of employer for actively initiating and installing cloud-based applications
CO-4	Assessment of own organizations‘ needs for capacity building and training in cloud computing-related IT areas

Course-2

Course Code:	A1CIT345
Course Title:	**PARALLEL PROGRAMMING & ALGORITHMS**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Understand the concepts of parallel programming and algorithms

CO-2	Design and prove correctness and analyze the computational complexity of sequential algorithms
CO-3	Describe and use basic sequential algorithms

Course-3

Course Code:	A1CIT332
Course Title:	**SERVICE ORIENTED ARCHITECTURE**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Should be able to explain in detail the basic paradigm and merits of service oriented architecture.
CO-2	Should be able to explain the considerations and circumstances for building applications using service oriented architecture.
CO-3	Should be able to fully understand the concept of enterprise service bus.
CO-4	Should be able to appreciate the design concepts, and common services involved in design of SOA driven applications.
CO-5	Should have a reasonable grasp of all the technologies involved in developing service oriented architecture applications

Course-4

Course Code:	A1CIT315
Course Title:	**NEURAL NETWORKS & SOFT COMPUTING**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Identify and describe soft computing techniques and their roles in building intelligent machines.
CO-2	Recognize the feasibility of applying a soft computing methodology for a particularproblem.
CO-3	Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.

Course-5

Course Code:	A1CIT323
Course Title:	**ADHOC NETWORKS**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Describe the unique issues in ad-hoc networks
CO-2	Describe current technology trends for the implementation and deployment of wireless ad-hoc networks
CO-3	Discuss the challenges in designing MAC, routing and transport protocols for wireless adhoc networks

Course-6

Course Code:	A1CIT333
Course Title:	**ENTERPRISE JAVA BEANS**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Demonstrate understanding the concepts of Java Bean Component model.
CO-2	Integrate Servlets, JSP and JDBC and build a web application
CO-3	Build Enterprise Applications using Session Bean, Entity Bean and MDB

Course-7

Course Code:	A1CIT348
Course Title:	**DIGITAL FORENSICS & INVESTIGATIONS**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Analyze and carve image files both logical and physical
CO-2	Explain guidelines for investigation reporting
CO-3	Explain anti-forensic methods/tools and their use

Course-8

Course Code:	A1CIT311
Course Title:	**DATA WAREHOUSING & DATA MINING**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Understand why there is a need for data warehouse in addition to traditional operational database systems

CO-2	Identify components in typical data warehouse architectures
CO-3	Design a data warehouse and understand the process required to construct One
CO-4	Understand why there is a need for data mining and in what ways it is different from traditional statistical techniques
CO-5	Understand the details of different algorithms made available by popular commercial data mining software
CO-6	Solve real data mining problems by using the right tools to find interesting Patterns

Course-9	
Course Code:	A1CIT314
Course Title:	**SEMANTIC WEB**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Demonstrate knowledge and be able to explain the three different —named‖ generations of the web.
CO-2	Demonstrate the ability to participate materially in projects that develop programs relating to Web applications and the analysis of Web data.
CO-3	Be able to understand and explain the key aspects of Web architecture and why these are important to the continued functioning of the World Wide Web.
CO-4	Be able to analyze and explain how technical changes affect the social aspects of Web-based computing
CO-5	Be able to develop —linked data‖ applications using Semantic Web technologies

Course-10	
Course Code:	A1CIT326
Course Title:	**PENETRATION TESTING**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Skills student will develop in this course Students will learn how to apply knowledge of engineering to security evaluations, design and conduct security assessment experiments
CO-2	Analyze and interpret the resulting data, understand professional and ethical responsibility, communicate effectively, understand the impact of security practices in a global and societal context
CO-3	Recognize the need for life-long learning in the quickly changing cybersecurity environment, develop knowledge of contemporary cybersecurity issues
CO-4	Use techniques, skills and modern engineering tools necessary for computer security engineering practice

Course-11	
Course Code:	A1CIT335
Course Title:	**ENTERPRISE RESOURCE PLANNING**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Examine systematically the planning mechanisms in an enterprise, and identify all components in an ERP system and the relationships among the components
CO-2	Understand production planning in an ERP system, and systematically develop plans for an enterprise
CO-3	Use methods to determine the correct purchasing quantity and right time to buy an item, and apply these methods to material management
CO-4	Understand the difficulties of a manufacturing execution system, select a suitable performance measure for different objectives, and apply priority rules to shop floor control.

M.Tech. (CNIS)

Semester-I Courses

Course-1	
Course Code:	**A1CNT101**
Course Title:	**Advanced Computer Networks**
Theory / Lab:	T
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Ability to understand the difference between OSI model and TCP/IP protocol suite.
CO-2	2. Ability to identify IPv4 address classes, and also be able to perform sub-netting and supernetting.

CO-3	3. Ability to choose a particular routing protocol (static or dynamic) and be able to configure
	the routers.
CO-4	4. Ability to understand the role of switch at layer 2 and be able to configure, switch port
	security, VLAN's, VTP etc.
CO-5	5. Ability to explain IPv6 addressing scheme and understand the concepts of WAN protocols.
CO-6	6. Ability to design networks and configure the intermediate devices along with basic
	security features.
CO-7	7. Fully appreciate the role of a network engineer in designing small to medium scale
	networks.

Course-2

Course Code:	**A1CST101**
Course Title:	Advanced Data Structures 3 - 2 4
Theory / Lab:	T
L-T-P-C:	3-0-2-4
Course Outcomes:	
CO-1	Have the ability to understand data structure, notations. Be able to implement linked
	lists, stacks and queues.
CO-2	2. Have the ability to grasp the significance of Queues and Trees.
CO-3	3. Have the ability to design priority queues, and understand various sorting techniques.
CO-4	4. Have the ability to demonstrate the Hashing Techniques.
CO-5	5. Have the ability to differentiate greedy and divide and conquer algorithms and
	applications.
CO-6	6. Fully appreciate the elements and components of data structures and their
	applications.

Course-3

Course Code:	**A1CST102**
Course Title:	OOP Using JAVA
Theory / Lab:	T
L-T-P-C:	3-0-2-4
Course Outcomes:	
CO-1	Have the ability to understand the basic concepts of Object Oriented paradigm.
	2. Have the ability to Understand and apply Inheritance, polymorphism, and interfaces.
CO-2	3. Have the ability to grasp the significance if handling exceptions and understand the
CO-3	benefits of multithreading.
CO-4	4. Have the ability define, import and make use of packages.
CO-5	5. Have the ability to handle events, design basic and advanced User Interfaces, and
	applets.
CO-6	6. Fully appreciate the advantages of Object Oriented Programming and use Java to
	implement simple applications.

Course-4

Course Code:	**A1CNL101**
Course Title:	**Networking Design Lab - I**
Theory / Lab:	L
L-T-P-C:	0-0-3-2
Lab Outcomes:	
CO-1	Have the ability to identify IPv4 addresses classes, perform sub-netting and
	Supernetting.
CO-2	2. Have the ability to configure static routing in a router.
CO-3	3. Have the ability to configure RIP, EIGRP.
CO-4	4. Have the ability to configure OSPF routing.
CO-5	5. Have the ability to configure switch for basic security and VLAN, VTP.
CO-6	6. Have the ability to configure standard and extended ACL's
CO-7	7. Fully appreciate the role of network engineer in establishing a small to medium sized
	networks.

Course Code:	**A1CNT202**
Course Title:	**SENSOR AND ADHOC NETWORKS**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Lab Outcomes:	
CO-1	Have the knowledge and understanding of MANETS, characteristics, applications and challenges.
CO-2	2. Have the ability to comprehend routing algorithms and their pros and cons.
CO-3	3. Have the knowledge and understanding of wireless sensor networks, applications and data retrieval.
CO-4	4. Have the ability to understand various security mechanisms in Ad Hoc networks.

CO-5	5. Fully appreciate the role of Mobile Adhoc networks, and wireless sensor networks in real world applications.

Course Code:	**A1CNT204**
Course Title:	**Network Perimeter Security**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Ability to understand the basic concepts of information security management.
CO-2	Ability to appreciate the need for Information security planning in the project development life cycle.
CO-3	Ability to grasp the significance of contingency planning and security policy.
CO-4	Ability to demonstrate the knowledge of security management models and performance parameters.
CO-5	Ability to appreciate the need for Risk management and ability to perform risk assessment.
CO-6	Ability to know the components of personnel and perimeter security.
CO-7	Ability to demonstrate the knowledge of standards like ISO 27001

Semester-II Courses

Course-1

Course Code:	**A1CST104**
Course Title:	**Relational Data Base Management Systems**
Theory / Lab:	T
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Have the ability to explain why to choose a database system instead of simply storing data in operating system file ,in terms of three tier architecture, levels of abstraction, creation of database with various types of database languages and data independence and to explain the various database design steps and how to develop an entity-relationship model for different database relations with extended features.
CO-2	Have the ability to describe various queries for creating and modifying on the relations using SQL, applying integrity and referential constraints on the relations and Have the ability to explain functional dependencies, schema refinement, refining by decomposition and refining the problems using various normal forms.
CO-3	Have the ability to describe ACID properties, recovery systems ,backup systems, file organization and indexing and B+ Trees.
CO-4	Grasp the concepts of basic Er-models, Relational algebra, Relational Calculas, SQL Queries, different normal forms.
CO-5	Grasp the concepts of transactions and how concurrency control and crash recovery can be achieved by applying various locking techniques and recovery algorithms and how to organize the files in tree structured and hash based indexed structure using ISAM, B+ trees and static and dynamic hashing techniques.
CO-6	Fully appreciate the techniques involved in a database system and use variety of tools to implement them in order to study, learn and develop much more database applications/projects.

Course-2

Course Code:	**A1CST207**
Course Title:	**Web Technologies and Tools**
Theory / Lab:	T
L-T-P-C:	3-0-2-4
Course Outcomes:	
CO-1	Ability to understand the importance of open source software and open source operating systems. Able to understand the linux operating system kernel and writing the scheduling programs in linux OS.
CO-2	Ability to use open source languages and open source databases like PHP and MYSQL to develop the application.
CO-3	Ability to write the python scripts and integrates the MYSQL and PHP to develop an application.
CO-4	have the ability to write the perl scripts and develop an application using the PERL subroutines, packages and modules.
CO-5	Ability to grasp the significance of open source software importance and dealing with operating system like linux and handling the schedulers in linux, writing the web application using the PHP and MYSQL.
CO-6	Ability to grasp the significance of open source scripting languages like PERL and PYTHON. and library functions in PYTHON for dealing with files in writing more complicated programs.
CO-7	Ability to fully appreciate the art of open source software language's and software's. And develop projects optimally using the full feature set of open source software's.

Course-3

Course Code:	**A1CST106**
Course Title:	**Theory of Operating Systems**

Theory / Lab:	T
L-T-P-C:	3-0-2-4
Course Outcomes:	
CO-1	Have the ability to demonstrate the fundamental issues in Operating Systems structure and how the process is managed and how the process are scheduled.
CO-2	Have the ability to demonstrate the various synchronization techniques ,multithreading issues, and explain the various issues leading to deadlock and how to handle deadlock
CO-3	Have the ability to explain the various memory management techniques
CO-4	Grasp the significance of various design issues of Operating systems and the usage of various algorithms in Process scheduling, multithreading techniques.
CO-5	Grasp the significance of concepts of critical sections, leading to deadlocks and how data is managed on mass storage devices and memory management techniques.
CO-6	Fully appreciate the various issues related to Operating systems design and how to manage the various I/O devices, memory, processes, and files.

Course-4

Course Code:	**A1CNT210**
Course Title:	**Information Security Management and Standards**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Ability to understand the basic concepts of information security management.
CO-2	Ability to appreciate the need for Information security planning in the project development life cycle.
CO-3	Ability to grasp the significance of contingency planning and security policy.
CO-4	Ability to demonstrate the knowledge of security management models and performance parameters.
CO-5	Ability to appreciate the need for Risk management and ability to perform risk assessment.
CO-6	Ability to know the components of personnel and perimeter security.
CO-7	Ability to demonstrate the knowledge of standards like ISO 27001

Course-5

Course Code:	**A1CNL102**
Course Title:	**Networking Design Lab - II**
Theory / Lab:	L
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	1. Have the ability to understand the need for penetration testing and ethical hacking and be able to appreciate the basic terminology and jargon of ethical hacking and phases.
CO-2	2. Have the ability to perform foot printing and reconnaissance using various tools and also able to grasp how to defend against the same.
CO-3	3. Have the ability to understand and know how sniffers will work and how to perform sniffing and also have the ability to use tools for gaining access.
CO-4	4. Have the ability to understand the consequences of DoS and DDoS attacks and also know how to execute and defend against such attacks.
CO-5	5. Have the ability to grasp the significance of session hijacking and its procedure and defense strategies.
CO-6	6. Have the ability to explore the vulnerabilities of web applications and web servers and be able to perform SQL injection attacks.

Course Code:	**A1CNT207**
Course Title:	**Penetration Testing & Network Defense**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	1. Have the ability to understand the need for penetration testing and ethical hacking and be able to appreciate the basic terminology and jargon of ethical hacking and phases.
CO-2	2. Have the ability to perform foot printing and reconnaissance using various tools and also able to grasp how to defend against the same.
CO-3	3. Have the ability to understand and know how sniffers will work and how to perform sniffing and also have the ability to use tools for gaining access.
CO-4	4. Have the ability to understand the consequences of DoS and DDoS attacks and also know how to execute and defend against such attacks.
CO-5	5. Have the ability to grasp the significance of session hijacking and its procedure and defense strategies.
CO-6	6. Have the ability to explore the vulnerabilities of web applications and web servers and be able to perform SQL injection attacks.
CO-7	7. Have the ability to fully appreciate the different phases of ethical hacking to perform penetration testing at systems and networks level.

Course Code:	A1CST307
Course Title:	Distributed Systems
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Students have the ability to explain resource sharing in distributed systems and different system models used to construct Distributed system network between systems
CO-2	Students have the ability to explain Distributed Objects and Remote Invocation
CO-3	Students have the ability to explain function of distributed file systems
CO-4	Students have the ability to explain Distributed Transaction management, Coordination and Agreement between distributed processes
CO-5	Students can explain what a distributed system is, why one would design a system as a distributed system, and what the desired properties of such systems are.
CO-6	Students can build distributed system software using RMI
CO-7	Students can design a distributed system that fulfills requirements with regards to key distributed systems properties (such as scalability, transparency, etc)

Semester-III Courses

Course-1

Course Code:	A1CSP601
Course Title:	Research Methodologies
Theory / Lab:	Theory
L-T-P-C:	0-0-0-2
Course Outcomes:	
CO-1	Demonstrate the ability to identify complex problem domain.
CO-2	Ability to review research literature.
CO-3	Use research-based knowledge and research methods including design of experiments.
CO-4	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.
CO-5	Comprehand and write effective research reports and/or papers.

Course-2

Course Code:	A1CSP602
Course Title:	Comprehensive Viva
Theory / Lab:	Viva
L-T-P-C:	0-0-0-2
Course Outcomes:	
CO-1	Use aquired knowledge and be able to analyze and interpret data, and synthesis of the information to provide valid conclusions.
CO-2	Apply reasoning informed by the contextual knowledge
CO-3	Communicate effectively on complex engineering problems
CO-4	Demonstrate knowledge and understanding of the select specialization.

Course-3

Course Code:	A1CSP603
Course Title:	Pre-requisite Study
Theory / Lab:	Theory
L-T-P-C:	0-0-0-2
Course Outcomes:	
CO-1	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools
CO-2	Function effectively as an individual, abilty to self-learning.
CO-3	Demonstrate the ability to make effective presentations
CO-4	Identify, formulate, review research literature, and analyze complex engineering problems.

Course-4

Course Code:	A1CSP604
Course Title:	Seminar
Theory / Lab:	Seminar
L-T-P-C:	0-0-0-2
Course Outcomes:	
CO-1	Use aquired knowledge and be able to analyze and interpret data, and synthesis of the information to provide valid conclusions.
CO-2	Communicate effectively on complex engineering problems

CO-3	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
CO-4	Comprehend and write effective reports and design documentation
CO-5	Ability to engage in independent and life-long learning in the broadest context of technological change.

Course-5	
Course Code:	**A1CSP605**
Course Title:	**Project**
Theory / Lab:	Project work
L-T-P-C:	0-0-0-8
Course Outcomes:	
CO-1	Demonstrate a sound technical knowledge of their selected project topic
CO-2	Undertake problem identification, formulation and solution by considering ethical responsibility
CO-3	Design engineering solutions to complex problems utilizing as system approach
CO-4	Conduct an engineering project that has environmental impact
CO-5	Communicate with engineers and the community at large in written and oral forms
CO-6	Demonstrate the knowledge, skills and attitudes of a professional engineer

IV Semester Courses

Course-1	
Course Code:	**A1CSP606**
Course Title:	**Project**
Theory / Lab:	Project work
L-T-P-C:	0-0-0-18
Course Outcomes:	
CO-1	Demonstrate a sound technical knowledge of their selected project topic
CO-2	Undertake problem identification, formulation and solution by considering ethical responsibility
CO-3	Design engineering solutions to complex problems utilizing as system approach
CO-4	Conduct an engineering project that has environmental impact
CO-5	Communicate with engineers and the community at large in written and oral forms
CO-6	Demonstrate the knowledge, skills and attitudes of a professional engineer

M.Tech. (CSE)

Semester-I Courses

Course-1	
Course Code:	**A1CNT101**
Course Title:	**Advanced Computer Networks**
Theory / Lab:	T
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Ability to understand the difference between OSI model and TCP/IP protocol suite.
CO-2	2. Ability to identify IPv4 address classes, and also be able to perform sub-netting and supernetting.
CO-3	3. Ability to choose a particular routing protocol (static or dynamic) and be able to configure
	the routers.
CO-4	4. Ability to understand the role of switch at layer 2 and be able to configure, switch port
	security, VLAN's, VTP etc.
CO-5	5. Ability to explain IPv6 addressing scheme and understand the concepts of WAN protocols.
CO-6	6. Ability to design networks and configure the intermediate devices along with basic
	security features.
CO-7	7. Fully appreciate the role of a network engineer in designing small to medium scale
	networks.

Course-2	
Course Code:	**A1CST101**
Course Title:	Advanced Data Structures
Theory / Lab:	T
L-T-P-C:	3-0-2-4
Course Outcomes:	
CO-1	Have the ability to understand data structure, notations. Be able to implement linked
	lists, stacks and queues.
CO-2	2. Have the ability to grasp the significance of Queues and Trees.

CO-3	3. Have the ability to design priority queues, and understand various sorting techniques.
CO-4	4. Have the ability to demonstrate the Hashing Techniques.
CO-5	5. Have the ability to differentiate greedy and divide and conquer algorithms and
	applications.
CO-6	6. Fully appreciate the elements and components of data structures and their
	applications.

Course-3	
Course Code:	**A1CST102**
Course Title:	OOP Using JAVA
Theory / Lab:	T
L-T-P-C:	3-0-2-4
Course Outcomes:	
CO-1	Have the ability to understand the basic concepts of Object Oriented paradigm.
	2. Have the ability to Understand and apply Inheritance, polymorphism, and interfaces.
CO-2	3. Have the ability to grasp the significance if handling exceptions and understand the
CO-3	benefits of multithreading.
CO-4	4. Have the ability define, import and make use of packages.
CO-5	5. Have the ability to handle events, design basic and advanced User Interfaces, and
	applets.
CO-6	6. Fully appreciate the advantages of Object Oriented Programming and use Java to
	implement simple applications.

Course-4	
Course Code:	**A1CST103**
Course Title:	**Software Engineering Practices**
Theory / Lab:	T
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Have the ability to Understand security threats, attacks, mechanisms.
CO-2	2. Have the ability to understand the symmetric key cryptography and related
	algorithms.
CO-3	3. Have the ability to understand the asymmetric key cryptography and related
	algorithms.
CO-4	4. Fully appreciate the applications of symmetric Cryptography.
CO-5	5. Fully appreciate the applications of asymmetric Cryptography.
CO-6	6. Really understand the role of cryptographic algorithms and applications for
	information security.

Course-5	
Course Code:	**A1CSL101**
Course Title:	Software Design Lab **- I**
Theory / Lab:	L
L-T-P-C:	0-0-3-2
Lab Outcomes:	
CO-1	Have the ability to understand the basic concepts of Object Oriented paradigm.
	2. Have the ability to Understand and apply Inheritance, polymorphism, and interfaces.
CO-2	3. Have the ability to grasp the significance if handling exceptions and understand the
CO-3	benefits of multithreading.
CO-4	4. Have the ability define, import and make use of packages.
CO-5	5. Have the ability to handle events, design basic and advanced User Interfaces, and
	applets.

Course Code:	**A1CNT202**
Course Title:	**SENSOR AND ADHOC NETWORKS**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Lab Outcomes:	
CO-1	Have the knowledge and understanding of MANETS, characteristics, applications and challenges.
CO-2	2. Have the ability to comprehend routing algorithms and their pros and cons.
CO-3	3. Have the knowledge and understanding of wireless sensor networks, applications and data retrieval.
CO-4	4. Have the ability to understand various security mechanisms in Ad Hoc networks.
CO-5	5. Fully appreciate the role of Mobile Adhoc networks, and wireless sensor networks in real world applications.

Course Code:	**A1CNT204**
Course Title:	**Network Perimeter Security**
Theory / Lab:	T

L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Ability to understand the basic concepts of information security management.
CO-2	Ability to appreciate the need for Information security planning in the project development life cycle.
CO-3	Ability to grasp the significance of contingency planning and security policy.
CO-4	Ability to demonstrate the knowledge of security management models and performance parameters.
CO-5	Ability to appreciate the need for Risk management and ability to perform risk assessment.
CO-6	Ability to know the components of personnel and perimeter security.
CO-7	Ability to demonstrate the knowledge of standards like ISO 27001

Semester-II Courses

Course-1

Course Code:	**A1CST104**
Course Title:	**Relational Data Base Management Systems**
Theory / Lab:	T
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Have the ability to explain why to choose a database system instead of simply storing data in operating system file ,in terms of three tier architecture, levels of abstraction, creation of database with various types of database languages and data independence and to explain the various database design steps and how to develop an entity-relationship model for different database relations with extended features.
CO-2	Have the ability to describe various queries for creating and modifying on the relations using SQL, applying integrity and referential constraints on the relations and Have the ability to explain functional dependencies, schema refinement, refining by decomposition and refining the problems using various normal forms.
CO-3	Have the ability to describe ACID properties, recovery systems ,backup systems, file organization and indexing and B+ Trees.
CO-4	Grasp the concepts of basic Er-models, Relational algebra, Relational Calculas, SQL Queries, different normal forms.
CO-5	Grasp the concepts of transactions and how concurrency control and crash recovery can be achieved by applying various locking techniques and recovery algorithms and how to organize the files in tree structured and hash based indexed structure using ISAM, B+ trees and static and dynamic hashing techniques.
CO-6	Fully appreciate the techniques involved in a database system and use variety of tools to implement them in order to study, learn and develop much more database applications/projects.

Course-2

Course Code:	**A1CST207**
Course Title:	**Web Technologies and Tools**
Theory / Lab:	T
L-T-P-C:	3-0-2-4
Course Outcomes:	
CO-1	Ability to understand the importance of open source software and open source operating systems. Able to understand the linux operating system kernel and writing the scheduling programs in linux OS.
CO-2	Ability to use open source languages and open source databases like PHP and MYSQL to develop the application.
CO-3	Ability to write the python scripts and integrates the MYSQL and PHP to develop an application.
CO-4	have the ability to write the perl scripts and develop an application using the PERL subroutines, packages and modules.
CO-5	Ability to grasp the significance of open source software importance and dealing with operating system like linux and handling the schedulers in linux, writing the web application using the PHP and MYSQL.
CO-6	Ability to grasp the significance of open source scripting languages like PERL and PYTHON. and library functions in PYTHON for dealing with files in writing more complicated programs.
CO-7	Ability to fully appreciate the art of open source software language's and software's. And develop projects optimally using the full feature set of open source software's.

Course-3

Course Code:	**A1CST106**
Course Title:	**Theory of Operating Systems**
Theory / Lab:	T
L-T-P-C:	3-0-2-4
Course Outcomes:	
CO-1	Have the ability to demonstrate the fundamental issues in Operating Systems structure and how the process is managed and how the process are scheduled.

CO-2	Have the ability to demonstrate the various synchronization techniques ,multithreading issues, and explain the various issues leading to deadlock and how to handle deadlock
CO-3	Have the ability to explain the various memory management techniques
CO-4	Grasp the significance of various design issues of Operating systems and the usage of various algorithms in Process scheduling, multithreading techniques.
CO-5	Grasp the significance of concepts of critical sections, leading to deadlocks and how data is managed on mass storage devices and memory management techniques.
CO-6	Fully appreciate the various issues related to Operating systems design and how to manage the various I/O devices, memory, processes, and files.

Course-4

Course Code:	**A1CST107**
Course Title:	**Object Oriented Analysis and Design and Design Patterns**
Theory / Lab:	T
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	CO1: Ability to understand a system described in UML diagrams
CO-2	CO2: Ability to draw different UML diagrams of a given project.
CO-3	CO3: Ability to recognize design patterns used in existing systems.
CO-4	CO4: Grasp the significance of class and object diagrams, behavioral & use case diagrams for a particular problem.
CO-5	CO5: Grasp the significance of a given pattern and identifying its related patterns.
CO-6	CO6: fully appreciate the art of using design patterns in a new project and document the design decisions using UML diagrams.

Course-5

Course Code:	**A1CSL102**
Course Title:	Software Design Lab **- II**
Theory / Lab:	L
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Ability to understand the importance of open source software and open source operating systems. Able to understand the linux operating system kernel and writing the scheduling programs in linux OS.
CO-2	Ability to use open source languages and open source databases like PHP and MYSQL to develop the application.
CO-3	Ability to write the python scripts and integrates the MYSQL and PHP to develop an application.
CO-4	have the ability to write the perl scripts and develop an application using the PERL subroutines, packages and modules.
CO-5	Ability to grasp the significance of open source software importance and dealing with operating system like linux and handling the schedulers in linux, writing the web application using the PHP and MYSQL.
CO-6	Ability to grasp the significance of open source scripting languages like PERL and PYTHON. and library functions in PYTHON for dealing with files in writing more complicated programs.

Course Code:	A1CST204
Course Title:	**Data Mining**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	1. Have the ability to describe key areas such as OLAP (that stands for On Line Analytical Processing) Design, Data Warehousing (DW) and Data Mining (DM) and various tasks in Data preprocessing
CO-2	2. Have the ability to provide an overview of most common tasks and application areas of data warehousing and classification
CO-3	3. Have the ability to provide an overview of Association and Cluster Analysis
CO-4	4. Grasp the idea and implementation of most common techniques used in Datamining and Warehousing
CO-5	5. Grasp the necessity for building and evaluating predictive and descriptive models
CO-6	Fully appreciate the necessary background and skills to turn available data into valuable and useful information

Course Code:	**A1CST207**
Course Title:	**Distributed Systems**
Theory / Lab:	T
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Students have the ability to explain resource sharing in distributed systems and different system models used to construct Distributed system network between systems
CO-2	Students have the ability to explain Distributed Objects and Remote Invocation

CO-3	Students have the ability to explain function of distributed file systems
CO-4	Students have the ability to explain Distributed Transaction management, Coordination and Agreement between distributed processes
CO-5	Students can explain what a distributed system is, why one would design a system as a distributed system, and what the desired properties of such systems are.
CO-6	Students can build distributed system software using RMI
CO-7	Students can design a distributed system that fulfills requirements with regards to key distributed systems properties (such as scalability, transparency, etc)

Semester-III Courses

Course-1	
Course Code:	A1CSP601
Course Title:	Research Methodologies
Theory / Lab:	Theory
L-T-P-C:	0-0-0-2
Course Outcomes:	
CO-1	Demonstrate the ability to identify complex problem domain.
CO-2	Ability to review research literature.
CO-3	Use research-based knowledge and research methods including design of experiments.
CO-4	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.
CO-5	Comprehand and write effective research reports and/or papers.

Course-2	
Course Code:	A1CSP602
Course Title:	Comprehensive Viva
Theory / Lab:	Viva
L-T-P-C:	0-0-0-2
Course Outcomes:	
CO-1	Use aquired knowledge and be able to analyze and interpret data, and synthesis of the information to provide valid conclusions.
CO-2	Apply reasoning informed by the contextual knowledge
CO-3	Communicate effectively on complex engineering problems
CO-4	Demonstrate knowledge and understanding of the select specialization.

Course-3	
Course Code:	A1CSP603
Course Title:	Pre-requisite Study
Theory / Lab:	Theory
L-T-P-C:	0-0-0-2
Course Outcomes:	
CO-1	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools
CO-2	Function effectively as an individual, abilty to self-learning.
CO-3	Demonstrate the ability to make effective presentations
CO-4	Identify, formulate, review research literature, and analyze complex engineering problems.

Course-4	
Course Code:	**A1CSP604**
Course Title:	**Seminar**
Theory / Lab:	Seminar
L-T-P-C:	0-0-0-2
Course Outcomes:	
CO-1	Use aquired knowledge and be able to analyze and interpret data, and synthesis of the information to provide valid conclusions.
CO-2	Communicate effectively on complex engineering problems
CO-3	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
CO-4	Comprehend and write effective reports and design documentation
CO-5	Ability to engage in independent and life-long learning in the broadest context of technological change.

Course-5	
Course Code:	**A1CSP605**
Course Title:	**Project**
Theory / Lab:	Project work

L-T-P-C:	0-0-0-8
Course Outcomes:	
CO-1	Demonstrate a sound technical knowledge of their selected project topic
CO-2	Undertake problem identification, formulation and solution by considering ethical responsibility
CO-3	Design engineering solutions to complex problems utilizing as system approach
CO-4	Conduct an engineering project that has environmental impact
CO-5	Communicate with engineers and the community at large in written and oral forms
CO-6	Demonstrate the knowledge, skills and attitudes of a professional engineer

IV Semester Courses

Course-1	
Course Code:	**A1CSP606**
Course Title:	**Project**
Theory / Lab:	Project work
L-T-P-C:	0-0-0-18
Course Outcomes:	
CO-1	Demonstrate a sound technical knowledge of their selected project topic
CO-2	Undertake problem identification, formulation and solution by considering ethical responsibility
CO-3	Design engineering solutions to complex problems utilizing as system approach
CO-4	Conduct an engineering project that has environmental impact
CO-5	Communicate with engineers and the community at large in written and oral forms
CO-6	Demonstrate the knowledge, skills and attitudes of a professional engineer

Dept. of Chemical Engg

Course outcomes (Cos) of all courses of all programs offered by the institution

B.Tech. (Chemical Engg)

Semester-I Courses

Course-1	
Course Code:	A1MAT001
Course Title:	Engineering Mathematics-I
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Apply the knowledge of solving 1st order & 1st degree differential equations in finding orthogonal trajectories of families of curves, Growth & Decay problems& Newton's law of cooling
CO-2	Find the solution of initial value problems and be able to evaluate improper integrals of particular kind by using Laplace Transforms
CO-3	Apply the concepts of Maxima and Minima for finding extreme values
CO-4	Formulate and solve P.D.E and be able to apply the knowledge in finding the solutions of one dimensional wave equation and one dimensional heat equation.

Course-2	
Course Code:	A1CYT002:
Course Title:	Chemistry for Chemical Engineers
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Differentiate between the hard water and soft water, estimation of hardness of water and specification of potable water and purification of sea water through reverse osmosis. Students will also gain knowledge on redox reactions and their applications in batteries and fuel cells.
CO-2	Calculate calorific values, outline fractional distillation process, cracking methods and the mechanism of lubrications.
CO-3	Outline Nernst distribution law, Surface chemistry, behavior of colloids and their properties. Student will gain knowledge of order, reaction rates, feasibility of the reaction and gain knowledge about catalytic reactions.
CO-4	Outline Beer's law and its applications, summarize the principles and applications of chromatographic methods.

Course-3	
Course Code:	A1CIT001:
Course Title:	Computer programming
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Have the ability to write a formal algorithmic solution for the given problem & explain the features of C like types including scalar & vector types, operators, expressions, expression evaluation, operator precedence, sequential, conditional & iterative constructs.
CO-2	Have the ability to use modular programming constructs of C while appreciating different ways of exchanging inputs and outputs among modules and different memory allocation strategies in C.
CO-3	Have the ability to define & use user defined data types using C constructs and write C programs that handles files.
CO-4	Grasp the significance of primary constructs & methodology of procedural language C and appreciate the orthogonality of the same in writing reasonably complicated programs, and Grasp the significance of type extendibility in C, need for address as a data type and library functions for dealing with files in writing more complicated programs.

Course-4	
Course Code:	A1CET001:
Course Title:	Basics of Civil & Mechanical Engineering
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Able to know floor area, plinth area, and building materials such as brick, cement, concrete, steel.
CO-2	Able to be aware of concepts of surveying, infrastructure such as buildings, roads, bridges, dams.
CO-3	Able to determine the performance of components like I.C. Engines, turbines, belt, rope and gear
CO-4	Able to identify the type of mechanical component suitable for the required power transmission

Course-5	
Course Code:	A1CHT002:
Course Title:	Introduction to Chemical Engineering
Theory / Lab:	Theory

L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Student will be able to understand the role of chemical engineers in process industries and to carry out material and energy balances.
CO-2	Student will be able to understand the basic concepts of momentum, heat and mass transfer.
CO-3	Student will be able to understand the use of equipment required for momentum, heat and mass transfer.
CO-4	Student will be able to understand the basic concepts of reaction engineering and CSTR, PFR & Batch Reactor

Course-6

Course Code:	A1EHL001:
Course Title:	English Language Practice –I
Theory / Lab:	Lab
L-T-P-C:	1-0-0-2
Course Outcomes:	
CO-1	Student shall have the ability to understand the syntactical and grammatical intricacy
CO-2	Student shall be able to use right structure for right context and meaning.
CO-3	Student shall be able to read and comprehend the content in English well
CO-4	Student shall be able to write well for his/ her professional requirement.
CO-5	Student will be able to comprehend and analyze the core concepts well
CO-6	Student will be able to develop life skills

Course-7

Course Code:	A1CYL001 :
Course Title:	Engineering Chemistry lab
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Students will acquire a minimum knowledge about the chemistry lab kind of experiments can be performed and the precautions perform four types titrations and understand the principle involved and applications of the method
CO-2	Students will analyze different water samples collected from their residential areas and from other places and the results obtained were compared with Indian standards. And Based on the position of the metals in the electrochemical series a model electrochemical cell is constructed and the values are determined and effect of metal ion concentration is studied.

Course-8

Course Code:	A1CIL001:
Course Title:	Computer programming Lab
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Fully appreciate the art of procedural programming in C and develop programs optimally using the full feature set of C language.

Semester-II Courses

Course-1

Course Code:	A1MAT002:
Course Title:	Mathematical Methods
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Student will be able to obtain the solution of linear system of equations which frequently occur in engineering problems
CO-2	Student will gain the proficiency in finding the Eigen values and Eigen vectors and reduction of quadratic forms to canonical forms
CO-3	Student will be able to find approximate solutions of transcendental equations by using numerical methods.
CO-4	Student will be able to estimate the unknown values of the function using interpolation.
CO-5	Student will be able to solve Initial value problems through numerical methods
CO-6	Student will be able to find the solution of Difference equations which arise in discrete time systems.

Course-2

Course Code:	A1CHT001:

Course Title:	Environmental Studies
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Students will understand the knowledge of the natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources.
CO-2	Students will acquire the knowledge on the concepts of the ecosystem and its function in the environment, biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity.
CO-3	Students will acquire the knowledge on the environmental legislations of India and understand various attributes of the pollution and their impact and measures to reduce the pollution along with waste management practices.
CO-4	Students will understand social issues related to rural and urban environment and the possible means to combat the challenges and understand global initiatives towards sustainable development, environmental assessment and the stages involved in EIA and the environmental audit.

Course-3

Course Code:	A1PYT001:
Course Title:	Engineering Physics
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Understand the phenomena of interference, diffraction and polarization exhibited by light waves and the characteristics of laser and its applications specific to optic fiber.
CO-2	List different crystal systems, space lattices, and parameters of unit cell and the Bragg's law of X-ray diffraction.
CO-3	Describe the response of materials in presence of electric and magnetic fields and the basic laws of thermodynamics, work done, thermodynamic processes and entropy
CO-4	Explain the system of forces (non-equilibrium) and different types of friction

Course-4

Course Code:	A1EET001:
Course Title:	Basic Electrical and Electronics Engineering
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Students gain ample knowledge of electrical circuit analysis i.e., AC and DC circuit analysis. And moreover, students can also solve the different types of circuits by using the fundamental concepts.
CO-2	Students are able to know about the predominant role of all electrical machines and identify suitable machine for a particular application.
CO-3	Students can understand the role of the different types of instruments which are used for the different measurements according to the given supply and also ample of knowledge about the power generation, transmission systems.
CO-4	Have the ability to explain the working principle of different types of semiconductor devices.
CO-5	Student have the ability to explain the working principal of transducers and operation of different types of transducers are learnt
CO-6	Student can explain different types of communication systems and also its applications are knowledgeable.

Course-5

Course Code:	A1MED001:
Course Title:	Engineering. Drawing
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Student will be able to construct regular polygons, conic curves and simple scales
CO-2	Student will be able to draw orthographic projections of points, lines, planes and solids
CO-3	Student will be able to produce isometric projection from orthographic projections and vice-versa

Course-6

Course Code:	A1PYL001:
Course Title:	Engineering Physics Lab
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	

CO-1	Experimentally demonstrate the interference and diffraction of light waves; and measure the numerical aperture of the optic fiber; and the energy loss due to hysteresis for a ferromagnetic material; and apply tangent law for measuring the magnetic fields due to current; and determine the parameters of materials like the thermal conductivity, specific heat, and the coefficient of friction.

Course-7

Course Code:	A1EHL002:
Course Title:	English Language Practice –II
Theory / Lab:	Lab
L-T-P-C:	1-0-0-2
Course Outcomes:	
CO-1	Student shall have the ability to speak intelligibly.
CO-2	Student shall be able to use phrases, foreign expressions correctly.
CO-3	Student shall be able to participate well in debates and discussions.
CO-4	Student shall be able to write technical Reports.
CO-5	Student will be able to prepare Resume and face interviews confidently.
CO-6	Student will be able to communicate confidently and effectively.

Course-8

Course Code:	A1MEW001:
Course Title:	Basic Engineering Workshop
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Identify and overhaul the components of Bicycle/ Two Wheeler Engine.
CO-2	Identify the elements of casting, pattern making and prepare a mould for a single piece and split piece pattern.
CO-3	Know the specifications, cutting parameter and perform drilling, milling and grinding operations.
CO-4	Know the specifications, welding parameters and perform arc welding and gas welding.
CO-5	Calculate load for required electrical design and select correct specifications of electrical requisites.

Semester-III Courses

Course-1

Course Code:	A1CHT201:
Course Title:	Material Science for Chemical Engineers
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Interpret the types of bonds in metals and alloys and its imperfections with geometry.
CO-2	Understand the phase diagrams for binary systems
CO-3	Understand the structure, properties, processing and performance related to metals and its alloys .
CO-4	Analyse various properties and applications of ceramic and polymer materials

Course-2

Course Code:	A1CHT202:
Course Title:	Chemical Process Calculations
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Carry out material balance calculations which need to be performed in chemical processing operations
CO-2	Understand the concepts of vapor pressure, percentage humidity, relative humidity, dew point temperature and wet bulb temperature
CO-3	Calculate heat effects associated with physical and chemical Processes.
CO-4	Calculate air requirement for a combustion process

Course-3

Course Code:	A1CHT203:
Course Title:	Fluid Mechanics for Chemical Engineers
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	To introduce the basic concepts of static and dynamic behavior of fluids
CO-2	To derive Continuity equation & Bernoulli's theorem and explain its application to fluid flow problems

CO-3	Estimate the pressure drop that occurs during fluid flow through packed bed and fluidized bed
CO-4	To expose about fluid moving machinery flow measuring devices such as head and area meters and its selection

Course-4

Course Code:	A1CHT204:
Course Title:	Chemical Technology
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Student will be able to relate the physical and chemical properties of various compounds towards the working principles of various established technologies in industrial flowsheets
CO-2	Student will be able to understand complexity of various process equipments such as furnaces, complex distillation units etc.
CO-3	Student will have conceptual knowledge towards the application of principles of energy efficient, pollution abatement and raw material recovery and reuse in process flow sheets
CO-4	Student will Have a working knowledge towards various important issues (safety issues, economics etc.) associated to inorganic chemical technologies

Course-5

Course Code:	A1CYT205:
Course Title:	Organic Chemistry
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Students will acquire basic concepts of Organic reactions and the mechanism involved in it and the type of organic reaction and the mechanism involved in it.
CO-2	Students will be able to recognize the configuration and conformation of the molecule. The basic concept in polymers strengthens the student's knowledge in the polymer chemistry which helps him in the future.
CO-3	The students will be able to define terms related to heterocyclic compounds, to recognize their basic structures and to discuss the important chemical, and commercial aspects of compounds.
CO-4	Students will know the chemistry of heterocyclic compounds and their synthesis, reactions and their importance in Pharma industry. On exposer to dye stuff chemistry, the students will acquire knowledge in the synthesis, classification and industrial applications of dyes.

Course-6

Course Code:	A1MAT110:
Course Title:	Foundation Elective-I- CVSM
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Student will be able to check the analytic nature and construct analytic functions by Milne- Thomson method.
CO-2	Student will be able to expand the given complex valued functions as an infinite series.
CO-3	Student will be able to evaluate integrals of complex functions in the given region.
CO-4	Student will be able to apply the knowledge of distributions in sampling.
CO-5	Student will be able to estimate the population parameters and test the hypothesis.

Course-7

Course Code:	A1CHL201:
Course Title:	Fluid Mechanics Lab for Chemical Engineers
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Students will gain practical knowledge of experimental methods like verification of Bernouli equation, friction factor determination, pressure drop , flow rate calculations in flow lines and packed and fludized columns etc and handle equipment safely, make measurements to an appropriate degree of accuracy, collect data and analyse the results and write up an appropriate report.

Course-8

Course Code:	A1CHL202:
Course Title:	Chemical Technology Lab
Theory / Lab:	Lab

L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Student will be able to handle different analytical apparatus and to prepare organic and inorganic chemicals through various experimental procedures

Semester-IV Courses

Course-1

Course Code:	A1CHT206:
Course Title:	Process Heat Transfer
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Understand the basic laws of heat transfer and LMTD calculations
CO-2	Evaluate heat transfer coefficients for laminar and turbulent flow
CO-3	Evaluating Heat transfer coefficients for Natural convection and forced convection.
CO-4	Analyze heat exchangers and evaporators performance and radiation concepts

Course-2

Course Code:	A1CHT207:
Course Title:	Chemical Engineering Thermodynamics-I
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Student will be able to understand the concepts of heat, work and energy conversion, and calculate heat and work quantities for industrial processes and determine the thermodynamic properties of fluids using a variety of different sources (EOS)
CO-2	Student will be able to understand the relationships among the internal energy, enthalpy, heat capacities, entropy, Gibbs and Helmholtz Free Energies and be able to calculate these energy functions from equations of state and heat capacity data.
CO-3	Student will be able to analyze (calculate efficiencies) typical thermodynamic devices and units (turbine, pump, nozzles, compressor, heat pump, refrigerator, etc) using thermodynamic principles and make thermodynamic analysis of Carnot, Rankine cycles and be able to calculate ideal efficiencies for these cycles.
CO-4	Student will be able to understand processes involving power production, refrigeration, and liquefaction, and be able to calculate relevant system efficiencies for these processes.

Course-3

Course Code:	A1CHT208:
Course Title:	Mechanical Unit Operations
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	To enable the student to gain basic knowledge in particle characterization namely particle size, shape and specific surface.
CO-2	To enable the student to have working knowledge of particulate solids handling and mixing
CO-3	To enable the student to learn the principles of size reduction and screening and concepts of filtration.
CO-4	To enable the student to understand the functioning of various prominent solid fluid operations related equipment.

Course-4

Course Code:	A1CHT302:
Course Title:	Core Elective –I- Petroleum Refining
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Student will be able to understand the origin and formation of petroleum reserves and their deposits in the world.
CO-2	Student will be able to estimate the properties of petroleum products with their testing methods.
CO-3	Student will be able to understand about desalting & fractionation of petroleum crude.
CO-4	Student will be able to identify the treatment methods of gasoline, kerosene and lubes.

Course-5

Course Code:	A1MAT104:
Course Title:	Foundation Elective-II- EM-II
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3

Course Outcomes:	
CO-1	Student will be able to solve boundary value problems using Fourier series and Fourier transforms.
CO-2	Student will be able to find the lengths, surface area of revolution and volume of revolution for various curves.
CO-3	Student will be able to understand the physical significance of vector operators.
CO-4	Student will be able to apply vector integral theorems to evaluate Line, Surface and Volume integrals with ease.

Course-6

Course Code:	A1CHL203:
Course Title:	Process Heat Transfer Lab
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Students will gain practical knowledge of experimental methods like conduction, convection and radiation and handle apparatus and substances correctly and safely, make measurements to an appropriate degree of accuracy, collect data and analyse the results and write up an appropriate report

Course-7

Course Code:	A1CHL204:
Course Title:	Mechanical unit operations Lab
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Students will gain practical knowledge of experimental methods like screening, crushing , froth floatation etc and handle equipment safely, make measurements to an appropriate degree of accuracy, collect data and analyse the results and write up an appropriate report

Semester-V Courses

Course-1

Course Code:	A1CHT209:
Course Title:	Process Instrumentation
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Understand the basic elements of an instrument and its characteristics
CO-2	Become familiar with various types of instruments for measurement of various process variables like temperature, pressure, vacuum, head, level, composition, flow and density
CO-3	Get a clear perspective of various recording, indicating, signaling instruments, transmission of instrument readings
CO-4	Get an understanding of instrumentation diagrams, control center, process analysis and digital instrumentation

Course-2

Course Code:	A1CHT210:
Course Title:	Chem. Engineering Thermodynamics-II
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Calculate heat and work requirements for industrial process
CO-2	Compute thermodynamic properties of multi component systems undergoing composition changes.
CO-3	Analyze experimental VLE data to calculate the activity coefficient and obtain simple models for excess Gibbs energy.
CO-4	Have the knowledge of effect of Temperature, Pressure on equilibrium conversion which is useful in design of reactors.

Course-3

Course Code:	A1CHT211:
Course Title:	Chemical Reaction Engineering-I
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Understanding the difference between order and Molecularity of reaction, difference between elementary and non-elementary reactions
CO-2	Use of Batch , Plug flow and Mixed flow reactors for a given application

CO-3	Difference between series and parallel reactions and their applications
CO-4	Effect of temperature and pressure on reaction rate

Course-4

Course Code:	A1CHT212:
Course Title:	Mass Transfer Operations-I
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	To estimate the flux of molecules and diffusivity of gases, liquids and solids.
CO-2	To find out number of stages for a distillation column
CO-3	Understand the mass transfer equipment operations and design parameters.
CO-4	Understand the threshold limits of separation processes

Course-5

Course Code:	A1CHT306:
Course Title:	Core Elective-II- IPCE
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Understand the importance of air pollution and dispersion of plumes
CO-2	Analyse the sources of air pollutants
CO-3	Understand the control methods for treatment of air and water pollutants.
CO-4	Analyse the treatment methods for solid waste management

Course-6

Course Code:	A1CHT309:
Course Title:	Core Elective-III - NT
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Student will be able to understand classification & properties of nano-materials
CO-2	Student will be able to understand methods used for the synthesis of nano-materials
CO-3	Student will be able to understand applications of nano-science, nano-technology and nano-materials
CO-4	Student will be able to understand characterization of nano-materials

Course-7

Course Code:	A1CHL205:
Course Title:	Chemical Reaction Engineering. Lab
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Students will gain practical knowledge of experimental methods like determination of order and reaction rate constant for batch reactor, CSTR and plug flow reactors and handle apparatus and substances correctly and safely, make measurements to an appropriate degree of accuracy, collect data and analyse the results and write up an appropriate report.

Course-8

Course Code:	A1CHL206:
Course Title:	Mass Transfer Operations Lab
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Students will gain practical knowledge of experimental methods like distillation, extraction, leaching, adsorption etc and handle apparatus and substances correctly and safely, make measurements to an appropriate degree of accuracy, collect data and analyse the results and write up an appropriate report.

Semester-VI Courses

Course-1

Course Code:	A1CHT213:
Course Title:	Mass Transfer Operations-II
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	

CO-1	An ability to apply the separation techniques like extraction, leaching & adsorption for the separation of organic and inorganic chemical compounds or solutions as individual components
CO-2	An ability to understand the various techniques like chromatography techniques, ion exchange etc
CO-3	An ability to preliminary design calculations of extractors; adsorption columns, dryers etc
CO-4	An ability to apply the concept of membrane separation technology for industry.

Course-2

Course Code:	A1CHT214:
Course Title:	Process Dynamics & Control
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Ability to distinguish a first order and second order system with the understanding of the factors influencing the dynamic response of system for different inputs
CO-2	Develop control system block diagram and write down the combined transfer function for a given controlled process responding to a change in set point or load and study its dynamic behavior
CO-3	Determine the characteristic equation from a given control system block diagram and solve using Routh test, Root-locus and Bode stability criteria
CO-4	Ability to understand the difference between P, PI, PD controllers and analyze different process control strategies using Z-N and C-C tuning rules

Course-3

Course Code:	A1CHT215:
Course Title:	Chemical Reaction Engineering -II
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Student will be able to calculate the residence time distribution function and design real reactors using the Dispersion and Tank in series models
CO-2	Student will be able to calculate the effect of pore diffusion on surface kinetics in solid catalytic reactions
CO-3	Student will be able to design heterogeneous catalytic reactors at a basic level
CO-4	Student will be able to calculate conversion in fluid solid reactions using shrinking core model and progressive conversion model

Course-4

Course Code:	A1CHT216:
Course Title:	Process Modeling & Simulation
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Understand the model equations for chemical process problems involving reaction kinetics, heat transfer and mass transfer etc.
CO-2	Write component and energy balances for chemical engineering process
CO-3	Solve the numerical methods for solving ODEs applicable to process equipment
CO-4	Analyze the simulation using MATLAB tools for chemical engineering problems

Course-5

Course Code:	A1CHT310:
Course Title:	Core Elective-IV- FT
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Student will be able to understand the importance of food processing, handling and storage.
CO-2	Student will be able to understand the biochemistry of fermentation and the role of microbes in fermentation.
CO-3	Student will be able to understand the importance of large scale processing.
CO-4	Student will be able to understand the importance of waste management and maintenance of hygiene.

Course-6

Course Code:	A1CHL207:
Course Title:	Process Dynamics & Control Lab
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Student will be able to understand and analyze process control engineering by studying the dynamics of the major components of a control system

Course-7	
Course Code:	A1CHL208:
Course Title:	Process Modeling and Simulation lab using MATLAB
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Students will gain practical knowledge on Mathematical model equations development and simulation using MATLAB tool for chemical process systems to collect data and analyse the results report.

Course-8	
Course Code:	A1MET402:
Course Title:	Open Elective –I (AFE)
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Able to use various alternate fuels appropriately to the needs
CO-2	Able to understand the importance of oxygenated fuels
CO-3	Be familiar with applications of CNG, LPG and hydrogen fuels
CO-4	Be acquainted with the knowledge of production of biofuels
CO-5	Be familiar with emission regulations in India
CO-6	Able to explain different emission control methods used for automobiles

Semester-VII Courses

Course-1	
Course Code:	A1MST001:
Course Title:	Managerial Economics & Financial Analysis
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	An ability to apply the knowledge of managerial and economic concepts.
CO-2	An ability to design a system according to the resources availability to meet the organizational needs.
CO-3	An ability to use the techniques and skills and methods of management to resolve the issues at organizational levels as well as at global level.
CO-4	An ability to identify managerial problems with optimum solutions.

Course-2	
Course Code:	A1CHT217:
Course Title:	Transport Phenomena
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Student will be able to calculate diffusivity, thermal conductivity and viscosity at low and high pressure and calculate momentum flux and velocity distribution for typical geometries.
CO-2	Student will be able to calculate heat flux and temperature distribution for typical geometries.
CO-3	Student will be able to calculate mass flux and concentration distribution for typical geometries.
CO-4	Student will be able to use Equations of change for solving mass, momentum and heat transport problems and derive equation of change for turbulent transport.

Course-3	
Course Code:	A1CHT218:
Course Title:	Plant Design & Economics for Chemical Engineers
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Perform the economic analysis for process including capital investment, product cost, and profitability. Submit results in a written report including equipment specifications, economic analysis, and safety information.
CO-2	Must be able to calculate capital investment, product cost for process and the importance of depreciation, interest, taxes and insurance and how they affect the product cost.
CO-3	Must be able to select the best investment among various alternatives available using profitability analysis.
CO-4	Define and formulate optimization problem and solve it using graphical method and Analytical methods.

Course-4	
Course Code:	A1CHT313:

Course Title:	Core Elective – V- BCE
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	To introduce an overview of the basic structure and function of important cell types, RNA and DNA, amino acids and proteins.
CO-2	To teach the kinetics of enzyme catalyzed reactions and the effect of various parameters on enzyme activity and kinetics and also to educate the methods of enzyme immobilization and the applications of immobilized enzymes.
CO-3	To impart the kinetics of cell growth including substrate utilization and product formation and also to teach the design and analysis of various types of bioreactors.
CO-4	To train on various downstream processing strategies for product recovery and purification.

Course-5

Course Code:	A1CHT317:
Course Title:	Core Elective – VI- CC
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Understand electrochemical fundamentals
CO-2	Understand corrosion preventing methods
CO-3	Understand environmental induced corrosion
CO-4	Describe the more common methods used by industry to control corrosion.

Course-6

Course Code:	A1CHT321
Course Title:	Core Elective – VII- ISHM
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Students will be able to understand about the Safety Programs, Engineering Ethics, Accident and Loss Statistics, Acceptable Risk, Public Perceptions.
CO-2	Students will be able to understand about the concept of Toxicology and Industrial Hygiene.
CO-3	Students will be able to understand about Fires and Explosions along with the designs to prevent them.
CO-4	Students will be able to understand about Relief Systems and the methods used for Hazard Identification.

Course-7

Course Code:	A1CET402:
Course Title:	Open Elective-II- APC
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Decide the ambient air quality based on the analysis of air pollutants
CO-2	Judge the plume behavior in a prevailing environmental condition
CO-3	Design particulate and gaseous control measures for an industry
CO-4	Apply the concept of ambient air quality in maintaining the air pollutant levels in the atmosphere

Course-8

Course Code:	A1CHD201:
Course Title:	Process Equipment Design & Drawing using AutoCAD
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Students will be able to draw instrumentation symbols, process flow sheet symbols, process flow diagrams, instrumentation diagrams, distillation column, batch reactor, double pipe heat exchanger, shell & tube heat exchanger and multiple effect evaporator using AutoCAD

Semester-VIII Courses

Course-1

Course Code:	A1CHT323:
Course Title:	Core Elective – VIII (Self-study)- OSC
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	An ability to know about the three generations of solar cells combined with an introduction to life cycle analysis for solar cells.

CO-2	An ability to understand the working principle and application of organic solar cells.
CO-3	An ability to understand the materials for organic solar cells with focus on the active layer including common polymer materials, fullerenes, and low band-gap polymers.
CO-4	An ability to learn about the production, stability and lifetime of organic solar cells.

Course-2

Course Code:	A1CHP601 & 602
Course Title:	Directed Study & Project
Theory / Lab:	
L-T-P-C:	0 - 0 - 15 - 10
Course Outcomes:	Students will be able to
CO-1	Apply the engineering knowledge of their concerned project topic
CO-2	Design engineering solutions to complex problems by utilizing research-based knowledge including design of experiments, an
CO-3	Use modern tools including for modelling to solve complex engineering problems
CO-4	Function effectively as a team.
CO-5	Communicate effectively.
CO-6	Acquire skills useful for life-long learning

Dept. of IT

Course outcomes (Cos) of all courses of all programs offered by the institution

B.Tech. (Information Technology)

Semester-I Courses

Course-1

Course Code:	A1MAT001
Course Title:	Engineering Mathematics - I
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Students will be able to apply the knowledge of solving 1st order & 1st degree differential equations in finding orthogonal trajectories of families of curves, Growth & Decay problems
CO-2	Student will be able to find the solution of initial value problems and be able to evaluate improper integrals of particular kind by using Laplace Transforms
CO-3	Students will be able to apply the concepts of Maxima and Minima for finding extreme values
CO-4	Student will be able to formulate and solve P.D.E and be able to apply the knowledge in finding the solutions of one dimensional wave equation and one dimensional heat equation .

Course-2

Course Code:	A1CYT001
Course Title:	Engineering Chemistry
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Students gain the knowledge about water used in industries (boilers etc) and for drinking purpose, difference between hard water and soft water, estimation of hardness of water and specification of potable water and purification of sea water through reverse osmosis.
CO-2	Students gain the knowledge of galvanic cells, concentration cells, applications of ion selective electrodes, Conductometry and Potentiometry to understand the principle and applications of electrochemistry. Topics on electrochemical cells, batteries and fuel cells make students understand the alternate sources of energy and also help them to tackle problems of corrosion and control.
CO-3	Students gain the knowledge on mechanism of corrosion, factors responsible, types corrosion and methods of protection.
CO-4	Students gain the knowledge on structure, synthesis properties and applications of polymers, additives to be mixed with polymers to obtain desired plastics and moulding techniques, advanced topics on plastics like conducting polymers and biodegradable polymers, fibre reinforced plastics and bullet proof plastics, synthetic plastics that are essential to latest technology.
CO-5	Student gain the knowledge on the determination of calorific value by bomb calorimeter, the proximate and ultimate analysis of coal, Fractional distillation of crude, followed by catalytic cracking to obtain the liquid fuels for the functioning of internal combustion engine, octane and cetane number, which have large focus on oil industry.
CO-6	Students gain knowledge on advanced materials like carbon nano tubes and fullerenes, their properties and applications, manufacturing of cement, need for green chemistry, principles of green chemistry solar cells and greenhouse effect and their importance.

Course-3

Course Code:	A1CET001
Course Title:	Basic of Civil & Mechancial Engineering
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Able to know floor area, plinth area, and building materials such as brick, cement, concrete, steel.
CO-2	Able to be aware of concepts of surveying, infrastructure such as buildings, roads, bridges, dams.
CO-3	Able to determine the performance of components like I.C. Engines, turbines, belt, rope and gear
CO-4	Able to identify the type of mechanical component suitable for the required power transmission

Course-4

Course Code:	A1CHT001
Course Title:	Environmental Studies
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Student will have knowledge on the natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources
CO-2	Student will have knowledge on the concepts of the ecosystem and its function in the environment, biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
CO-3	Student will have knowledge on various attributes of the pollution and their impact and measures to reduce or control the pollution along with waste management practices
CO-4	Student will have knowledge on social issues both rural and urban environment and the possible means to combat the challenges
CO-5	Student will have knowledge on the environmental legislations of India and the first global initiatives towards sustainable development, environmental assessment and the stages involved in EIA and the environmental audit

Course-5

Course Code:	A1ECT001
Course Title:	Fundamentals of Electronic Circuits & Devices
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Students have the ability to develop and solve mathematical representations for simple RLC circuits.
CO-2	Students will be able to simplify various circuits using Mesh and Nodal Analysis.
CO-3	Students will understand the working principle of different types of semiconductor diodes.
CO-4	Students will be able to design and analyze various Rectifiers with and without filters.

Course-6

Course Code:	A1EHL001
Course Title:	English Language Practice - I
Theory / Lab:	Lab
L-T-P-C:	1-0-2-2
Course Outcomes:	
CO-1	Student shall have the ability understand the syntactical and grammatical intricacy
CO-2	Student shall be able to use right structure for right context and meaning.
CO-3	Student shall be able to read and comprehend the content in English well
CO-4	Student shall be able to write well for his/her professional requirement
CO-5	Student shall be able to Speak in English well
CO-6	Student shall be able to understand and analyze the core components of his study well

Course-7

Course Code:	A1CYL001
Course Title:	Engineering Chemistry Laboratory
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Students will gain knowledge on the method of determination of acid/base, total hardness, iron and zinc contents in the sample solution.
CO-2	Students will gain knowledge on the principles of conductometric, potentiometric, pH metric and colorimetric methods of determination.

CO-3	Students will understand in construction of galvanic cell, determination of calorific value, and preparation of biodiesel.

Course-8

Course Code:	A1MEW001
Course Title:	Basic Engineering Workshop
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Will be aware of the basic engineering trades and be able to execute related work at a rudimentary level
CO-2	Will be able to select and use proper tools for the different tasks
CO-3	Will be able to apply knowledge and skills developed to handle real-life situations in these areas

Semester-II Courses

Course-1

Course Code:	A1MAT002
Course Title:	Mathematical Methods
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Student will be able to obtain the solution of linear system of equations which frequently occur in engineering problems
CO-2	Student will gain the proficiency in finding the Eigen values and Eigen vectors and reduction of quadratic forms to canonical forms
CO-3	Student will be able to estimate the missing terms of given data using interpolation.
CO-4	Student will be able to solve Initial value problems through numerical methods.
CO-5	Student will be able to find the solution of Difference equations which arise in discrete time systems.

Course-2

Course Code:	A1MED001
Course Title:	Engineering Drawing
Theory / Lab:	Theory/Lab
L-T-P-C:	1-0-3-3
Course Outcomes:	
CO-1	Student will be able to construct regular polygons, conic curves and simple scales
CO-2	Student will be able to draw orthographic projections of points, lines, planes and solids
CO-3	Student will be able to produce isometric projection from orthographic projections and vice-versa

Course-3

Course Code:	A1PYT002
Course Title:	Applied Physics
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Student will be able to understand the phenomena of interference, diffraction and polarization exhibited by light waves.
CO-2	Student shall understand about laser, its characteristics and production with an example and application of laser in specific to optic fiber.
CO-3	The student shall understand about different crystal systems, space lattices, and parameters of unit cell and the Bragg's law of X-ray diffraction.
CO-4	Student will be able to understand foundation principles of quantum mechanics and semiconductors.
CO-5	Student shall understand about response of the materials in presence of electric and magnetic fields and the basic laws of electromagnetic waves.

Course-4

Course Code:	A1EHT101
Course Title:	Professional Communication
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Student shall understand the significance of cultural front in communication and obtain the ability to communicate effectively at cross cultural fronts
CO-2	The teaching and learning activities encompass three major aspects including foundations of business and organizational communication, and planning and composing business messages. Students shall apply this skill set when writing e-mails, memos, letters, minutes of a meeting and a short business report.
CO-3	Student acquires effective public speaking skills
CO-4	Students apply appropriate written and spoken skills in a variety
CO-5	Student prepares himself for combating the future requirements of the employment
CO-6	Student shall be able to understand and analyze the core components of his study well

Course-5

Course Code:	A1CIT001
Course Title:	Computer Programming
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Have the ability to write a formal algorithmic solution for the given problem & explain the features of C like types including scalar & vector types, operators, expressions, expression evaluation, operator precedence, sequential, conditional & iterative constructs.
CO-2	Have the ability to use modular programming constructs of C while appreciating different ways of exchanging inputs and outputs among modules and different memory allocation strategies in C.
CO-3	Have the ability to define & use user defined data types using C constructs and write C programs that handles files.
CO-4	Grasp the significance of primary constructs & methodology of procedural language C and appreciate the orthoganality of the same in writing reasonably complicated programs.
CO-5	Grasp the significance of type extendibility in C, need for address as a data type and library functions for dealing with files in writing more complicated programs.
CO-6	Fully appreciate the art of procedural programming in C and develop programs optimally using the full feature set of C language.

Course-6

Course Code:	A1EHL002
Course Title:	English Language Practice - II
Theory / Lab:	Lab
L-T-P-C:	1-0-2-2
Course Outcomes:	
CO-1	Student shall have the ability to speak intelligibly
CO-2	Student shall be able to use phrases, foreign expressions and idioms correctly
CO-3	Student shall be able to participate well in debates and discussions
CO-4	Student shall be able to write both Technical and General reports well
CO-5	Student shall be able prepare resume well and face the interviews confidently
CO-6	Student shall communicate confidently and effectively

Course-7

Course Code:	A1CIL001
Course Title:	Computer Programming Laboratory
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2

Course Outcomes:	
CO-1	Have the ability to pick and choose the required built-in data-types for the specific problem and utilize the full power of operators and expression evaluation of C Language while writing programs for any given problem.
CO-2	Have the ability to use choose and utilize different control constructs in C Language depending on the context of the need while developing a C program for any specific problem.
CO-3	Have the ability to divide the parts of a program solution into functions and write a program in C as an inter-play of functions using each other in what is called modular programming.
CO-4	Have the ability to fully appreciate the concept and utilization of single and multi-dimensional arrays of different data-types in C.
CO-5	Have the ability to appreciate the concept of address variables and understand the benefits and utilization of the same along with under the flexibility provided by dynamic memory allocation and its comparison to static memory allocation.
CO-6	Have the ability to appreciate the concept of user defined data types and utilize these concepts to define new composite data types as required for implementing solutions to a problem in a C program.
CO-7	Have the ability to appreciate the library support available in standard C for dealing with external files both for read and write purposes and use them as required while developing C Programs.

Course-8

Course Code:	A1PYL002
Course Title:	Applied Physics Laboratory
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Student will be able to experimentally observe interference and diffraction patterns of light waves due to different optical devices and determine the given parameters.
CO-2	Student shall understand the tir process in the optic fiber experimentallyand will be able to determine the numerical aperture and bending loss of the optic fiber.
CO-3	Student shall experimentally determine the temperature coefficient of resistance, energy gap, type of charge carriers and concentration of charge carriers in a semiconductor and to study the I-V characteristics of the given p-n junction diode.
CO-4	Student shall experimentally study the magnetic hysteresis and determine related parameters and study the variation of magnetic fields due to currents and to study the frequency response of LCR circuits.

Semester-III Courses

Course-1

Course Code:	A1CIT201
Course Title:	Data Structures
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Have the ability to compare different searching and sorting methods and perform basic operations on stacks and queues (Knowledge Outcome)
CO-2	Have the ability to implement linked lists and trees and use them in various applications (Knowledge Outcome)
CO-3	Have the ability to implement various tree and graph ADTs and to use them solve common graph problems (Knowledge Outcome)
CO-4	Grasp the significance of creating, solving, and designing, testing, debugging and applying of linear data structures. (Understanding Outcome)
CO-5	Grasp the significance of creating, solving, and designing, testing, debugging and applying of non-linear data structures. (Understanding Outcome)
CO-6	Fully appreciate the art of different data structures and applying the knowledge of data structures to various applications. (Applying)

Course-2

Course Code:	A1CIT202
Course Title:	Mathematical Foundations of Computer Science
Theory / Lab:	Theory

L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Students will be able to formulate and validate the logical expressions for a variety of applications and will able to understand the fundamental results of number theory.
CO-2	Students will be able to design relational databases, design finite automata to recognize string patterns and be able to solve problems using mathematical induction.
CO-3	Students will be able to formulate all possible permutations and combinations for problems in hand and also solve recurrence relations for various problems.
CO-4	Students can grasp the significance of mathematical and predicate logic, number theory and set theory in computer science applications.
CO-5	Students can grasp the significance of having knowledge of combinatorics and recurrence relations which help in effective design of various software applications
CO-6	Students can fully appreciate the feature set and essence of various principles of mathematics which can be applied in real time computer science applications

Course-3

Course Code:	A1CIT203
Course Title:	Digital Logic Design
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	have the ability to deal with different number systems and perform basic arithmetic operations, explain in detail Boolean algebra operations, basic gates for implementing different Boolean operations, forms of representing Boolean expressions and minimizing them.
CO-2	have the ability to describe, analyze and build combinational and sequential circuits and explore some of the most widely used combinational circuits.
CO-3	have the ability to describe, analyze and build common synchronous sequential circuits like registers, counters and PLAs and also describe the design procedure and issues involved in asynchronous sequential circuits.
CO-4	grasp the significance of number systems, Boolean algebra and combinational circuit design and how they might be applied for designing circuits for any given problem.
CO-5	grasp the significance of sequential circuits, distinguishing them from combinational circuits and the procedure to be used for coming up with sequential circuits (synchronous and asynchronous)
CO-6	fully appreciate the basics of logic design, digital gates to support basis Boolean operations and the process of designing different circuits for required logical functions that have state and no state.

Course-4

Course Code:	A1CIT204
Course Title:	UNIX & Shell Programming
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Students will able to identify the features of UNIX operating system and convinced that how good UNIX operating system is .
CO-2	Students will be able to grasp the syntax and semantics of grep , sed and awk scripting and able to process the text files and redirect the streams by combining one or more commands as a script.
CO-3	Students will be able to process files and manage devices with the help of utilities in UNIX operating system.
CO-4	Students will be able to develop basic korn shell scripts for a specific purpose using script programming constructs.
CO-5	Students will be able to identify how UNIX operating system environment can be customized
CO-6	Appreciate the art of UNIX operating system and able to communicate with operating system by developing own commands

Course-5

Course Code:	A1CIT205
Course Title:	Data Communications
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4

Course Outcomes:	
CO-1	Have the ability to explain data communication standards, OSI Model and its functionality and services of each layer.
CO-2	Have the ability to explain about transmission media and the switching.
CO-3	Have the ability to explain about various errors detection and correction techniques.
CO-4	Grasp the significance of transmission media and transmission mechanisms that are required to communicate the data.
CO-5	Grasp the significance of applying various error detection and correction techniques in various protocols for effective communication.
CO-6	Fully appreciate the conglomeration of equipments and the underlying transmission principles required for establishing a communication system

Course-6

Course Code:	A1MST001
Course Title:	MANAGERIAL Economics & Financial Analysis
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	have the ability to explain and discuss in detail significance of managerial economics, laws and rules that govern demand, demand forecasting, theory of production and cost analysis.
CO-2	have the ability to explain and discuss in detail types of competition, pricing models, different types of business organizations and business cycles.
CO-3	have the ability to explain and discuss capital budgeting options, proposal evaluation techniques, accounting principles, maintaining accounting statements, and evaluating business using well known ratios based on accounting statements.
CO-4	grasp the significance of demand analysis, production theory and cost analysis, pricing, and how these would help determine whether a business model is feasible and how to price products.
CO-5	grasp the significance of different types of starting organizations and their relative merits and demerits, how to organize capital, ability to evaluate proposals and good accounting practices and how those artifacts track the business on an ongoing basis.
CO-6	fully appreciate the important of understanding what goes into managing a business from an economical perspective and how tracking of business activity needs to be done for reflecting business on an operating basis and evaluating the effectiveness

Course-7

Course Code:	A1CIL201
Course Title:	Data Structures Lab
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Able to design and analyze the time and space efficiency of the data structure
CO-2	have the ability to implement linear and non-linear data structures like trees and graphs
CO-3	have the ability to distinguish between the purpose of various non-linear data structures
CO-4	Have practical knowledge on the applications of data structures
CO-5	Be capable to identity the appropriate data structure for given problem

Course-8

Course Code:	A1CIL202
Course Title:	UNIX & Shell Programming Lab
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	An ability to understand the basic features of UNIX and be able to login to a remote machine in order to work with commands in all possible ways with a clear exposure on UNIX file system
CO-2	An ability to write an expression that can be used in conjunction with sed in order to match and remember a particular pattern and also have an exposure of using awk effectively

CO-3	An ability to write a foreground or background shell script that accepts input through command line or through console in order to perform various computations with a use of several operators and also could learn the usage of awk scripts in conjunction with shell.
CO-4	An ability to write C programs with an implementation of system call interface provided by UNIX to simulate the working of basic commands like Is, cp and mv

Course-9

Course Code:	A1ACA510
Course Title:	Soft Skills – I
Theory / Lab:	Theory
L-T-P-C:	0-0-0-0
Course Outcomes:	
CO-1	Students shall develop their interpersonal skills and shall be an effective goal oriented team player
CO-2	Students shall evolve as professional with idealistic, practical and moral values
CO-3	Students shall develop communication and problem solving skills
CO-4	Students develop improve their attitude towards life and understand its influence on their behavior

Semester-IV Courses

Course-1

Course Code:	A1CIT206
Course Title:	Object Oriented Programming
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	have the ability to explain benefits of object oriented programming and how and why they make it easy to model real world, explain and discuss the basic language features of JAVA and its design goals.
CO-2	have the ability to explain and discuss JAVA support of object oriented concepts like abstraction, encapsulation, inheritance and polymorphism and JAVA rich features on exception handling and multi-threading.
CO-3	have the ability to explain and discuss JAVA API library particularly the input/output, utilities and user interface packages and how they can be used to implement rich applications in JAVA.
CO-4	grasp the significance of object oriented programming and how JAVA makes it easy and facilitates good object oriented programming.
CO-5	grasp the significance of advanced language features like exception handling, multi-threading and event driven programming and appreciate the JAVA API support for using these features of the language.
CO-6	fully appreciate the art of object oriented programming and have the know-how to utilize the rich API provided by JAVA platform to develop applications of significant complexity with relative ease.

Course-2

Course Code:	A1CIT207
Course Title:	Operating Systems
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	have the ability to explain in detail the purpose of the operating system, kernel structure and its interface with application software and to explain in detail the different process management related aspects of typical operating systems.
CO-2	have the ability to describe in detail the different ways and detail in which the memory management and file management services are provided in a typical operating system.
CO-3	have the ability to describe in detail the I/O management and protection and security services provided by a typical operating system.
CO-4	grasp the significance of importance, role and details of basic operating system structure, process management services and memory management services.
CO-5	grasp the significance of different ways in file system and file management services are provided by operating systems and how operating systems take care of protection and security services.
CO-6	fully appreciate the role, different alternate ways in which operating systems are implemented and different variations on the common services provided by operating systems.

Course-3

Course Code:	A1CIT208
Course Title:	Database Mangement Systems
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	will have the ability to explain different model for data organization and basic set theory concepts that lead to entity relationship modeling that is basis for RDBMS along with relational algebra and relational calculus notations.
CO-2	will have the ability to explain and describe the different query and manipulations constructs available in SQL standard for data querying and manipulation, and how to design a good relational database eliminating redundancies using normalization.
CO-3	will have the ability to explain and describe the transaction management and recovery aspects of typical commercial RDBMS and how data storage of RDBMS is implemented using external data structures.
CO-4	grasp the significance of relational data modeling and structured querying on top of typical RDBNMS along with advantages of RDBMS and more specifically of DBMS over file systems.
CO-5	grasp the significance of structured approach to RDBMS design, the transactional and recovery features of RDBMS and data structures used for external data storage of RDBMS in a file.
CO-6	full appreciate the need, working and feature set of relational database management systems.

Course-4

Course Code:	A1CIT209
Course Title:	Computer Architecture
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	have the ability to explain the concept of stored program computer & the different representations forms for basic data types, ALU & instruction design all the way from macro instruction design to micro instructions to ALU circuit design and different ways of designing control unit.
CO-2	have the ability to demonstrate complete understanding of algorithms for basic arithmetic operations on different types of data and memory design aspects of computer design.
CO-3	have the ability to demonstrate sound understanding input/output organization including modes of transfer, advanced processor design aspects like pipelining and vector processing, and multiprocessor design principles.
CO-4	grasp the significance of basic computer organization including designing and building ALU, Instruction Design and corresponding control unit design & algorithms for basic arithmetic operations on all data types.
CO-5	grasp the significance of memory devices, memory design principles in modern computers, Basic arithmetic operation algorithms and I/O organization of computer, concepts involved in super scalar processor design, and concepts involved and multi-processor design.
CO-6	fully appreciate the concepts design & development of modern stored program computers.

Course-5

Course Code:	A1CIT210
Course Title:	Formal Lanaguages and Automata Theory
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	have the ability to explain the basic notations and concept of regular expressions and finite automation and other equivalent machines.
CO-2	have the ability to explain and describe in detail regular languages and their properties, context free grammars and their languages and hierarchy of languages as classified by Chomsky.
CO-3	have the ability to explain in detail pushdown automation and its equivalence to context free grammars, Turing machines and the whole theory of computability.
CO-4	grasp the significance of regular grammars and all their equivalent automations and expressions and some case studies on where they are useful.

CO-5	grasp the significance of context free grammars, their equivalent automata, Turing machine and their generality and equality to abstract computer and whole theory of computability.
CO-6	fully appreciate the formal basis for design of any formal language and how we can think of machines that can automatically verify validity of a string against a grammar and the theory behind defining what is computable and what is not.

Course-6

Course Code:	A1MAT109
Course Title:	Probability and Statistics
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Students will able to apply probabilistic tools to study systems with random components in many areas of communication networks, electro physics and computers.
CO-2	Students will be able to estimate the parameters of population in many socio- economic and industrial production related surveys and reducing sampling errors.
CO-3	Students will able to get Prediction and control the numerical and time series data occurs in industry and scheduling
CO-4	Student will able to evaluate the performance measures of the systems in Networks, transportation systems, process and production lines.

Course-7

Course Code:	A1CIL203
Course Title:	Object Oriented Programming Lab
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Students able to apply java programming constructs to perform mathematical operations
CO-2	Students able to apply control statements and iterative statements
CO-3	Students able to apply classes concepts and constructors ,methods
CO-4	Students able to apply inheritance and Exception handling
CO-5	Students able to apply multi threading concepts,network concepts
CO-6	Students able to apply awt components to design Graphcal user interfaces

Course-8

Course Code:	A1CIL204
Course Title:	Database Management Systems Lab
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Students Will be able to model the prototype for database from client requirements
CO-2	Students will be able to create and alter the table data structures
CO-3	Student will be able to retrieving data from database to perform a specific task
CO-4	Students will be able to modify data in terms of update, delete .
CO-5	Students will be able to model the database to avoid the redundancy
CO-6	Students will be able to write procedures & triggers for data access from thierd party like other programming languages and ensure security.

Course-9

Course Code:	A1ACA512
Course Title:	General Aptitude
Theory / Lab:	Theory
L-T-P-C:	2-0-0
Course Outcomes:	

CO-1	Understand the basic concepts of QUANTITATIVE ABILITY
CO-2	Understand the basic concepts of LOGICAL REASONING Skills
CO-3	Acquire satisfactory competency in use of VERBAL REASONING
CO-4	Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability
CO-5	Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

Semester-V Courses

Course-1

Course Code:	A1CIT211
Course Title:	Compiler Design
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Students will have the ability to write the Lexical Analysis Phases for any Programming construct.
CO-2	Students will have the ability to use the Parsers like SLR, LALR and CLR Parsers.
CO-3	Students will be able to generate an optimized code for a given program in a programming language.
CO-4	Students will be able to grasp the significance of Lexical and syntactic analysis
CO-5	Students will be able to grasp the significance of code optimization and code generation phases of a compiler.
CO-6	Students can fully appreciate the art of Compilers and use them for Real Time Problems.

Course-2

Course Code:	A1CIT212
Course Title:	Computer Networks
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Student will be able to understand the importance of layered architecture and various routing and congestion control algorithms
CO-2	Student will be familiar with the address classes and transport layer protocols
CO-3	Student is exposed to various application layer protocols like DNS, WWW, Simple mailing, HTTP, VOIP etc.
CO-4	Student will understand the concepts of mobile computing, mobile ad-hoc networks and wireless sensor networks.
CO-5	Student will be able to apply the concepts of networking and configure network with static IP addressing.

Course-3

Course Code:	A1CIT213
Course Title:	Micro-Processors & Interfacing
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Know the architecture of 8086 microprocessor, know the characteristic differences between 8085 and 8086 microprocessors. Learn the Pin diagram of 8086 along with its modes of operation.
CO-2	Explain the data transfer, arithmetic and logical instructions of 8086.
CO-3	Understand the string manipulation, branch control, flag, and processor control group of instructions. Write simple assembly language programs.
CO-4	Know the interrupt structure of 8086, and learn the architecture and working principle of 8279 interrupt controller
CO-5	Design the chip select logic for interfacing static RAM and EPROM with 8086. To know about 8257 DMA controller.

CO-6	To understand the importance of Input/output ports via 8255. To be able to interface devices like keyboard/display unit, stepper motor, ADC and DAC with 8086 microprocessor.

Course-4

Course Code:	A1CIT214
Course Title:	Web Technologies
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Students able to design static and dynamic web pages according to client requirements.
CO-2	Students able to identify when to choose client-side scripting and server-side scripting.
CO-3	Students able to understand how to store and exchange information between applications using XML.
CO-4	Students will able to configure a web server and how to deploy an application into a web server.
CO-5	Students will able to design and develop a various applications by integrating the technologies.

Course-5

Course Code:	A1CIT311
Course Title:	Data Ware housing & Data Mining
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Have the ability to describe key areas such as OLAP Design and various tasks in Data preprocessing.
CO-2	Have the ability to perform common tasks on data warehousing like mining frequent patterns.
CO-3	Have the ability to provide an overview of classification and cluster analysis to be used for machine learning.
CO-4	Grasp the necessity for building and evaluating predictive and descriptive models.
CO-5	Fully appreciate the necessary background and skills to turn available data into valua-ble and useful information

Course-6

Course Code:	A1CIT322
Course Title:	Routing & Switching Concepts
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Ability to understand the difference between OSI model and TCP/IP protocol suite.
CO-2	Ability to choose a particular routing protocol (static or dynamic) and be able to configure the routers.
CO-3	Ability to understand the role of switch at layer 2 and be able to configure, switch port security, VLAN, VTP etc.
CO-4	Ability to design networks and configure the intermediate devices along with basic security features.
CO-5	Fully appreciate the role of a network engineer in designing small to medium scale networks.

Course-7

Course Code:	A1EET403
Course Title:	MATLAB
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Knowledge of MATLAB environment and its programming fundamentals
CO-2	Ability to write Programs using commands, functions and vectors
CO-3	Able to handle polynomials, and use 2D Graphic commands

Course-8

Course Code:	A1MBT311
Course Title:	Internet Marketing
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	An overall understanding of the dimensions of marketing.
CO-2	Ability to develop strategies to leverage the potential of internet marketing.
CO-3	An ability to develop and leverage web marketing models
CO-4	An Understanding of online consumer behavior and ethics in digital marketing

Course-9

Course Code:	A1CIL205
Course Title:	Complier Design & Computer Networks Lab
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	students have the ability to design and implement the first phase of the compiler
CO-2	students have the ability to design and implement the second phase of the compiler
CO-3	students have the ability to understand the deign of a modern compilers
CO-4	Applying shortest path routing algorithms
CO-5	Shall gain knowledge of sending packet with reliability

Course-10

Course Code:	A1CIL206
Course Title:	Web Technologies Lab
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	students will be ablue to design static web pages withc rich look and feel
CO-2	Students will be able to design and generate dynamic web contents with help of serverside scripting
CO-3	Students able to understand how to store and exchange information between applications using XML.
CO-4	students will be able to retrieve data from database based on userneed using serverside scripting
CO-5	students will be able to integrate the technologies to design a complete web application
CO-6	Students will able to configure a web server and how to deploy an application into a web server.

Course-11

Course Code:	A1ACA511
Course Title:	Soft Skills - II
Theory / Lab:	Theory
L-T-P-C:	2-0-0-0
Course Outcomes:	
CO-1	Students shall develop their interpersonal skills and shall be an effective goal oriented team player
CO-2	Students shall evolve as professional with idealistic, practical and moral values
CO-3	Students shall develop communication and problem solving skills
CO-4	Students develop improve their attitude towards life and understand its influence on their behavior

Semester-VI Courses

Course-1

Course Code:	A1CIT215
Course Title:	Design & Analysis of Algorithms
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Understand the data structures and analyze worst-case running times of algorithms using asymptotic analysis.
CO-2	Describe the divide-and-conquer, dynamic, greedy paradigms and explain when an algorithmic design situation calls for it.
CO-3	Explain major graph algorithms and their analyses. Employ graphs to model engineering problems, when appropriate. Synthesize new graph algorithms and algorithms that employ graph computations as key components and analyze them.
CO-4	Explain the different ways to analyze randomized algorithms. Recite algorithms that employ randomization. Explain the differences between a randomized algorithm and an algorithm with probabilistic inputs.
CO-5	Analyze randomized algorithms. Employ indicator random variables and linearity of expectation to perform the analyses. Recite analyses of algorithms that employ this method of analysis

Course-2

Course Code:	A1CIT216
Course Title:	Software Engineering
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Able to acquire knowledge on nature of software, software engineering principles and prepare the SRS for a software product.
CO-2	Able to understand the types of requirements suitable for the product construction and choose respective development model.
CO-3	Able to design the user interface of the product.
CO-4	Able to know the testing methodology of the product for reliability check by applying different metrics.
CO-5	Able to understand the risk and quality management of the product

Course-3

Course Code:	A1CIT217
Course Title:	OOAD & Design Patterns
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Ability to understand a system described in UML diagrams
CO-2	Ability to draw different UML diagrams of a given project.
CO-3	Ability to recognize design patterns used in existing systems.
CO-4	Ability to formulate or identify a pattern that suits for a given problem.
CO-5	Ability to understand the related patterns

Course-4

Course Code:	A1CIT316
Course Title:	Data Science & Analytics
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Student will be able to know the importance of Hadoop.
CO-2	Shall understand the importance of Hadoop distributed file system and apply knowledge in developing map reduce programs
CO-3	Understand the insights of Map-Reduce Jobs

CO-4	Shall gain knowledge to set-up a hadoop cluster
CO-5	Shall gain knowledge in managing unstructured data using PIG
CO-6	Shall gain knowledge in HBASE which is an open-source, non-relational, distributed database and ZOOKEEPER A distributed hierarchical key-value store, which is used to provide a distributed configuration service, synchronization service, and naming registry for large distributed systems

Course-5

Course Code:	A1CIT332
Course Title:	Service Oriented Architecture
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Understand functions of Service Oriented Architecture and identify the ways in which they can benefit organizations and study the comparison of web services with other technologies. (Knowledge Outcome)
CO-2	Understand the design of SOA, Major components of the architecture SOAP, XML, HTTP, WSDL, XML schema, UDDI and Interactions between various components. (Knowledge Outcome)
CO-3	Learn some of Semantic Web technologies and applications with knowledge of XML's, Grammar rules, namespace schema. (Knowledge Outcome)
CO-4	Create web services and web services clients with state-of-the-art tools along (Understanding Outcome)
CO-5	Understand the web service interoperability, security, and future of web services with the implementation of cloud computing (Understanding Outcome)
CO-6	Use Webservices to interoperate two systems. (Applying)

Course-6

Course Code:	A1CIT325
Course Title:	Firewalls & VPN
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Identify the threats posed to information and network security, as well as the common attacks associated with those threats
CO-2	Aware of Industry Security standards, policies and practices
CO-3	Learn types of firewalls, their limitation, and designing of packet filtering firewall rules
CO-4	Understanding proxy servers and configuring advanced firewall functions
CO-5	Knowledge of VPNs and their tunneling protocols
CO-6	Implementation IPSec in Remote Access VPN

Course-7

Course Code:	A1CIT315
Course Title:	Neural Networks & Soft Computing
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Identify and describe soft computing techniques and their roles in building intelligent machines.
CO-2	Recognize the feasibility of applying a soft computing methodology for a particular problem.
CO-3	Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.

Course-8

Course Code:	A1CIT311
Course Title:	Dataware Housing & Data Mining
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	

CO-1	Have the ability to describe key areas such as OLAP (that stands for On Line Analytical Processing) Design, Data Warehousing (DW) and Data Mining (DM) and various tasks in Data preprocessing.
CO-2	Have the ability to provide an overview of most common tasks and application areas of data warehousing, mining frequent patterns and association.
CO-3	Have the ability to provide an overview of classification and cluster analysis
CO-4	Grasp the idea and implementation of most common techniques used in Data mining and Warehousing
CO-5	Grasp the necessity for building and evaluating predictive and descriptive models.
CO-6	Fully appreciate the necessary background and skills to turn available data into valuable and useful information.

Course-9

Course Code:	A1CIL207
Course Title:	Design & Analysis of Algorithms Lab
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Students will be able to understand the data structures and analyse the complexities (efficiency) of algorithms using asymptotic analysis.
CO-2	Students will be able to describe the various algorithms(divide & conquer, dynamic , greedy) and explain in which algorithmic design is suitable for what type of problem.
CO-3	Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems when appropriate. Synthesize new graph algorithms and analyse them
CO-4	Explain different ways to analyse randomized algorithms. Explain between a randomized algorithm and an algorithm with probabilistic inputs.
CO-5	Analyse randomized algorithms. Employ indicator random variables and linearity of expectation to perform the analyses. Recite analyses of algorithms that employ this method of analysis

Course-10

Course Code:	A1CIL208
Course Title:	Software Engineering Lab (Project Oriented)
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Student should be able to take a general project idea, elicit detailed requirements by talking with the client and formalize requirements of the project.
CO-2	Student should be able to do feasibility studies on the project and come up with effort estimate for the project.
CO-3	Student should be able to design and implement the project using 3-tier architecture using technologies of his choice.
CO-4	Student should be able to design functional test cases and test the developed software using those test cases.
CO-5	Student should be able to deploy the project and develop a rudimentary user manual that can be referred to by the users while using the software.
CO-6	Students should be able to appreciate the entire software engineering process and the alternative development life-cycles and understand the suitability and pros and cons of each of them in a given context.

Course-11

Course Code:	A1ACA507
Course Title:	Entrepreneurship Development
Theory / Lab:	Theory
L-T-P-C:	2-0-0-0
Course Outcomes:	
CO-1	Demonstrate the ability to provide a self-analysis in the context of an Entrepreneurial Career.

CO-2	Demonstrate the ability to find an attractive market that can be reached Economically
CO-3	It helps the students in creating an Appropriate Business-Model for their innovations

Semester-VII Courses

Course-1

Course Code:	A1CIT218
Course Title:	Design of UNIX Operating System
Theory / Lab:	Theory
L-T-P-C:	4-0-0-4
Course Outcomes:	
CO-1	Students will have the ability to understand structure and services of operating system (Kernel) and the design followed to provide kernel services like buffer cache, internal representation of files.
CO-2	Students will have the ability to understand the layout of system memory and the processes functionality and their life cycle.
CO-3	Students will have the ability to understand the significance of drivers, interfaces and streams.
CO-4	Students will grasp the significance of structured system, kernel design construct, buffers and organized file system storage and its implementation.
CO-5	Students will grasp the significance of work done by operating systems by using processes workflow design.
CO-6	Students will fully appreciate the art of operating system design and development for providing services by abstracting the core functionality to users.

Course-2

Course Code:	
Course Title:	MOOCs
Theory / Lab:	
L-T-P-C:	
Course Outcomes:	
CO-1	Student shall have gain knowledge in new or advanced courses from NPTEL platform.
CO-2	Student will have flexibitlity for choose any course of his interest which are not included in curriculum

Course-3

Course Code:	A1CIT326
Course Title:	Penetration Testing
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Skills student will develop in this course Students will learn how to apply knowledge of engineering to security evaluation, design and conduct security assessment experiments
CO-2	Analyze and interpret the resulting data, understand professional and ethical responsibility, communicate effectively, understand the impact of security practices in a global and societal context
CO-3	Recognize the need for life-long learning in the quickly changing cybersecurity environment, develop knowledge of contemporary cybersecurity issues
CO-4	Use techniques, skills and modern engineering tools necessary for computer security engineering practice.

Course-4

Course Code:	A1CIT348
Course Title:	Image Processing & Pattern Recognition
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Understanding of digital image processing fundamentals, hardware & software digitization, enhancement and restoration , encoding, segmentation and feature detection

CO-2	Ability to apply image processing techniques in both the spatial and frequency (Fourier) domains
CO-3	Ability to Understand how digital images are represented, manipulated, encoded and processed , with emphasis on algorithm design , implementation and performance evaluation
CO-4	Students will able to explain and compare a variety of pattern classification, structural pattern recognition, and pattern classifier combination techniques.

Course-5

Course Code:	A1CIT317
Course Title:	Social Network Analysis
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Have the ability to visualize, summarize and compare networks
CO-2	Understand basic principles behind network analysis algorithms
CO-3	Develop practical skills of social network analysis
CO-4	Be capable of analyzing real world social networks

Course-6

Course Code:	A1CIT347
Course Title:	Cryptography & Information Security
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	be able to individually reason about software security problems and protection techniques on both an abstract and a more technically advanced level.
CO-2	be able to individually explain how software exploitation techniques, used by adversaries, function and how to protect against them.

Course-7

Course Code:	A1CIT327
Course Title:	Information Security & Management Standards
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Learner will have sufficient knowledge about Information assurance and security policies.
CO-2	Learner will have sufficient insight on risk management and change management.
CO-3	Learner will have sufficient knowledge on disaster recovery and physical security.
CO-4	Learner will gain an understanding about influences on information security management and their implications.
CO-5	Learner will have a significant understanding on vulnerabilities, personnel and physical security policies.
CO-6	Learner will appreciate the alignment of information assurance policies with business process.

Course-8

Course Code:	A1CIT341
Course Title:	Bio-Informatics
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	The Students will be able to describe the contents and properties of the most important bioinformatics databases, perform text- and sequence- based searches, and analyze and discuss the results in light of molecular biological knowledge.
CO-2	The Students will be able to explain the major steps in pairwise and multiple sequence alignment, explain the principle for, and execute pairwise sequence alignment by dynamic programming.
CO-3	The Students will be able to predict the secondary and tertiary structures of protein sequences.

Course-9

Course Code:	A1CIT337
Course Title:	Human Computer Interaction
Theory / Lab:	Theory
L-T-P-C:	3-0-0-3
Course Outcomes:	
CO-1	Explain the capabilities of both humans and computers from the viewpoint of human information processing.
CO-2	Describe typical human–computer interaction (HCI) models, styles, and various historic HCI paradigms.
CO-3	Apply an interactive design process and universal design principles to designing HCI systems.
CO-4	Describe and use HCI design principles, standards and guidelines.
CO-5	Analyze and identify user models, user support, socio-organizational issues, and stakeholder requirements of HCI systems.
CO-6	Discuss tasks and dialogs of relevant HCI systems based on task analysis and dialog design.

Course-10

Course Code:	A1CIL209
Course Title:	Object Oriented Analysis and Design & Design Patterns Lab
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Understand Object Oriented Software Development Process
CO-2	Gain exposure to Object Oriented Methodologies & UML Diagrams
CO-3	To apply Object Oriented Analysis Processes for projects

Course-11

Course Code:	A1CIL210
Course Title:	Operating Systems Lab
Theory / Lab:	Lab
L-T-P-C:	0-0-3-2
Course Outcomes:	
CO-1	Students will have the ability to simulate the functionalities of operating system.
CO-2	Students will grasp the significance of kernel functionality.
CO-3	Students will fully appreciate the design of operating system.

Course-12

Course Code:	A1ACA509
Course Title:	Professional Ethics & IPR
Theory / Lab:	Theory
L-T-P-C:	2-0-0-0
Course Outcomes:	
CO-1	The students will understand the basic perception of profession, professional ethics, various moral & social issues, industrial standards, code of ethics and role of professional ethics in engineering field.
CO-2	The students will aware of professional rights and responsibilities of an engineer, responsibilities of an engineer for safety and risk benefit analysis.
CO-3	The students will acquire knowledge about various roles of engineers in variety of global issues and able to apply ethical principles to resolve situations that arise in their professional lives.

Semester-VIII Courses

Course-1

Course Code:	A1CIP601
Course Title:	Directed Study
Theory / Lab:	Theory
L-T-P-C:	0-0-0-2
Course Outcomes:	
CO-1	Student will gain knowledge on tools that are useful for completing the major project.
CO-2	Demonstrate a sound technical knowledge of the advanced concepts required for selected project topic
CO-3	Conduct an engineering project that fulfills the individual's/industrial needs

Course-2

Course Code:	A1CIP602
Course Title:	Project
Theory / Lab:	Theory
L-T-P-C:	0-0-0-8
Course Outcomes:	
CO-1	Demonstrate a sound technical knowledge of their selected project topic
CO-2	Undertake problem identification, formulation and solution by considering ethical responsibility
CO-3	Design engineering solutions to complex problems utilizing as system approach
CO-4	Conduct an engineering project that has environmental impact
CO-5	Communicate with engineers and the community at large in written and oral forms
CO-6	Demonstrate the knowledge, skills and attitudes of a professional engineer

Course-3

Course Code:	A1ACA501
Course Title:	NSS
Theory / Lab:	Theory
L-T-P-C:	0-0-0-0
Course Outcomes:	
CO-1	Will gain an ability to understand themselves in relation to their community
CO-2	Will exhibit capabilities to identify the needs and problems of the community and involve them in problem solving process
CO-3	Will be able to develop among themselves a sense of social and civic responsibility.

Course-4

Course Code:	A1ACA502
Course Title:	NCC
Theory / Lab:	Theory
L-T-P-C:	0-0-0-0
Course Outcomes:	
CO-1	Will Demonstrate several valuable things such as selflessness, honesty, discipline, hard work and ways to build confidence and gain leadership qualities.
CO-2	Will gain ability to use their social skills and their senses to get to know new places and adapt to the varying environment and also get to learn about the history and art of the new place.
CO-3	Will gear towards joining the forces and providing their 100% when the country is in need of them.

Course-5

Course Code:	A1ACA503
Course Title:	Sports
Theory / Lab:	Theory
L-T-P-C:	0-0-0-0
Course Outcomes:	

CO-1	Demonstrate the skills necessary to participate, perform, and progress in a variety of sport and/or exercise classes.
CO-2	Apply the cognitive and/or movement experiences from the Physical Education curriculum in order to participate in lifelong fitness.
CO-3	Identify and explain the rules, concepts and vocabulary used in the Physical Education curriculum.

Course-6

Course Code:	A1ACA504
Course Title:	Cultural
Theory / Lab:	Theory
L-T-P-C:	0-0-0-0
Course Outcomes:	
CO-1	Student shall gain knowledge to identify the fundamental aspects of the music/dance he/she chooses
CO-2	Student will be able to perform/present the basic topics in classical music/dance.
CO-3	Student shall gain hands-on/vocal/dance knowledge and practice.

Course-7

Course Code:	A1ACA505
Course Title:	Yoga
Theory / Lab:	Theory
L-T-P-C:	0-0-0-0
Course Outcomes:	
CO-1	Improve physical conditioning related to flexibility through participation in Hatha yoga
CO-2	Develop and maintain a personal yoga practice.

Course-8

Course Code:	A1ACA507
Course Title:	Enterpreneur Development
Theory / Lab:	Theory
L-T-P-C:	0-0-0-0
Course Outcomes:	
CO-1	demonstrate the ability to communicate effectively both orally and in writing.
CO-2	demonstrate knowledge of the legal and ethical environment impacting business organizations and exhibit an understanding and appreciation of the ethical implications of decisions.
CO-3	demonstrate an ability to engage in critical thinking by analyzing situations and constructing and selecting viable solutions to solve problems.
CO-4	demonstrate an ability to work effectively with others.
CO-5	demonstrate an understanding of and appreciation for the importance of the impact of globalization and diversity in modern organizations.
CO-6	demonstrate knowledge of current information, theories and models, and techniques and practices in all of the major business disciplines including the general areas of Accounting and Finance, Information Technologies, Management, Marketing, and Quantitative Analysis.

Dept. of MBA

Course outcomes (Cos) of all courses of all programs offered by the institution

1. First for B.Tech. Program then for M.Tech.

MBA

Semester-I Courses

Course-1

Course Code:	**A1MBT001**
Course Title:	**PERSPECTIVES OF MANAGEMENT**
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Understand the concepts and principles of management
CO-2	Be knowledgeable of the functions as well as skills of successful management.
CO-3	Understand theoretical aspects and its application to practice through case discussions.
CO-4	Demonstrate critical thinking when presented in the management issues/problems

Course-2

Course Code:	**A1MBT002**
Course Title:	**BUSINESS ENVIRONMENT AND LAW**
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Student will be familiarized with the influence of micro and macro environmental forces on business.
CO-2	Student will have some overall knowledge of Indian economy
CO-3	Student will get a deeper understanding on the influence various policies on business environment.
CO-4	Student will understand the challenges, mechanisms and regulatory framework of international business environment

Course-3

Course Code:	**A1MBT003**
Course Title:	**ECONOMICS FOR MANAGERS**
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Students understand how market forces affect price, quantity and Demand & supply analysis.
CO-2	Students understand elasticity and its relationship to pricing and revenue.
CO-3	Students can utilize statistical analysis to assess product demand conditions and they can estimate a demand function and techniques for demand forecasting..
CO-4	Students can understand different cost concepts , cost analysis for improving their decision making skills.

Course-4

Course Code:	**A1MBT004**
Course Title:	**ACCOUNTING FOR MANAGERS AND REPORTING**
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Use accounting and business terminology, and understand the nature and purpose of generally accepted accounting principles (GAAP).
CO-2	Explain the objective of financial reporting, the elements of the financial statements, and the related key accounting assumptions and principles.
CO-3	Recognize the information conveyed in each of the four basic financial statements and the way it is used by investors, creditors, regulators, and managers

CO-4	Identify the ethical implications inherent in financial reporting and be able to apply strategies for addressing them.

Course-5

Course Code:	**A1MBT005**
Course Title:	**MANAGING PEOPLE**
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Understanding of the basic concepts of organization behavior.
CO-2	Understanding of different attitudes and perceptions.
CO-3	Better understanding of intrapersonal and interpersonal relations.
CO-4	Clarity for group behavior and dynamics.

Course-6

Course Code:	**A1MBT006**
Course Title:	**QUANTITATIVE TECHNIQUES FOR MANAGERS**
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Students are aware of the concepts of probability & Distribution.
CO-2	Understand the usage of various statistical methods in business management.
CO-3	Aware of decision theory, time series and index numbers and their significance in decision making.
CO-4	Aware of methods of statistical Quality Control.

Course-7

Course Code:	**A1MBL001**
Course Title:	**BUSINESS COMMUNICATION- LAB**
Theory / Lab:	Lab
L-T-P-C:	2-0-2-2
Course Outcomes:	
CO-1	Aware of communication process and understand the essentials of good communication.
CO-2	Knowledge of different types of communication.
CO-3	Learn effective good written and oral communication.
CO-4	Understand essentials of effective business correspondence.

Semester-II Courses

Course-1

Course Code:	**A1MBT101**
Course Title:	**FINANCIAL MANAGEMENT**
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	The student will be able to understand scope and objectives of corporate finance.
CO-2	The student will able to understand how to borrow money and how to invest money.
CO-3	The student will able to understand the concept of value of the firms.
CO-4	The student will be able to understand the timing and importance in financial planning.
CO-5	The student will be able to understand the working capital concepts and estimations.

Course-2

Course Code:	**A1MBT102**
Course Title:	**HUMAN RESOURCE MANAGEMENT**
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Synthesize the role of human resources management as it supports the success of the organization including the effective development of human capital as an agent for organizational change.

CO-2	Synthesize the role of human resources management as it supports the success of the organization including the effective development of human capital as an agent for organizational change.
CO-3	Understand the role of employee benefits and compensation as a critical component of employee performance, productivity and organizational effectiveness.
CO-4	Demonstrate knowledge of practical application of training and employee development as it impacts organizational strategy and competitive advantage.

Course-3

Course Code:	**A1MBT103**
Course Title:	**MARKETING MANAGEMENT**
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Compile relevant information from the marketing intelligence available in the market
CO-2	Analyze markets based on various segments
CO-3	Create a point of difference to various products
CO-4	Formulate pricing strategies by considering various factors affecting the price of the product.
CO-5	Incorporate ethical considerations while taking marketing decisions

Course-4

Course Code:	**A1MBT104**
Course Title:	**BUSINESS RESEARCH METHODS**
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Define a research problem and conduct a literature review
CO-2	Outline the principles of hypothesis testing and identify appropriate analytical strategies to test specific hypotheses.
CO-3	Evaluate the relative strengths and weaknesses of qualitative and quantitative research methods.
CO-4	Develop, present and defend a research proposal as a possible basis for their dissertation project.
CO-5	Outline major ethical issues involved in research.
CO-6	Report and communicate analytical findings and recommendations in a manner conducive to the profession or discipline.

Course-5

Course Code:	**A1MBT105**
Course Title:	**CORPORATE SOCIAL RESPONSIBILITY AND GOVERANCE**
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	The student learns the important of ethics in an perspectives of all human endeavor.
CO-2	The student gets familiarity about the theory & practices of BE in an organization.
CO-3	The student understands CSR.
CO-4	The student get working knowledge CG in an organization.

Course-6

Course Code:	**A1MBT106**
Course Title:	**PRODUCTION AND OPERATIONS MANAGEMENT**
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Understand and apply concepts and applications of quantitative and qualitative models in Operations Management.
CO-2	Develop essential skills of modeling, managing and optimizing operations decisions in manufacturing and service organizations.
CO-3	Utilize a variety of quantitative and qualitative methods and tools used in managing and improving operations decisions.
CO-4	Leverage material management knowledge.

CO-5	Use of state-of-the-art distribution practices to implement strategic and operational concepts

Course-7

Course Code:	**A1MBL101**
Course Title:	**IT FOR MANAGERS – LAB**
Theory / Lab:	Lab
L-T-P-C:	1-0-3-2
Course Outcomes:	
CO-1	The student will be able to use MS word tool for documentation.
CO-2	The student will be able to apply MS excel for graphs and other calculations.
CO-3	The student will be able to do presentations on power point.
CO-4	The student learns SQL Commands to do MS project.

Course-8

Course Code:	**A1MBV401**
Course Title:	**Comprehensive Viva Voce**
Theory / Lab:	
L-T-P-C:	0-0-0-1
Course Outcomes:	
CO-1	The students will be able to recall the important concepts in foundation and core mandatory courses.
CO-2	The students will be able to apply concepts learned for solving real time problem scenarios.

Semester-III Courses

Course-1

Course Code:	**A1MBT107**
Course Title:	**ENTREPRENEURSHIP AND MSMEs**
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Demonstrate the ability to provide a self-analysis in the context of an Entrepreneurial Career.
CO-2	Demonstrate the ability to find an attractive market that can be reached Economically.
CO-3	It helps the students in creating an Appropriate Business-Model for their innovations.

Course-2

Course Code:	**A1MBT210**
Course Title:	**FINANCIAL MARKETS AND SERVICES**
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Understands the detail structure of Indian Financial System.
CO-2	Acquire knowledge on various financial markets like money, capital, forex& derivatives.
CO-3	Get awareness on different types of financial services.

Course-3

Course Code:	**A1MBT211**
Course Title:	**BANKING AND INSURANCE**
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Understand the structure and regulatory framework of Banks in India including the RBI.
CO-2	Knowledge of Banking operations in general and related to businesses in particular and the role of technology in modern day Banking.
CO-3	Acquaint with the various financing facilities for businesses available with the modern day Banks.
CO-4	Knowledge of Insurance operations/ regulatory framework for Insurance and the role of Insurance for Businesses

Course-4

Course Code:	**A1MBT213**
Course Title:	**SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT**
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Analyze and evaluate financial markets, how securities are traded, mutual funds, investment companies, and investor behavior.
CO-2	Explain macro and industry analysis, equity valuation, financial statement analysis and technical analysis
CO-3	Analyze bond prices and yields and fixed-income portfolios.
CO-4	Construct optimal portfolios and illustrate the theory and empirical applications of asset pricing models.
CO-5	Characterize the implications of the market efficiency evidence on active portfolio management

Course-5

Course Code:	**A1MBT202**
Course Title:	**RETAIL MANAGEMENT**
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	The knowledge of retailing is enhanced to make them opt careers in the area of retailing.
CO-2	The concept and meaning of multichannel retailing, types of retailers, customer buying behavior is understood.
CO-3	The importance of retail market strategy, retail location importance, HRM, information, supply chain management and customer relationship management is understood.
CO-4	The knowledge of merchandise planning and assortment, pricing, retail communication mix, store management, store layout design and visual merchandising is developed.

Course-6

Course Code:	**A1MBT204**
Course Title:	**CONSUMER BEHAVIOUR AND MARKET RESEARCH**
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	The students will be able to understand business markets and the related concepts and theories involved in business activities.
CO-2	Student can able to describe the business organization buying behavior with particular emphasis on the globalization of modern business.
CO-3	Student can analyze business situations in the context of buyer-seller relationships, consumer relationship management and supply chain management.
CO-4	CO4 Student can understand consumer perception towards purchasing of various products.

Course-7

Course Code:	**A1MBT207**
Course Title:	**LOGISTICS AND SUPPLY CHAIN MANAGEMENT**
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	The importance of gaining competitive advantage through logistics management is understood.
CO-2	The critical facets of supply chain management and their inter-relationships is understood.
CO-3	The aspects of sourcing, transportation and pricing decisions are understood.
CO-4	An understanding of global logistics and global supply chains is developed.

Course-8

Course Code:	**A1MBT222**
Course Title:	**LABOUR LAWS**
Theory / Lab:	Theory

L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	The nature and scope of labor laws
CO-2	The rationale of labor laws in organizations
CO-3	The international labor organization visa-viz the labor laws in India and
CO-4	Managing employee relations at work.

Course-9

Course Code:	**A1MBT220**
Course Title:	**GLOBAL HUMAN RESOURCE MANAGEMENT**
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Ability to differentiate between HRM and IHRM.
CO-2	Knowledge of the major challenges that MNCs face in the global context and will become acquainted with cultural literacy, international human resource planning, international staffing, international training and development, international compensation, international performance management, international industrial relations, international strategic human resources management.

Course-10

Course Code:	**A1MBT226**
Course Title:	**COMPENSATION MANAGEMENT**
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Develop a clear understanding of compensation management in the organisations
CO-2	Demonstrate how the compensation strategy fit together organizational goals
CO-3	Understanding the importance of fringe benefits Awareness of the latest trends in compensation
CO-4	Awareness about the compensation structure and differentials.

Semester-IV Courses

Course-1

Course Code:	**A1MBT108**
Course Title:	**STRATEGIC MANAGEMENT**
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	The viewpoints of senior and top management executives with a major focus on the total enterprise as a whole rather than each functional department are understood.
CO-2	The knowledge about the factors that shapes a company's strategy in view of competition is acquired.
CO-3	The students are enabled to acquire an understanding of environmental scanning and leadership.
CO-4	The knowledge of various aspects of strategic management process is developed.

Course-2

Course Code:	**A1MBT302**
Course Title:	**CORPORATE VALUATION AND MERGERS**
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Understand the dynamics in the process of business restructuring.
CO-2	Value the firms in different methods and models.
CO-3	Comprehend variety of takeover defense strategies.
CO-4	comply with the legal procedures and framework in the process of business integration and disintegration.

Course-3

Course Code:	**A1MBT304**
Course Title:	**LEADERSHIP IN ORGANIZATIONS**
Theory / Lab:	Theory

L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	Student can learn and understand different types of leadership styles and their traits.
CO-2	The program equips students to select, implement, and manage appropriate leadership methodologies to meet individual, group, and organizational needs.
CO-3	Student will develop a range of leadership skills and abilities such as effectively leading change, resolving conflict, and motivating others.
CO-4	Student can understand various strategic leaders and their styles for developing leadership skills.

Course-4

Course Code:	**A1MBT305**
Course Title:	**INTERNET MARKETING**
Theory / Lab:	Theory
L-T-P-C:	3-1-0-3
Course Outcomes:	
CO-1	An overall understanding of internet marketing dimensions.
CO-2	Ability to develop strategies to leverage the potential of internet marketing.
CO-3	An ability to develop internet marketing strategies with reference to the digital age.
CO-4	An Understanding of online consumer behavior.

Course-5

Course Code:	**A1MBP501**
Course Title:	**Project Report & VIVA-VOCE**
Theory / Lab:	Project
L-T-P-C:	0-0-0-6
Course Outcomes:	
CO-1	Demonstrate a sound knowledge of their selected project topic.
CO-2	Undertake real time problems faced by organizations and provide solutions by considering ethical responsibility.
CO-3	Communicate with management of the organization and the community at large in written and oral forms.
CO-4	Demonstrate the knowledge, skills and attitudes of a manager.

2.6.1.(a) Program outcomes (POs), program specific outcomes (PSOs) for all programs offered by the institution

I B.Tech. (Civil Engineering)

Program Outcomes(POs)

1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
2	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
3	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
4	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
5	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
6	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
7	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
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
10	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
11	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
12	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.

Program Specific Outcomes(PSOs)

1	Solve civil engineering problems using analytical methods and modern tools and techniques
2	Plan, design, execute, maintain and rehabilitate civil engineering structures and systems

II M.Tech. (Structural Engineering)

Program Outcomes(POs)

1	An ability to independently carry out research / investigation and development work to solve practical problems.
2	An ability to use modern engineering tools, software and equipment to analyze critically, design, conduct experiments and interpret investigations to solve structural engineering problems with clear understanding of limitations of such modern tools.
3	An ability to derive information relevant to uncommon problem through literature survey, conduct of suitable experiment, apply pertinent research methodologies, interpret the information and analyze the data for the development of technical expertise in the field of structural engineering.
4	An ability to communicate and function effectively as an individual and as a team, within multi-disciplinary environment in executing and managing projects.
5	An ability to recognize the need for the self-engagement in life-long learning to meet the ever changing, challenging demands of the society with utmost enthusiasm.

Program Specific Outcomes(POs)

1	To analyze and design structural components & systems using appropriate software, modern tools and standards.
2	Undertake real time projects and research in the field of structural engineering to provide sustainable solutions to the Civil Engineering problems.

2.6.1.(a) Program outcomes (POs), program specific outcomes (PSOs) for all programs offered by the institution

I B.Tech. (Electrical and Electronics Engg)

Program Outcomes(POs)

1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	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.
3	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.
4	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.
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6	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.
7	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.
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	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.
11	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.
12	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.

Program Specific Outcomes(PSOs)

1	An ability to design & develop models as well as analyze & assess the performance of different types of generation, transmission, distribution and protection mechanisms in core engineering.
2	An ability to devise control strategies and provide optimal solutions for industrial and societal electrical energy requirements

II M.Tech. (Power Systems)

Program Ooutcomes(POs)

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12	

Program Specific Outcomes(POs)

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3	
4	

2.6.1.(a) Program outcomes (POs), program specific outcomes (PSOs) for all programs offered by the institution

I **B.Tech. (Mechanical Engg)**

Program Ooutcomes(POs)

1	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	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.
4	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.
5	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.
6	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.
7	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	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.
11	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.
12	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.

Program Specific Outcomes(PSOs)

1	The student will be able to demonstrate the skill set required to suit the requirements of the Industry as well a research environment
2	The student will be able to design experiments, conduct experiment, analyse, comprehend and report based on the knowledge acquired by the experience based learning.

II **M.Tech. (Product Design and Manufacturing)**

Program Ooutcomes(POs)

1	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	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.
4	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.
5	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.
6	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.
7	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	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.
11	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.
12	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.

Program Specific Outcomes(POs)

1	The student will be able to demonstrate the skill set required to suit the requirements of the Industry as well a research environment
2	The student will be able to design experiments, conduct experiment, analyse, comprehend and report based on the knowledge acquired by the experience based learning.

2.6.1.(a) Program outcomes (POs), program specific outcomes (PSOs) for all programs offered by the institution

I B.Tech. (ECE)

Program Outcomes(POs)

1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	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.
3	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.
4	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.
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6	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
7	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
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
10	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.
11	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.
12	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.

Program Specific Outcomes(PSOs)

1	An ability to design and implement complex systems in the areas related to Analog and Digital Electronics, Communication, Signal processing, RF & Microwave, VLSI and Embedded systems.
2	Ability to make use of acquired knowledge to be employable and demonstrate leadership and entrepreneurial skills

II M.Tech. (VLSI)

Program Ooutcomes(POs)

1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	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.
3	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.
4	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.
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6	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
7	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
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
10	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.

11	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.
12	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.

Program Specific Outcomes(POs)

1	An ability to design and implement complex systems in the areas related to Analog and Digital Electronics, Communication, Signal processing, RF & Microwave, VLSI and Embedded systems.
2	Ability to make use of acquired knowledge to be employable and demonstrate leadership and entrepreneurial skills

2.6.1.(a) Program outcomes (POs), program specific outcomes (PSOs) for all programs offered by the institution

I B.Tech. (Computer Science & Engineering)

Program Outcomes(POs)

1	**PO1: Engineering knowledge:**
	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	**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.
3	**PO3: Design/development:**
	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.
4	**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.
5	**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.
6	**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.
7	**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.
8	**PO8: Ethics:**
	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	**PO9: Individual and team work:**
	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	**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.
11	**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.
12	**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.

Program Specific Outcomes(PSOs)	
1	**PSO1 (PO1, PO2, PO3, and PO5): Pattern based approach:**
	Apply through knowledge of Programming paradigms, constructs, architectural patterns and algorithmic patterns while coming up with solutions to complex problems that can be deployed in complex usability scenarios.
2	**PSO2 (PO3, and PO5): Reusability and Adaptability:**
	Assimilate, fully appreciate, utilize and evangelize component based architecture that would promote reusability, adaptability and extensibility at all levels of solution design for complex problems.
3	**PSO3 (PO2, PO3, and PO4): Analysis and Synthesis:**
	Demonstrate ability to both analyze existing systems with a view to understand the solution comprehensively, change/optimize the solution and to synthesize systems based on a new requirements utilizing existing infrastructure including system components that can be reused.

II M.Tech. (Computer Network & Information Security)

Program Outcomes(POs)

1	Apply the knowledge of mathematics, science, engineering fundamentals, and engg. specialization to the solution of complex engineering problems.
2	Identify, formulate, research literature, and analyze engineering problems to arrive at substantiated conclusions using first principles of mathematics, natural, and engineering sciences.
3	Design solutions for complex engineering problems and design system components, processes to meet the specifications with consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4	Use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5	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.
6	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.
7	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings.
10	Communicate effectively with the engineering community and with society at large. Be able to comprehend and write effective reports documentation. Make effective presentations, and give and receive clear instructions.
11	Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team. Manage projects in multidisciplinary environments.
12	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.

Program Specific Outcomes(POs)

1	Design, develop and maintain corporate computer networking infrastructure.
2	Demonstrate advanced programming skills, database management, web technologies.
3	Implement multi-layer security at host and campus level, understaing the cyber laws, performing penetration testing, have a detailed understanding of information security management and standards.
4	Demonstrate good communication skills, take up independet project design and development.

2.6.1.(a) Program outcomes (POs), program specific outcomes (PSOs) for all programs offered by the institution

I **B.Tech. (Chemical Engg)**

Program Outcomes(POs)

1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	**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.
3	**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.
4	**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.
5	**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.
6	**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.
7	**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.
8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	**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.
11	**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.
12	**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.

Program Specific Outcomes(PSOs)

1	**PSO1:** An ability to solve chemical engineering problems using analytical methods and modern tools and techniques
2	**PSO2:** An ability to design, operate, maintain and troubleshoot chemical engineering equipments.

2.6.1.(a) Program outcomes (POs), program specific outcomes (PSOs) for all programs offered by the institution

B.Tech. (Information Technology)

Program Outcomes(POs)

1	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	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.
4	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.
5	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.
6	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.
7	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	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.
11	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.
12	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.

Program Specific Outcomes(PSOs)

1	Apply through knowledge of Programming paradigms, constructs, architectural patterns and algorithmic patterns while coming up with solutions to complex problems that can be deployed in complex usability scenarios.
2	Assimilate, fully appreciate, utilize and evangelize component based architecture that would promote reusability, adaptability and extensibility at all levels of solution design for complex problems.
3	Demonstrate ability to both analyze existing systems with a view to understand the solution comprehensively, change/optimize the solution and to synthesize systems based on a new requirements utilizing existing infrastructure including system components that can be reused.

2.6.1.(a) Program outcomes (POs), program specific outcomes (PSOs) for all programs offered by the institution

MBA

Program Outcomes(POs)

1	Apply knowledge of management theories and practices to solve business problems
2	Foster Analytical and critical thinking abilities for data-based decision making
3	Ability to develop Value based Leadership ability
4	Ability to understand, analyze and communicate global, economic, legal, and ethical aspects of business
5	Ability to lead themselves and others in the achievement of organizational goals, contributing effectively to a team environment
6	Generate business ideas, develop business plans, understand regulatory requirements, and locate sources of finance and other resources to start new business ventures