DEPARTMENT OF CIVIL ENGINEERING

Course Objective and Course Outcome

Name Of Subject:	Building Technology and Materials (201001)
Course Objectives:	
1	To enumerate different types of structure and their requirement as building components.
2	To describe all basic activities of construction from foundation to finishing.
3	To study different types of materials used in construction for civil engineering projects.
Course Outcomes:	
CO1	Identify types of building and basic requirements of building components
CO2	Explain types of masonry, formwork, casting procedure and necessity of underpinning and scaffolding.
CO3	Elucidate different types of flooring and roofing materials.
CO4	.Describe types of doors, windows, arches and lintel.
CO5	Illuminate means of vertical circulation and protective coatings
CO6	Explain different materials especially eco-friendly materials and safety measures to be adopted at any construction site
Name Of Subject:	Strength of Materials (201002)
Course Objectives:	
1	To study the different types of stresses due to load, temperature, etc.

2	To learn concept of Shear Force and Bending Moment Diagram for determinate beams.
Course Outcomes:	
CO1	Compute different type of stresses in determinate, indeterminate, homogeneous and composite structures.
CO2	Develop bending and shear stress diagram.
CO3	Determine the torsional stresses and stresses due to strain energy for different loading conditions.
CO4	Explain the concept of principal stresses due to combined loading and able to compare the values of analytical and graphical (Mohr's circle) method.
CO5	Plot loading diagram, Shear Force Diagram (SFD) and Bending Moment Diagram (BMD).
CO6	Analyze axially and eccentrically loaded column
Name Of Subject:	Surveying
Course Objectives:	
1	To learn the basis of plane surveying and different types of instruments used for plane surveying
2	To learn different methods of plane surveying
3	To understand advancement in plane surveying such as electronic instruments and software
Course Outcomes:	
CO1	Operate and use surveying eqipments
CO2	Draw plan or map of existing permanant features on the ground

CO3	Classify the ground features from the map or plan
CO4	Analyse temporary adjustments and check permanent adjustment of the theodite
Name Of Subject:	Geotechnical Engineering (201008)
Course Objectives:	
1	To describe soil properties, classification and its behavior under stress.
2	To learn methods for measurements and determination of index & engineering properties of soil.
3	To study the interaction between water and soil and the effects of static vs flowing water on soil strength
Course Outcomes:	
CO1	Identify and classify the soil based on the index properties and its formation process
CO2	Explain permeability and seepage analysis of soil by construction of flow net
CO3	Illustrate the effect of compaction on soil and understand the basics of stress distribution
CO4	Express shear strength of soil and its measurement under various drainage conditions.
CO5	Evaluate the earth pressure due to backfill on retaining structures by using different theories.
CO6	Analysis of stability of slopes for different types of soils.
Name Of Subject:	Engineering Mathematics
Course Objectives:	
1	To make the students familiarize with concepts and techniques in Ordinary & Partial differential equations, Numerical methods, Statistical methods, Probability theory and Vector calculus.

2	The aim is to equip them with the techniques to understand advanced level mathematics and its applications that would enhance analytical thinking power, useful in their disciplines.
Course Outcomes:	
CO1	Solve Higher order linear differential equations and its applications to modelling and analysing Civil engineering problems such as bending of beams, whirling of shafts and mass spring systems.
CO2	Solve System of linear equations using direct & iterative numerical techniques and develop solutions for ordinary differential equations using single step & multistep methods applied to hydraulics, geotechnics and structural systems.
CO3	Apply Statistical methods like correlation, regression and probability theory in data analysis and predictions in civil engineering.
CO4	Perform Vector differentiation &integration, analyze the vector fields and apply to fluid flow problems.
CO5	Solve Partial differential equations such as wave equation, one and two dimensional heat flow equations.
TE CIVIL SEMESTER-I	
Name Of Subject:	Structural Analysis –II (301004)
Course Objectives:	
1	To learn Slope Deflection method for beam and frame analysis.
2	To learn Moment Distribution method for beam and frame analysis.
3	To learn Flexibility method for beam and frame analysis.
4	To learn Stiffness method for beam and frame analysis.

5	To study Finite difference method.
6	To learn Fundamental concepts of Finite Element method.
Course Outcomes:	
CO1	Students able to analyze beams and Frames by slope Deflection method.
CO2	Students able to analyze beams and Frames by Moment distribution method.
CO3	Students able to analyze beams and Frames by Flexibility method.
CO4	Students able to analyze beams and Frames Stiffness method.
CO5	Students able to understand and analyze concept of Finite difference method.
CO6	Students able to learn Fundamental concepts of Finite Element method.
Name Of Subject:	Structural Design I (301003)
Course Objectives:	
1	To learn Analysis and design of Tension member
2	To learn Analysis and design of Compression member
3	To learn eccentrically loaded column & column bases
4	To learn Analysis and design of Flexural member
5	To learn Design of welded plate girder
6	To learn Design of Roof truss
Course Outcomes:	

CO1	Students able to make Analysis and design of Tension member
CO2	Students able to make Analysis and design of Compression member
CO3	Students able to make eccentrically loaded column & column bases
CO4	Students able to make Analysis and design of Flexural member
CO5	Students able to make Design of welded plate girder
CO6	Students able to make Design of Roof truss
Name Of Subject:	Hydrology and water Resource Engineering (301001)
Course Objectives:	
1	To learn government organizations, apply & analyze precipitation & its abstractions, runoff, runoff hydrographs and gauging of streams.
2	To learn floods, hydrologic routing & Q-GIS software in hydrology, reservoir planning, capacity of reservoir & reservoir economics.
3	To learn water logging & water management, apply & analyze ground water hydrology, irrigation, piped distribution network and canal revenue, apply and analyze crop water requirement.
Course Outcomes:	
CO1	Understand government organizations, apply & analyze precipitation & its abstractions.
CO2	Understand, apply & analyze runoff, runoff hydrographs and gauging of streams.
CO3	Understand, apply & analyze floods, hydrologic routing & Q-GIS software in hydrology.
CO4	Understand, apply & analyze reservoir planning, capacity of reservoir & reservoir economics.
CO5	Understand water logging & water management, apply & analyze ground water hydrology
CO6	Understand irrigation, piped distribution network and canal revenue, apply and analyze crop water requirement.

Name Of Subject:	Fluid Mechanics-II (301005)
Course Objectives:	
1	To learn fluid flow around Submerged Objects and its types, Open channel flow and its relationship.
2	To learn uniform flow in open channels and jumps involved, impact of jet and pumps used.
3	To learn generaton of hydropower, different types of flows for computaton in open channel.
Course Outcomes:	
CO1	To understand fluid flow around Submerged Objects and iits types.
CO2	To understand Open channel flow and its relationship.
CO3	To understand uniform flow in open channels and jumps involved.
CO4	To understand impact of jet and pumps used.
CO5	To understand generaton of hydropower.
CO6	To understand different types of flows for computaton in open channel.
Name Of Subject:	Infrastructure Engineering and Construction Techniques (301002)
Course Objectives:	
1	To learn Railways and its types, different Construction Techniques.
2	To learn different Tunneling methods, Docks & Harbors and its requirement, different Construction Equipments.
Course Outcomes:	
CO1	To understand Meaning and scope of Infrastructure Engineering

CO2	To understand Railways and its types
CO3	To understand different Construction Techniques
CO4	To understand different Tunneling methods
CO5	To understand Docks & Harbors and its requirement
CO6	To understand different Construction Equipments

BE CIVIL SEMESTER-I

Name Of Subject:	Environmental Engineering - II (401001)
Course Objectives:	
1	To provide the necessary knowledge on wastewater collection system, characteristics of wastewater and treatment/processing/control technologies for wastewater.
2	To impart necessary skill for the design and operation of wastewater treatment facilities
3	To prepare students for higher studies and research in the field of wastewater treatment technology.
4	To introduce new development in the field of waste management and pollution control.
Course Outcomes: After the completion of the course the student should be able to -	
CO1	Explain component of sewage collection, conveyance and treatment plant, keeping in view of quantitative and qualitative approach.
CO2	Describe stream sanitation and design screen chamber, grit chamber, and primary sedimentation tank.
CO3	Describe and design secondary treatment units with special emphasis on activated sludge process and trickling filter.
CO4	Describe low cost treatment methods, viz,.Oxidation pond, aerated lagoon, phytoremediation and root zone technology.
CO5	Describe anaerobic treatment processes as anaerobic digester, up flow anaerobic sludge blanket and design of units as septic tank with

	up flow filters and soak pit.
CO6	Explain industrial wastewater treatment facilities.
Name of Subject:	Architecture and Town Planning (ATP) (401004)
Course Objectives: Objectives of the Course are	
1	1.To make students conversant with the importance of Architecture and Town Planning in construction industry
2	2.To learn landscaping and importance of sustainable architecture in urban renewal
3	3.To understand the Goals and Objectives, Levels of Neighborhood planning and MRTP Act 1966
4	4.To study types of Civic Surveys, Planning agencies for various levels of planning and Traffic transportation systems
5	5.To understand the LARR, URDPFI and RERA Act 2016 and MAHA-RERA
6	6.To learn Special townships, SEZ, CRZ, Smart City, AMRUT Guidelines and Application of GIS, GPS, remote sensing in planning
Course Outcomes: At the end of the course the students will have an ability to	
CO1	1.Explain the importance of Architecture and Town Planning.
CO2	2.Explain the landscaping and urban renewal.
CO3	3.Apply Levels of neighborhood planning and MRTP Act.
CO4	4.Apply the appropriate survey method for planning and use the traffic transportation system.
CO5	5.Application of LARR, URDPFI and RERA Act 2016 and MAHA-RERA.
CO6	6.Application of GIS, GPS, remote sensing in planning
Name Of Subject:	Structural Design and Drawing III (401003)

Course Objectives:	
1	To study introduction, basic concept various pre-tensioning & post tensioning systems,concept of losses, stress calculation and cable profile.
2	To design of post tensioned prestressed concrete simply supported rectangular and flanged sections for flexure and shear including end block.
3	To design of prestressed two way flat slab by direct design method.
4	To analysis and design of RCC cantilever type of retaining wall for various types of backfill conditions.
5	To study introduction, types, function, codal provisions, methods of analysis, design of circular, square, and rectangular water tanks resting on ground by working stress method, Introduction to limit state design of water tanks.
6	To study introduction to single and multi-degree of freedom systems: free, forced, un-damped and damped vibration, Estimation of earthquake forces by seismic coefficient method, Estimation of combined effect of lateral forces and vertical loading on G+2 storied frames.
Course Outcomes:	
CO1	Students will have knowledge of pre-tensioning & post tensioning systems also they will calculate stresses,losses and analyze cable profile.
CO2	Students will able to design post tensioned prestressed concrete simply supported rectangular and flanged sections for flexure and shear including end block.
CO3	Students will able to design prestressed two way flat slab by direct design method.
CO4	Students will analyze and design RCC cantilever type of retaining wall for various types of backfill conditions.
CO5	Students will have knowledge of introduction, types, function, codal provisions of water tank and able to analyze and design of circular, square, and rectangular water tanks resting on ground by working stress method with the help of limit state method.
CO6	Students will have knowledge of introduction, types, function, codal provisions of water tank and able to analyze and design of circular, square,

	and rectangular water tanks resting on ground by working stress method with the help of limit state method.
Name Of Subject:	Transportation Engineering (401002)
Course Objectives:	
1	To learn role of Transportation, Highway developmenn and Highway planning.
2	To Learn Geometric design of Highway and Highway drainage System.
3	To Learn Traffic Engineering and control.
4	To Learn Propeties of Highway Pavement Materials and its various test on it.
5	To Design Highway Pavement
6	To learn Pavement Construction Techniques and Modern Trends in Highway Materials, Construction and Maintenance.
Course Outcomes:	
CO1	Students able to understand role of transportation, Highway development and Highway planning.
CO2	Students able to understand geometric design of Highway
CO3	Students able to understand Traffic Engineering and its Control.
CO4	Students able to understand Propeties of Highway Pavement Materials and its various test on it.
CO5	Students able to understand the design of Highway Pavement.
CO6	Students able to understand Pavement Construction Techniques and Modern Trends in Highway Materials, Construction and Maintenance.
Name Of Subject:	TQM & MIS in Civil Engineering (401005)
Course Objectives:	

1	To learn total quality management and toatl quality control, 7 QC tool.
2	To learn ISO and Quality Manual Importance, contents, documentation
3	To learn Management Control and CONQAS and CIDC-CQRA Certifications,TQM Implementation and Management Information systems (MIS).
Course Outcomes:	
CO1	Students aqucire knowledge of what is quality, quality gurus and their contribution in this world. Describe Total quality management and toatl quality control
CO2	Students will able to understand the concept of 7 QC tools and apply them in their project or any industrial research problem.
CO3	Students will analyze the use and importance of ISO and Quality Manual Importance, contents, documentation. Importance of check-lists in achieving quality.
CO4	Descirbe Management Control and CONQAS and CIDC-CQRA Certifications
CO5	Descirbe techniques in TQM Implementation and various types of international and national quality awards
CO6	Explain Introduction to Management Information systems (MIS)

SE CIVIL SEMESTER-II

Name Of Subject:	Fluid Mechanics I (201004)
Course Objectives:	
1	To study basics of Fluid Mechanics, Fluid properties and concept of submerged & floating structure in a static fluid.
2	To make use of principles of continuity, momentum, and energy as applied to fluid motions.
3	To apply fundamental principles of fluid mechanics for the solution of practical civil engineering problems.
Course Outcomes:	

CO1	Use fluid properties, dimensional analysis for solving problems of fluid flow.
CO2	Solve fluid statics problems.
CO3	Measure fluid pressure.
CO4	Calibrate discharge measuring instrument like ventrurimeter, orifice meter.
CO5	Distinguish between various types of fluid flows and find the fluid velocity using principles of Kinematics and Dynamics.
CO6	Design pipes to carry particular amount of discharge
Name Of Subject:	Architectural Planning and Design of Buildings (201005)
Course Objectives:	
1	To understand necessity of Town planning, principles of planning, principles of architecture and byelaws
2	To study the planning for building services such as noise and acoustics, ventilation, lighting, plumbing work and safety practices.
3	To develop the plan, elevation and section of load bearing and framed structures.
Course Outcomes:	
CO1	Make use of principles of planning and principles of architectural Planning
CO2	Analyze the available primary or secondary data and plan different types of structures considering futuristic need of an area
CO3	Improve the status of existing structures by proposing appropriate green measures
CO4	Plan effectively various types of buildings according to their utility with reference to different codes.
CO5	Understand and resolve contemporary issues at multi-dimensional functional levels.

Name Of Subject:	Structural Analysis I
Course Objectives:	
1	To understand the basics configuration and classification of structures
2	To analyze the determinate and indeterminate structures
Course Outcomes:	
CO1	Understand the basic concept of static and kinematic indeterminacy, slope and deflection of determinate and indeterminate beams for analysis of structures.
CO2	Analyze indeterminate beams structures and frames
CO3	Evaluate determinate and indeterminate trusses and its application in the field.
CO4	Apply influence line diagrams for the analysis of structures under moving load.
CO5	Analyze two and three hinged arches and its application.
CO6	Apply plastic analysis for indeterminate steel structures by limits state method.
Name Of Subject:	Engineering Geology
Course Objectives:	
1	To study basic of Engineering Geology and introductory part of the Earth science.
2	To understand the utility and application of Geological principles in various phases of Civil Engineering activities.
3	To describe the sources, and characterization of common Building materials.
4	To learn the basic aspects occur due to structural features like folds and faults.
5	To explain various natural hazards and their implications on structures and effects on society.

Course Outcomes:	
CO1	Explain the basic concepts of Engineering Geology.
CO2	Differentiate between the different rock types, their inherent characteristics and their application in civil engineering.
CO3	Understand physical properties, mechanical properties of the minerals and their application in civil engineering
CO4	Identify favourable and unfavourable conditions for the buildings, roads, dam, tunneling etc through the rocks.
CO5	Explain mass wasting processes, effects of mass wasting process on the civil engineering structures and remedial measures
CO6	Interpret geohydrological characters of the rocks present at the foundations of the dams, percolation tanks, tunnels
CO7	Understand Seismic activities and its effect on the civil engineering construction
CO8	Identify Geological hazards and presence of ground water
Name Of Subject:	Concrete Technology (201007)
Course Objectives:	
1	To know properties of various ingredients of concrete.
2	To learn the behavior of concrete at its fresh & hardened state
3	To understand special concrete and their application in Industries
4	To learn concept of concrete mix design.
5	To explain deterioration of concrete and study methods of repair.
Course Outcomes:	
CO1	Understand chemistry, properties, and classification of cement, fly ash, aggregates and admixtures, and hydration of cement in concrete.

CO2	Prepare and test the fresh concrete
CO3	Test hardened concrete with destructive and nondestructive testing instruments
CO4	Get acquainted to concrete handling equipments and different special concrete types.
CO5	Design concrete mix of desired grade
CO6	Predict deteriorations in concrete and repair it with appropriate methods and techniques.

TE CIVIL SEMESTER-II

Name Of Subject:	ADVANCED SURVEYING (301007)
Course Objectives:	
1	To make students aware with different advance surveying methodologies applied to carry out large scale survey works in field measurements with modern instruments &To understand the concept of SBPS in identification of land features from space, it's segments, uses, governing factors & errors.
2	To understand the hydrographic surveying & its methods of sounding, plotting used in finding solution of problems
3	To know in detail the concept of remote sensing with different data acquisition techniques & get introduced to the field of GIS, coordinate systems, map projections, its working principles, data collection, data processing and analysis.
4	To know about significance of triangulation adjustments in terms of its field measurements errors, its distributions, laws & methods .
5	To get introduced to the concept of photogrammetry in preliminary identification and map making.
6	To study trigonometric leveling work based on parameters of correction for curvature & refraction & to know setting out of different construction works .
Course Outcomes:	
CO1	Understand modern surveying technique & equipments also apply knowledge of SBPS astronomy for solving civil engineering

	problems.
CO2	Understand hydrographic surveying & use sounding equipments and applying knowledge to finding solution of problems .
CO3	Remember & understand the principles of the earth surface, its projections and different coordinates involved in map making & apply RS & GIS in transportation engineering, structural engineering and land use planning.
CO4	Explain limits of accuracy, apply principles of theory of errors for correction of measurements & get solutions of problems & errors.
CO5	Identify aerial photographs and understand procedure of aerial survey & utilize stereoscope and parallax bars.
CO6	Handle the leveling errors they are likely to come across any large scale survey works & applying knowledge to do setting out of construction works like bridge, tunnel.
Name Of Subject:	Environmental Engineering-1 (301011)
Course Objectives:	
1	To provide the necessary knowledge on Noise pollution, Air pollution and Solid waste management.
2	To impart necessary skill for the design and operation of water treatment plants.
3	To impart necessary skill for the operation and processes of water treatment plants.
4	To prepare students for higher studies and research in the field of water treatment technology.
5	To introduce new developments in the field of water treatment.
6	To provide the necessary knowledge rain water harvesting, concepts in the field of water supply and treatment.
Course Outcomes:	
CO1	To provide the necessary knowledge on Noise pollution, Air pollution and Solid waste management.
CO2	To impart necessary skill for the design and operation of water treatment plants.

CO3	To impart necessary skill for the operation and processes of water treatment plants.
CO4	To prepare students for higher studies and research in the field of water treatment technology.
CO5	To introduce new developments in the field of water treatment.
CO6	To provide the necessary knowledge rain water harvesting, concepts in the field of water supply and treatment.
Name Of Subject:	Foundation Engineering
Course Objectives:	
1	To learn about types and purposes of different foundation systems and structures.
2	To provide students with exposure to the systematic methods for designing foundations.
3	To build the necessary theoretical background for design and construction of foundation systems.
4	To discuss and evaluate the feasibility of foundation solutions to different types of soil conditions considering the time effect on soil behavior.
Course Outcomes:	
CO1	Be able to plan and implement a site investigation program including subsurface exploration to evaluate soil/structure.
CO2	Be able to determine allowable bearing pressures and load carrying capabilities of different foundation systems.
CO3	Be able to carry out laboratory and field compaction tests for preparation of foundation surfaces and placement of engineered fill.
CO4	Students will get knowledge about types of deep foundations and will be able to calculate load carrying capacity by various methods.
CO5	Be able to design foundation on black cotton soil.
CO6	Students will get knowledge about new technique i.e. Geosynthetics and application in civil engineering.
Name of Subject:	Project Management and Engineering Economics (301008)

Course Objectives: Objectives of the Course are	
1	To make students conversant with the importance of project management in construction industry.
2	To Learn various optimization techniques and adopting appropriate technique for decision making with analyzing and solving problems on network analysis, resource allocation and updating
3	To Understand the principles of Inventory management with the concept of Materials Management and Project Appraisal
4	Learn to recognize and apply quality assurance and quality control techniques for Construction Management and the importance of TQM in construction projects.
Course Outcomes: At the end of the course the students will have an ability to	
CO1	Explain the importance, objective, and functions of project management.
CO2	Get knowledge about network for planning and scheduling of project.
CO3	Explain different methods of analysis for project resource management and safety norms to the construction project.
CO4	Understand project monitoring, resource allocation as well as basic knowledge of project management software for controlling of project.
CO5	Explain basic project economics in construction industry.
CO6	Understand conditions for project appraisal and preparation of project feasibility report as well as detailed project report.
Name Of Subject:	Structural Design – ii(301010)
Course Objectives:	
1	To learn Working stress method & Limit state method
2	To learn M.R. Of singly & Doubly reinforced rectangular R.C. section. Design Of One way Slab
3	To learn design of two way slabs & staircase

4	To learn Analysis and design of Flexural member
5	To learn shear, bond and torsion & Redistribution of moments
6	To learn Column & isolated column footing.
Course Outcomes:	
CO1	Students able to know Working stress method & Limit state method
CO2	Students able to know M.R. Of singly & Doubly reinforced rectangular R.C. section & make Design Of One way Slab
CO3	Students able to make design of two way slabs & staircase
CO4	Students able to make Analysis and design of Flexural member
CO5	Students able to know shear, bond and torsion & Redistribution of moments
CO6	Students able to Design Column & isolated column footing.

BE CIVIL SEMESTER-II

Name Of Subject:	Quantity Survey, Contratcs and Tenders
Course Objectives:	
1	To study Estimate, Meaning, purpose, methods, various basic term in estimate & types of estimate.
2	Learn process of preparation of detailed estimate of various structure upto plinth with help of various methods.
3	Learn the process of preparation detailed estimate and valuation of various structures upto superstructure with help of various methods
4	To study and understand detailed specification of Civil Work & its rate analysis.
5	Understanding the tendering process of civil work & Methods of Executing Works.

6	To concieve Knowledge and get to know the concept of contract, conditions of contracts and arbitration
Course Outcomes:	
CO1	Understand of the concept Estimate, various term in estimate & types of estimate.
CO2	Will be able to prepare estimate of various structure up to plinth level and prepare estimate of various Super Structures and DSR.
CO3	Acquire knowledge about detailed specification of Civil Work & to calculate its rate analysis.
CO4	Will be able to understand about valuation and preparation of valuation report.
CO5	Get to know tendering process of civil work & Methods of Executing Works.
CO6	Understand concept of contract include in tender & various terminology of include in contracts.
Name Of Subject:	Dams And Hydraulic Structures
Course Objectives:	
1	To learn introduction, classification, different terms related to dams and dam safety and instrumentation
2	To learn different components and construction of gravity dam, and concept and classification of Arch Dam and Other Dams
3	To learn details of spillway and gates, Hydropower Structures,
4	To learn details of Earth Dam and Diversion head works
5	To learn details of Canals and Canal Structures
6	To learn details of C. D. Works and River Training Structures
Course Outcomes:	
CO1	Students are able to understand introduction, classification, different terms related to dams and dam safety and instrumentation

CO2	Students are able to understand different components and construction of gravity dam, and concept and classification of Arch Dam and Other Dams
CO3	Students are able to understand details and design of spillway and gates, Hydropower Structures,
CO4	Students are able to understand details of Earth Dam and Diversion head works
CO5	Students are able to remember different components and apply knowledge to design and analyze earthen dam.
CO6	Students are able to understand details of C. D. Works and River Training Structures
Name Of Subject:	Construction Management (Elective-IV)
Course Objectives:	
1	To understand Role of construction industry, construction management & PMC in construction sector.
2	To learn the Construction scheduling, work study and work measurement.
3	To understand the labour laws and Capital investments associated with construction sector.
4	To learn risk management and value engineering technique for construction project.
5	To learn Materials management and human resource management skill.
6	To enhance awareness about applications of artificial intelligence technique in civil engineering.
Course Outcomes:	
CO1	Explain role of construction management, PMC in construction sector.
CO2	Prepare Scheduling of a Construction Project. Apply basic procedures of work study, work measurement, time and motion studies.
CO3	Explain Need and importance of labour laws and Prepare Project Balance Sheet.

CO4	Identify risks involved in projects, analyse the risks and control the risks using mathematical models, Perform value analysis.
CO5	Solve Materials management problem and explain human resource management.
CO6	Explain basic terminologies and applications of artificial intelligence in civil engineering.
Name Of Subject:	Air Pollution and Control
Course Objectives:	
1	To study the relation between Meteorology and Air Pollution
2	To learn the stack emission monitoring
3	To learn Sources, Causes & effects of indoor Air Pollution
4	To study methods and equipments used for controlling air pollution
5	To study methods and equipments used for controlling air pollution
6	To provide knowledge about EIA and its role
Course Outcomes:	
CO1	Apply the knowledge of meteorology to control air pollution
CO2	To conduct air pollution survey
CO3	Identify the sources of air pollutants and their effect on human, plants and materials
CO4	Design of air pollution controlling equipment
CO5	Use knowledge of legislation for prevention and control of air pollution
CO6	To prepare EIA of projects

DEPARTMENT OF CIVIL ENGINEERING

Program Objectives	
1	Have successful career in the diversified sectors of the engineering industry and/or higher studies by acquiring knowledge in mathematical, scientific and engineering fundamentals.
2	Analyze and design Civil engineering systems with social awareness and responsibility.
3	Exhibit professionalism, ethical approach, communication skills, team work in their profession and adapt to modern trends by engaging in lifelong learning.
Program Outcomes	
PO1	Engineering knowledge : An ability to apply knowledge of computing, mathematics, science and engineering fundamentals appropriate to Civil Engineering.
PO2	Problem analysis : An ability to define the problems and provide solutions by designing and conducting experiments, interpreting and analyzing data.
PO3	Design/development of solutions : An ability to design, implement and evaluate a system, process, component and program to meet desired needs within realistic constraints.
PO4	Conduct investigations of complex problems : An ability to investigate, formulates, analyze and provide an appropriate solution to the engineering problems.
PO5	Modern tool usage : An ability to use modern engineering tools and technologies necessary for engineering practices.
PO6	The engineer and society : An ability to analyze the local and global impact of computing on individuals, organizations and society.
PO7	Environment and sustainability : An ability to understand the environmental issues and provide the sustainable system.
PO8	Ethics : An ability to understand professional and ethical responsibility.
PO9	Individual and teamwork : An ability to function effectively as an individual or as a team member to accomplish the goal.
PO10	Communication : An ability to communicate effectively at different levels.
PO11	Project management and finance : An ability to keep abreast with contemporary technologies through lifelong learning.
PO12	Life-long learning : An ability to apply knowledge of principles of resource management and economics to provide better services in the field of technology.

DEPARTMENT OF CIVIL ENGINEERING

Program Specific Outcomes (PSOs)	
PSO1	Capability to manage large infrastructure projects ensuring safe and cost-effective execution of projects having knowledge of fast track construction and project management.
PSO2	Ability to use building software packages to calculate safe loads and stresses for designing structural members to ensure safety and serviceability.
PSO3	Ability to provide innovative solutions for traffic safety and efficiency through intelligent transportation systems, and mitigate the environmental impact of construction by adopting green building concepts.

DEPARTMENT OF COMPUTER ENGINEERING

COURSE OUTCOMES

Class: S. E (COMPUTER ENGINEERING)

ACADEMIC YEAR 2017-18

Course Objectives	
Course Name	**Discrete Mathematics (210241)**
1	To use appropriate set, function and relation models to understand practical examples, and interpret the associated operations and terminologies in context.
2	Determine number of logical possibilities of events
3	Learn logic and proof techniques to expand mathematical maturity.
4	Formulate problems precisely, solve the problems, apply formal proof techniques, and explain the reasoning clearly.
Course Outcomes:	
CO1	Solve real world problems logically using appropriate set, function, and relation models and interpret the associated operations and terminologies in context.
CO2	Analyze and synthesize the real world problems using discrete mathematics.
Course Objectives	
Course Name	**Digital Electronics & Logic Design (210242)**
1	To understand the functionality and design of Combinational and Sequential Circuits
2	To understand and compare the functionalities, properties and applicability of Logic Families.
3	To understand concept of programmable logic devices and ASM chart and get acquainted with design of synchronous state machines.
4	To design and implement digital circuits using VHDL.
Course Outcomes:	
CO1	Realize and simplify Boolean Algebraic assignments for designing digital circuits using KMaps.
CO2	Design and implement Sequential and Combinational digital circuits as per the specifications.
CO3	Apply the knowledge to appropriate IC as per the design specifications.
CO4	Design simple digital systems using VHDL.
CO5	Develop simple embedded system for simple real world application.

Course Objectives	
Course Name	**Data Structures and Algorithms (210243)**
1	To understand the standard and abstract data representation methods.
2	To acquaint with the structural constraints and advantages in usage of the data.
3	To understand the memory requirement for various data structures.
4	To operate on the various structured data.
5	To understand various data searching and sorting methods with pros and cons.
6	To understand various algorithmic strategies to approach the problem solution.
Course Outcomes:	
CO1	To discriminate the usage of various structures in approaching the problem solution.
CO2	To design the algorithms to solve the programming problems.
CO3	To use effective and efficient data structures in solving various Computer Engineering domain problems.
CO4	To analyze the problems to apply suitable algorithm and data structure.
CO5	To use appropriate algorithmic strategy for better efficiency
Course Objectives	
Course Name	**Computer Organization and Architecture (210244)**
1	To understand the structure, function, and characteristics of computer systems.
2	To understand the design of the various functional units and components of digital computers.
3	To identify the elements of modern instructions sets and explain their impact on processor design.
4	To explain the function of each element of a memory hierarchy, identify and compare different methods for computer I/O.
5	To compare simple computer architectures and organizations based on established performance metrics.
Course Outcomes:	
CO1	Demonstrate computer architecture concepts related to design of modern processors, memories, and I/Os
CO2	Analyze the principles of computer architecture using examples drawn from commercially available computers.
CO3	Evaluate various design alternatives in processor organization.

Course Objectives	
Course Name	**Object Oriented Programming (210245)**
1	To explore the principles of Object Oriented Programming (OOP).
2	To understand object-oriented concepts such as data abstraction, encapsulation, inheritance, dynamic binding, and polymorphism.
	To use the object-oriented paradigm in program design.
3	To lay a foundation for advanced programming.
4	Provide programming insight using OOP constructs.
Course Outcomes:	
CO1	Analyze the strengths of object-oriented programming
CO2	Design and apply OOP principles for effective programming
CO3	Develop programming application using object-oriented programming language C++
CO4	Percept the utility and applicability of OOP

Course Objectives	
Course Name	**Soft Skills (210249)**
1	To encourage the all-round development of students by focusing on soft skills.
2	To make the engineering students aware of the importance, the role and the content of soft skills through instruction, knowledge acquisition, demonstration and practice.
3	To develop and nurture the soft skills of the students through individual and group activities.
4	To expose students to right attitudinal and behavioral aspects and to build the same through activities
Course Outcomes:	
CO1	Effectively communicate through verbal/oral communication and improve the listening skills.
CO2	Write precise briefs or reports and technical documents.
CO3	Actively participate in group discussion / meetings / interviews and prepare & deliver presentations.
CO4	Become more effective individual through goal/target setting, self-motivation and practicing creative thinking.
CO5	Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality.

Course Objectives	
Course Name	**Engineering Mathematics III (207003)**
1	Linear differential equations of higher order applicable to Control systems, Computer vision and Robotics.
2	Transform techniques such as Fourier transform, Z-transform and applications to Image processing
3	Statistical methods such as correlation, regression analysis and probability theory to analyze data and to make predictions applicable to machine intelligence.
4	Vector calculus necessary to analyze and design complex electrical and electronic devices as appropriate to Computer engineering.
5	Complex functions, conformal mappings and contour integration applicable to Image processing, Digital filters and Computer graphics.
Course Outcomes:	
CO1	Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits.
CO2	Solve problems related to Fourier transform, Z-Transform and applications to Signal and Image processing.
CO3	Apply statistical methods like correlation, regression analysis and probability theory for analysis and prediction of a given data as applied to machine intelligence
CO4	Perform vector differentiation and integration to analyze the vector fields and apply to compute line, surface and volume integrals.
CO5	Analyze conformal mappings, transformations and perform contour integration of complex functions required in Image processing, Digital filters and Computer graphics.

Course Objectives	
Course Name	**Computer Graphics (210251)**
1	To acquaint the learner with the basic concepts of Computer Graphics
2	To learn the various algorithms for generating and rendering graphical figures
3	To get familiar with mathematics behind the graphical transformations
4	To understand and apply various methods and techniques regarding projections, animation, shading, illumination and lighting
Course Outcomes:	
CO1	Apply mathematics and logic to develop Computer programs for elementary graphic operations
CO2	Develop scientific and strategic approach to solve complex problems in the domain of Computer Graphics
CO3	Develop the competency to understand the concepts related to Computer Vision and Virtual reality
CO4	Apply the logic to develop animation and gaming programs

Course Objectives	
Course Name	**Advanced Data Structures (210252)**
1	To develop a logic for graphical modelling of the real life problems.
2	To suggest appropriate data structure and algorithm for graphical solutions of the problems.
3	To understand advanced data structures to solve complex problems in various domains.
4	To operate on the various structured data.
5	To build the logic to use appropriate data structure in logical and computational solutions.
6	To understand various algorithmic strategies to approach the problem solution
Course Outcomes:	
CO1	To apply appropriate advanced data structure and efficient algorithms to approach the problems of various domain.
CO2	To design the algorithms to solve the programming problems
CO3	To use effective and efficient data structures in solving various Computer Engineering domain problems.
CO4	To analyze the algorithmic solutions for resource requirements and optimization
CO5	To use appropriate modern tools to understand and analyze the functionalities confined to the data structure usage.
CO6	To apply appropriate advanced data structure and efficient algorithms to approach the problems of various domain.

Course Objectives	
Course Name	**Microprocessor (210253)**
1	To learn the architecture and programmer's model of advanced processor
2	To understand the system level features and processes of advanced processor
3	To acquaint the learner with application instruction set and logic to build assembly language programs.
4	To understand debugging and testing techniques confined to 80386 DX
Course Outcomes:	
CO1	To apply the assembly language programming to develop small real life embedded application
CO2	To understand the architecture of the advanced processor thoroughly to use the resources for programming
CO3	To understand the higher processor architectures descended from 80386 architecture

Course Objectives	
Course Name	**Principles of Programming Languages (210254)**
1	To learn principles of programming language
2	To understand structural, computational and logical implications regarding programming languages
3	To explore main programming paradigms
4	To understand and apply Object Oriented Programming (OOP) principles using C++ and Java
Course Outcomes:	
CO1	To analyze the strengths and weaknesses of programming languages for effective and efficient program development.
CO2	To inculcate the principles underlying the programming languages enabling to learn new programming languages.
CO3	To grasp different programming paradigms
CO4	To use the programming paradigms effectively in application development.

DEPARTMENT OF COMPUTER ENGINEERING

COURSE OUTCOMES

Class: T. E (COMPUTER ENGINEERING)

ACADEMIC YEAR 2017-18

Course Objectives	
Course Name	**Theory of Computation (310241)**
1	To Study abstract computing models
2	To learn Grammar and Turing Machine
3	To learn about the theory of computability and complexity.
Course Outcomes:	
CO1	Design deterministic Turing machine for all inputs and all outputs
CO2	Subdivide problem space based on input subdivision using constraints
CO3	Apply linguistic theory
Course Objectives	
Course Name	**Database Management Systems (310242)**
1	To understand the fundamental concepts of database management. These concepts include aspects of database design, database languages, and database-system implementation
2	To provide a strong formal foundation in database concepts, technology, and practice
3	To give systematic database design approaches covering conceptual design, logical design, and an overview of physical design
4	Be familiar with the basic issues of transaction processing and concurrency control
5	To learn and understand various Database Architectures and Applications
6	To learn a powerful, flexible, and scalable general-purpose database to handle big data
Course Outcomes:	
CO1	Design E-R Model for given requirements and convert the same into database tables.
CO2	Use database techniques such as SQL & PL/SQL.
CO3	Use modern database techniques such as NOSQL.
CO4	Explain transaction Management in relational database System.
CO5	Describe different database architecture and analyses the use of appropriate architecture in real time environment.
CO6	Use advanced database Programming concepts

Course Objectives	
Course Name	**Software Engineering and Project Management (310243)**
1	To learn and understand the principles of Software Engineering
2	To be acquainted with methods of capturing, specifying, visualizing and analyzing software requirements.
3	To apply Design and Testing principles to S/W project development.
4	To understand project management through life cycle of the project.
5	To understand software quality attributes.
6	To understand various algorithmic strategies to approach the problem solution.
Course Outcomes:	
CO1	Decide on a process model for a developing a software project
CO2	Classify software applications and identify unique features of various domains
CO3	Design test cases of a software system.
CO4	Understand basics of IT Project management.
CO5	Plan, schedule and execute a project considering the risk management.
CO6	Apply quality attributes in software development life cycle.
CO7	Understand irrigation, piped distribution network and canal revenue, apply and analyze crop water requirement.
Course Objectives	
Course Name	**Information Systems and Engineering Economics (310244)**
1	To prepare the students to various forms of the Information Systems and its application in organizations.
2	To expose the students to the managerial issues relating to information systems and help them identify and evaluate various options in Information Systems.
3	To Prepare engineering students to analyze cost / revenue data and should be able to do economic analyses in the decision making process to justify or reject alternatives / projects on an economic basis for an organization.
Course Outcomes:	
CO1	Understand the need, usage and importance of an Information System to an organization.
CO2	Understand the activities that are undertaken while managing, designing, planning, implementation, and deployment of computerized information system in an organization.
CO3	Further the student would be aware of various Information System solutions like ERP, CRM, Data warehouses and the issues in successful implementation of these technology solutions in any organizations

CO4	Outline the history, present position and expected performance of a company engaged in engineering practice or in the computer industry.
CO5	Perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives.
CO6	Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives.

Course Objectives	
Course Name	**Computer Networks (310245)**
1	To understand the fundamental concepts of networking standards, protocols, and technologies.
2	To learn different techniques for framing, error control, flow control and routing.
3	To learn role of protocols at various layers in the protocol stacks.
4	To learn network programming. perspective
5	To develop an understanding of modern network architectures from a design and performance
Course Outcomes:	
CO1	Analyze the requirements for a given organizational structure to select the most appropriate networking architecture, topologies, transmission mediums, and technologies
CO2	Demonstrate design issues, flow control and error control
CO3	Analyze data flow between TCP/IP model using Application, Transport and Network Layer Protocols.
CO4	Illustrate applications of Computer Network capabilities, selection, and usage for various sectors of user community.
CO5	Illustrate Client-Server architectures and prototypes by the means of correct standards and technology.
CO6	Demonstrate different routing and switching algorithms

Course Objectives	
Course Name	**Design and Analysis of Algorithms (310250)**
1	To develop problem solving abilities using mathematical theories
2	To analyze the performance of algorithms
3	To study algorithmic design strategies
Course Outcomes:	
CO1	Formulate the problem
CO2	Analyze the asymptotic performance of algorithms
CO3	Decide and apply algorithmic strategies to solve given problem
CO4	Find optimal solution by applying various methods

Course Objectives	
Course Name	**Systems Programming and Operating System (310251)**
1	To understand basics of System Programming.
2	To learn and understand data structures used in design of system software.
3	To learn and understand basics of compilers and tools.
4	To understand functions of operating system.
5	To learn and understand process, resource and memory management.
Course Outcomes:	
CO1	Analyze and synthesize system software
CO2	Use tools like LEX & YACC.
CO3	Implement operating system functions

Course Objectives	
Course Name	**Embedded Systems and Internet of Things (310252)**
1	To understand fundamentals of IoT and embedded system including essence, basic design strategy and process modeling.
2	To introduce students a set of advanced topics in embedded IoT and lead them to understand research in network.
3	To develop comprehensive approach towards building small low cost embedded IoT system.
4	To understand fundamentals of security in IoT,
5	To learn to implement secure infrastructure for IoT
6	To learn real world application scenarios of IoT along with its societal and economic impact using case studies
Course Outcomes:	
CO1	Implement an architectural design for IoT for specified requirement
CO2	Solve the given societal challenge using IoT
CO3	Choose between available technologies and devices for stated IoT challenge

Course Objectives	
Course Name	**Software Modeling and Design (310253)**
1	To understand and apply Object Oriented (OO) concept for designing OO based model/application
2	To transform Requirement document to Appropriate design
3	To understand different architectural designs and to transform them into proper model
4	To choose and use modern design tools for project development and implementation.
5	To choose and use appropriate test tool for testing web-based/desktop application
Course Outcomes:	
CO1	Analyze the problem statement (SRS) and choose proper design technique for designing webbased/ desktop application
CO2	Design and analyze an application using UML modeling as fundamental tool
CO3	Apply design patterns to understand reusability in OO design
CO4	Decide and apply appropriate modern tool for designing and modeling.
CO5	Decide and apply appropriate modern testing tool for testing web-based/desktop application

Course Objectives	
Course Name	**Web Technology (310254)**
1	To understand the principles and methodologies of web-based applications development process
2	To understand current client side and server-side web technologies
3	To understand current client side and server-side frameworks
4	To understand web services and content management
Course Outcomes:	
CO1	Analyze given assignment to select sustainable web development and design methodology
CO2	Develop web-based application using suitable client side and server-side web technologies
CO3	Develop solution to complex problems using appropriate method, technologies, frameworks, web services and content management

DEPARTMENT OF COMPUTER ENGINEERING

COURSE OUTCOMES

Class: B. E (COMPUTER ENGINEERING)

Course Objectives	
Course Name	**Design & Analysis of Algorithms (410441)**
1	To develop problem solving abilities using mathematical theories;
2	To apply algorithmic strategies while solving problems;
3	To develop time and space efficient algorithms;
4	To study algorithmic examples in distributed concurrent and parallel environments.
Course Outcomes:	
CO1	To solve problem in the UG projects;
CO2	To develop SRS in the UG projects;
CO3	To solve problems for multi-core or distributed or concurrent/ Parallel/ Embedded environments;
Course Objectives	
Course Name	**Principles of Modern Compiler Design(410442)**
1	To study concepts in assembling, parsing and compiling into target code for execution.
2	To Understand systems and methods of compilation.
3	To introduce basic tools for compiler writing and expose the latest techniques and advances in compiler.
4	To get exposed to concurrent, embedded and distributed compilation tools and techniques
Course Outcomes:	
CO1	To solve problem of parsing and compiling.
CO2	Ability to design and write simple compiler.
CO3	To be able to use compiler tools in basic, concurrent, distributed and embedded environments.
CO4	To develop awareness of latest trends and advances in compilers

Course Objectives	
Course Name	**Smart System Design and Applications (410443)**
1	To study multidisciplinary requirements of problem solving;
2	To study concepts of Artificial Intelligence;
3	To study smart systems programming and application development;
4	To study examples in distributed concurrent and parallel environments.
Course Outcomes:	
CO1	The study of one solve multidisciplinary case-study;
CO2	To use embedded systems using machine learning;
CO3	To solve problems for multi-core or distributed, concurrent and embedded environments;
Course Objectives	
Course Name	**Elective-I: Image Processing(410444A)**
1	To study image processing concepts;
2	To study mathematics and algorithms for image processing;
3	To study applications in image processing;
4	To study algorithmic examples in distributed concurrent and parallel environments.
Course Outcomes:	
CO1	To perform image processing programming;
CO2	To solve Image Processing problems using multi-core or distributed, concurrent/Parallel environments.
Course Objectives	
Course Name	**Elective-I: Image Processing(410444A)**
1	To study image processing concepts;
2	To study mathematics and algorithms for image processing;
3	To study applications in image processing;
4	To study algorithmic examples in distributed concurrent and parallel environments.
Course Outcomes:	
CO1	To perform image processing programming;
CO2	To solve Image Processing problems using multi-core or distributed, concurrent/Parallel environments.

Course Objectives	
Course Name	**Elective-I: Computer Network Design and Modeling (410444B)**
1	To expose students to the area of network design, modeling and analysis.
2	To expose students to the complete life cycle of the network design.
3	To motivate students to think performance perspective towards design & analysis of the computer network.
4	To expose students to the various open source network design tools.
5	To study algorithmic examples in distributed concurrent and parallel environments.
Course Outcomes:	
CO1	Students will be able to design, model and analyze computer network.
CO2	Students will be able to use tools for network design, modeling and analysis.
CO3	To solve problems for multi-core or distributed, concurrent/Parallel environments.
Course Objectives	
Course Name	**Elective-I: Advanced Computer Programming (410444C)**
1	To study advanced computer programming technologies
2	To apply advanced programming to data technologies
3	Study the concept of Object Distribution and invoking its services remotely in Distributed environment
4	To study algorithmic examples in distributed, concurrent and parallel environments
Course Outcomes:	
CO1	To solve problem using advanced programming
CO2	To solve problems for multi-core or distributed, concurrent/Parallel environments
Course Objectives	
Course Name	**Elective-I: Data Mining Techniques and Applications (410444D)**
1	To understand Data Mining Concepts.
2	To understand Data Mining needs and Application.
3	To study concepts of pattern based data mining for decision making.
4	To study algorithmic examples in distributed concurrent and parallel environments.
Course Outcomes:	
CO1	To develop programs and methods for data Mining applications.
CO2	To solve problems for multi-core or distributed, concurrent/Parallel environments

Course Objectives	
Course Name	**Elective-II: Problem Solving with Gamification (410445A)**
1	To develop problem solving abilities using gamification
2	To apply gamifications for Web Applications
3	To apply gamifications for Mobile Applications
Course Outcomes:	
CO1	To solve problem in projects
CO2	To develop projects using Gamification
CO3	To solve problems for multi-core or distributed, concurrent/Parallel environments
Course Objectives	
Course Name	**Elective-II: Pervasive Computing (410445B)**
1	To introduce pervasive computing abilities.
2	To introduce tools and techniques used while solving problems using pervasive computing.
3	To study algorithmic examples in distributed, concurrent and parallel environments
Course Outcomes:	
CO1	To solve problem pervasive computing abilities.
CO2	To solve problems for multi-core or distributed, concurrent/Parallel environments
Course Objectives	
Course Name	**Elective-II: Embedded Security (410445C)**
1	To learn Embedded Security in Portable Computing
2	To Learn advances in security in Embedded Technology, IoT
3	To study algorithmic examples in distributed environments
Course Outcomes:	
CO1	To solve problem in projects
CO2	To develop SRS in the projects
CO3	To solve Embedded Security problems
Course Objectives	
Course Name	**Elective-II: Multidisciplinary NLP (410445D)**
1	To develop problem solving abilities using Mathematics
2	To apply algorithmic strategies while solving problems
3	To develop time and space efficient algorithms
4	To study algorithmic examples in distributed, concurrent and parallel environments
Course Outcomes:	
CO1	To solve problem in projects

CO2	To solve problems for multi-core or distributed, concurrent/Parallel environments
Course Objectives	
Course Name	**Computer Laboratory-I (410446)**
1	To develop problem solving abilities using Mathematical Modeling
2	To apply algorithmic strategies, Software Engineering and Testing while solving problems
3	To develop time and space efficient algorithms
4	To study algorithmic examples in distributed, concurrent and parallel environments
Course Outcomes:	
CO1	To demonstrate efficient design, analysis and testing of algorithmic assignments.
CO2	To debug and demonstrate the Testing of functioning using Software Engineering for OO programming.
CO3	To effectively use multi-core or distributed, concurrent/Parallel environments.
Course Objectives	
Course Name	**Computer Laboratory-II (410447)**
1	To develop problem solving abilities for smart devices.
2	To develop problem solving abilities for gamifications.
3	To develop problem solving abilities of pervasiveness embedded security and NLP.
4	To apply algorithmic strategies while solving problems
5	To develop time and space efficient algorithms
6	To study algorithmic examples in distributed, concurrent and parallel environments
Course Outcomes:	
CO1	Problem solving abilities for smart devices.
CO2	Problem solving abilities for gamifications.
CO3	Problem solving abilities of pervasiveness, embedded security and NLP.
CO4	To solve problems for multi-core or distributed, concurrent/Parallel environments
Course Objectives	
Course Name	**Project (410448)**
1	To develop problem solving abilities using mathematics;
2	To apply algorithmic strategies while solving problems;
3	To develop time and space efficient algorithms;
4	To develop software engineering documents and testing plans;
5	To use algorithmic solutions using distributed, Embedded, concurrent and parallel environments.
6	To encourage and expose students for participation in National/

	International paper presentation activities.
7	Exposure to Learning and knowledge access techniques using Conferences, Journal papers and participation
Course Outcomes:	
1	To solve problem in projects;
2	To develop SRS and other software engineering documents in the project report;
3	To solve problems using multi-core, distributed, embedded, concurrent/Parallel environments;
4	To write conference paper;
5	To demonstrate presentation, communication and team-work skills.
Course Objectives	
Course Name	**Software Design Methodologies and Testing (410449)**
CO1	To understand and apply different design methods and techniques
CO2	To understand architectural design and modeling
CO3	To understand and apply testing techniques
CO4	To implement design and testing using current tools and techniques in distributed, concurrent and parallel
CO1	environments
CO2	To understand and apply different design methods and techniques
Course Outcomes:	
1	To choose and apply design techniques for software system
2	To design and model using UML for a given software system
3	To design test cases and implement automated testing for client server, Distributed, mobile applications
Course Objectives	
Course Name	**High Performance Computing (410450)**
1	To develop problem solving abilities using HPC
2	To develop time and space efficient algorithms
3	To study algorithmic examples in distributed, concurrent and parallel environments
Course Outcomes:	
CO1	Transform algorithms in the computational area to efficient programming code for modern computer
CO2	architectures
CO3	Write, organize and handle programs for scientific computations
CO4	Use tools for performance optimization and debugging
CO5	Analyze code with respect to performance and suggest and implement performance improvements

Course Objectives	
Course Name	**Elective-III: Mobile Computing (410451A)**
1	To develop problem solving abilities using Mobile Computing
2	To study foundations of Mobile Computing
Course Outcomes:	
CO1	To solve problem using Mobile Computing
Course Objectives	
Course Name	**Elective-III: Web Technology (410451B)**
1	To Learn advanced Web Technologies
2	To apply technologies while solving problems
Course Outcomes:	
CO1	To use technologies for solving problems in projects
Course Objectives	
Course Name	**Elective-III: Cloud Computing (410451C)**
1	To study cloud computing concepts;
2	Enhancing cloud computing environment.
3	To study various platforms
4	To study the applications that uses cloud computing.
Course Outcomes:	
CO1	To install cloud computing environments.
CO2	To develop any one type of cloud
Course Objectives	
Course Name	**Elective-III: Cyber Security (410451D)**
1	To develop problem solving abilities using Cyber Security
2	To apply algorithmic strategies for cyber security
3	To develop time and space efficient algorithms
4	To study algorithmic examples in distributed, concurrent and parallel environments
Course Outcomes:	
CO1	To solve problem in Cyber Security
CO2	To solve problems for multi-core or distributed, concurrent/Parallel environments

Course Objectives	
Course Name	**Elective-IV (Open Elective): Business Analytic and Intelligence (410452A)**
1	To develop problem solving abilities using Mathematics
2	To apply algorithmic strategies while solving problems
3	To develop time and space efficient algorithms
4	To study algorithmic examples in distributed, concurrent and parallel environments
Course Outcomes:	
CO1	To solve problem in projects
CO2	To develop SRS in the projects
CO3	To solve problems for multi-core or distributed, concurrent/Parallel environments
Course Objectives	
Course Name	**Elective-IV (Open Elective): Operations Research (410452B)**
1	To develop problem solving abilities using Mathematics
2	To apply algorithmic strategies while solving problems
3	To develop time and space efficient algorithms
4	To study algorithmic examples in distributed, concurrent and parallel environments
Course Outcomes:	
CO1	To solve problem in projects
CO2	To develop SRS in the projects
CO3	To solve problems for multi-core or distributed, concurrent/Parallel environments
Course Objectives	
Course Name	**Elective-IV (Open Elective): Mobile Applications (410452C)**
1	To develop problem solving abilities using Mobile Applications
2	To study mobile programming technology.
Course Outcomes:	
CO1	To solve problem in projects
CO2	To develop mobile applications

Course Objectives	
Course Name	**Elective-IV (Open Elective) (410452D)**
1	To develop problem solving abilities using Mathematics
2	To apply algorithmic strategies while solving problems
3	To develop time and space efficient algorithms
4	To study algorithmic examples in distributed, concurrent and parallel environments
Course Outcomes:	
CO1	To solve problem of Inter-disciplinary challenges.
CO2	To apply algorithmic skills for computing Applications.
CO3	To solve problems for multi-core or distributed, concurrent/Parallel environments
Course Objectives	
Course Name	**Computer Laboratory-III (410453)**
1	To develop problem solving abilities using Mathematical Modeling
2	To apply algorithmic strategies while solving problems
3	To develop time and space efficient algorithms
4	To implement software design and testing in distributed, concurrent and parallel environments
Course Outcomes:	
CO1	To solve problems using mathematical modeling.
CO2	To use software design methods and testing.
CO3	To solve problems for multi-core or distributed, concurrent/Parallel environments
Course Objectives	
Course Name	**Computer Laboratory-IV (410454)**
1	To develop problem solving abilities using HPC.
2	To Develop problem solving abilities using Business Analytics, OR and Mobile Programming.
3	To develop time and space efficient algorithms
4	To study algorithmic examples in distributed, concurrent and parallel environments
Course Outcomes:	
CO1	Ability to develop applications using BIA Technologies.
CO2	Ability to develop applications using OR and Mobile Programming Technologies.
CO3	To solve problems for multi-core or distributed, concurrent/Parallel environments

Course Objectives	
Course Name	**Project (410454)**
1	To develop problem solving abilities using mathematics;
2	To apply algorithmic strategies while solving problems;
3	To develop time and space efficient algorithms;
4	To develop software engineering documents and testing plans;
5	To use algorithmic solutions using distributed, Embedded, concurrent and parallel environments.
6	To encourage and expose students for participation in National/ International paper presentation activities.
7	Exposure to Learning and knowledge access techniques using Conferences, Journal papers and participation
Course Outcomes:	
CO1	To solve problem and demonstrate the results of the project;
CO2	To develop SRS, reliability testing reports, and other software engineering documents in the project report
CO3	To solve problems using multi-core, distributed, embedded, concurrent/Parallel environments;
CO4	To write conference paper;

Department of Computer Engineering

Programme Educational Objectives (PEOs)	
1	To become a successful Computer professional in diverse career paths having strong domain knowledge, updated with modern technology to provide the effective solutions for engineering problems.
2	To communicate effectively, recognize and incorporate strong professional ethics and values, sense of responsibilities, understanding of health, legal, safety, societal, and environmental issues.
3	To become a motivated graduates with research attitude, life-long learning, multidisciplinary approach in their profession to foster personal and organizational growth.

Department of Computer Engineering

Program Outcomes (POs)		
PO1	**Engineering knowledge**	Apply the knowledge of mathematics, science, Engineering fundamentals, andan Engineering specialization to the solution of complex Engineering problems.
PO2	**Problem analysis**	Identify, formulate, review research literature and analyze complex Engineering problems reaching substantiated conclusions using first principles of Mathematics, natural sciences and Engineering sciences.
PO3	**Design / Development of Solutions**	Design solutions for complex Engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and Environmental considerations.
PO4	**Conduct Investigations of Complex Problems**	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the Information to provide valid conclusions.
PO5	**Modern Tool Usage**	Create, select, and apply appropriate techniques, resources, and modern Engineering and IT tools including prediction and modeling to complex Engineering activities with an understanding of the limitations.
PO6	**The Engineer and Society**	Apply reasoning informed by the contextual knowledge to assess societal, Health, safety, legal and cultural issues and the consequent responsibilitiesrelevant to the professional engineering practices.
PO7	**Environment and Sustainability**	Understand the impact of the professional Engineering solutions in societal and Environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics**	Apply ethical principles and commit to professional ethics and responsibilities and norms of Engineering practice.
PO9	**Individual and Team Work**	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication Skills**	Communicate effectively on complex Engineering activities with the Engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project Management and Finance**	Demonstrate knowledge and understanding of Engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary Environments.
PO12	**Life-long Learning**	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

KJ's Educational Institute

TRINITY ACADEMY OF ENGINEERING, PUNE

(Approved by AICTE, New Delhi, Govt. of Maharashtra & affiliated to SPPU, DTE Code: EN6634)

Department Of Electronics And Telecommunication Engineering

A.Y. 2017-18

Program Outcomes	
PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem Survey: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
Program Specific Outcomes	
1	Apply principles, concepts and knowledge of science and mathematics for solving Electronics and Telecommunication Engineering problems.
2	To find out innovative ideas to design, develop and analyze solutions for given specifications by applying fundamentals of Electronics and Telecommunication engineering
3	To develop graduates with ability to use modern hardware and software tools in electronics and telecommunication domain.

Course Outcome

SE 2015 Pattern SEMI and SEM II

204181: Course Name: - **Signals and Systems**

On the completion of the course, student will be able to

CO1	Understand mathematical description and representation of continuous and discrete time signals and systems.
CO2	Develop input output relationship for linear shift invariant system and understand the convolution operator for continuous and discrete time system.
CO3	Understand and resolve the signals in frequency domain using Fourier series and Fourier transforms.
CO4	Understand the limitations of Fourier transform and need for Laplace transform and develop the ability to analyze the system in s- domain.
CO5	Understand the basic concept of probability, random variables & random signals and develop the ability to find correlation, CDF, PDF and probability of a given event.

204182: Course Name: -**Electronic Devices and Circuits**

On the completion of the course, student will be able to

CO1	Comply and verify parameters after exciting devices by any stated method.
CO2	Implement circuit and test the performance.
CO3	Analyze small signal model of FET and MOSFET
CO4	Explain behavior of FET at low frequency.
CO5	Design an adjustable voltage regulator circuits.

204183: Course Name: -**Electrical Circuits and Machines**

On the completion of the course, student will be able to

CO1	Analyze basic AC & DC circuit for voltage, current and power by using KVL, KCL, andnetwork theorems.
CO2	Explain the working principle of different electrical machines.
CO3	Select proper electrical motor for given application.
CO4	Design and analyze transformers

204184: Course Name: - **Data Structures and Algorithms**

On the completion of the course, student will be able to

CO1	Describe the computational efficiency of the principal algorithms such as sorting & searching.
CO2	Write basic programs using array and pointers in C.
CO3	Describe how arrays, records, linked structures are represented in memory and use them in algorithms.
CO4	Implement stacks & queues for various applications

CO5	Understand various terminologies and traversals of trees and use them for various Applications.
CO6	Understand various terminologies and traversals of graphs and use them for Various applications.

204185: Course Name: **Digital Electronics**

On the completion of the course, student will be able to

CO1	Demonstrate the basic logic gates and various variable reduction techniques ofdigital logic circuit
CO2	Design various sequential circuits and counters
CO3	Design synchronous sequential models and state Machines
CO4	Describe PLDS, TTL and CMOS with its applications
CO5	Explain the architecture and features of Microcontroller 8051

207005: Course Name: – **Engineering Mathematics-III**

On the completion of the course, student will be able to

CO1	Solve higher order linear Differential equations for various engineering problems like L-C-R electrical circuits.
CO2	Apply Fourier transform and Z-transform to various engineering problems.
CO3	Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific computing
CO4	Perform vector differentiation and integration, analyze the vector fields and apply to Electro-Magnetic fields.
CO5	Analyze conformal mappings, contour integration and transformations of Complex functions.

204187: Course Name: – **Integrated Circuits**

On the completion of the course, student will be able to

CO1	Explain internal structure and characteristics of Op-Amp.
CO2	Determine various performance parameters of op-amp with their significance
CO3	Analyze linear and nonlinear applications of Op-Amp
CO4	Design converters, Oscillators, PLL and filters using Op-amp

204188: Course Name: – **Control Systems**

On the completion of the course, student will be able to

CO1	Determine and use models of physical systems in forms suitable for use in the analysis and design of control systems.
CO2	Determine the (absolute) stability of a closed-loop control system.
CO3	Perform time domain and frequency domain analysis of control systems required for stability analysis.

CO4	Perform time domain and frequency domain correlation analysis.
CO5	Apply root-locus, Frequency Plots technique to analyze control systems.
CO6	Express and solve system equations in state variable form.

204189: Course Name: –: **Analog Communication**

On the completion of the course, student will be able to

CO1	Understand and identify the fundamental concepts and various components of analog communication systems.
CO2	Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system.
CO3	Describe analog pulse modulation techniques and digital modulation technique.
CO4	Develop the ability to compare and contrast the strengths and weaknesses of various communication systems.
CO5	Understand Behavior of Baseband systems and Amplitude modulated systems
CO6	Describe pulse analog modulation techniques.

204190: Course Name: – **Object Oriented Programming**

On the completion of the course, student will be able to

CO1	Describe the principles of object oriented programming
CO2	Apply the concepts of data encapsulation, inheritance in C++.
CO3	Understand basic program constructs in Java
CO4	Apply the concepts of classes, methods and inheritance to write programs Java
CO5	Use arrays, vectors and strings concepts and interfaces to write programs in Java.
CO6	Describe and use the concepts in Java to develop user friendly program

204191: Course Name: –**Employability Skill Development**

On the completion of the course, student will be able to

CO1	Have skills and preparedness for aptitude tests.
CO2	Be equipped with essential communication skills (writing, verbal and non-verbal)
CO3	Master the presentation skill and be ready for facing interviews.
CO4	Build team and lead it for problem solving.
CO5	To develop Skills for interviews,Group discussion,Listening skills,physical appearance
CO6	Ability of Problem Solving Techniques,Define the problem,Gather information,Identify various solution,Take actions,Evaluate the actions

TE 2015 Pattern SEMI and SEM II

304181: Course Name: - **Digital Communication**

On the completion of the course, student will be able to

CO1	Understand working of waveform coding techniques and analyse their performance.
CO2	Analyze the performance of a baseband and pass band digital communication system in terms of error rate and spectral efficiency.
CO3	Perform the time and frequency domain analysis of the signals in a digital communication system
CO4	Design of digital communication system.
CO5	Understand working of spread spectrum communication system and analyze its performance.

304182: Course Name: -**Digital Signal Processing**

On the completion of the course, student will be able to

CO1	Explain fundamentals of Digital signal processing, sampling and aliasing effect, mapping of analog frequencies to digital frequencies.
CO2	Analyze discrete time signals and LTI-DT systems using different transforms.
CO3	Design digital filters and realize using different filter structures. (Scope is up to calculation of values.
CO4	Describe various real world applications of DSP.

304183: Course Name: -**Electromagnetics**

On the completion of the course, student will be able to

CO1	Understand the basic mathematical concepts related to electromagnetic vector fields
CO2	Apply the principles of electrostatics to the solutions of problems relating to electric field and electric potential, boundary conditions and electric energy density
CO3	Apply the principles of magneto statics to the solutions of problems relating to magnetic field and magnetic potential, boundary conditions and magnetic energy density.
CO4	Understand the concepts related to Faraday‘s law, induced emf and Maxwell‘s equations
CO5	Apply Maxwell‘s equations to solutions of problems relating to transmission lines and uniform plane wave propagation.

304184: Course Name: - **Microcontrollers**

On the completion of the course, student will be able to

CO1	Explain the architecture and features of Microcontroller 8051 and PIC
CO2	hardware and software tools to develop Microcontroller 8051and PIC Systems
CO3	Develop interfacing to real world devices using Microcontroller 8051 and PIC

304185: Course Name: - **Mechatronics**

On the completion of the course, student will be able to

CO1	Illustrate the key elements of Mechatronics system
CO2	Explain the basic principle of Sensors and Transducers
CO3	Compare different actuators for Mechatronics application
CO4	Elaborate mechatronics systems used in automobiles

304193: Course Name: -: **Electronics System Design**

On the completion of the course, student will be able to

CO1	Apply the fundamental concepts and working principles of electronics devices to design electronics systems for the given specifications.
CO2	Select appropriate components and devices by interpreting the datasheets
CO3	Design the circuit schematic of an electronic system/sub-system for the given specifications.
CO4	Use an EDA tool to validate performance of circuit schematic or suitable tool for database management system.

304186: Course Name: - **Power Electronics**

On the completion of the course, student will be able to

CO1	Design & implement a triggering / gate drive circuit for a power device
CO2	Understand, perform & analyze different controlled converters.
CO3	Evaluate battery backup time & design a battery charger.
CO4	Design & implement over voltage / over current protection circuit.
CO5	Design of SCR Circuits
CO6	Fundamentals of UPS Circuits.

C311: 304187: Course Name: – **Information Theory, Coding and CommunicationNetworks**

On the completion of the course, student will be able to

CO1	Perform information theoretic analysis of communication system and Design a data compression scheme using suitable source coding technique
CO2	Design a channel coding scheme for a communication system
CO3	Design various cyclic coding and decoing technic
CO4	Design a Convolution coding, BCH Coding, RS Coding scheme for a communication system
CO5	Understand and apply fundamental principles of data communication
CO6	Apply flow and error control techniques in communication networks

304188: Course Name: – **Business Management**

On the completion of the course, student will be able to

CO1	Get overview of Management Science aspects useful in business.
CO2	Get Quality Aspects for Systematically Running the Business
CO3	To Develop Project Management aspect and Entrepreneurship Skills.
CO4	Get overview of Recent trends in Human Resource Development
CO5	Get motivation for Entrepreneurship
CO6	Use of social media for marketing.

304189: Course Name: – **Advanced Processors**

On the completion of the course, student will be able to

CO1	Describe the ARM microprocessor architectures and its feature
CO2	Interface the advanced peripherals to ARM based microcontroller
CO3	Design embedded system with available resources
CO4	Use of DSP Processors and resources for signal processing applications
CO5	Apply GSM and GPS module interfacing, on-chip ADC using interrupt (VIC) and without using interrupt (VIC)
CO6	Special purpose DSP Hardware, Architecture of TMS320C67X, Features of C67X processors

C314: 304190: Course Name: –**System Programming and Operating Systems**

On the completion of the course, student will be able to

CO1	Demonstrate the knowledge of Systems Programming and and design concepts of Operating Systems
CO2	Formulate the Problem and develop the solution for same
CO3	Compare and analyze the different implementation approach of system programming operating system abstractions
CO4	Interpret various OS functions used in Linux / Ubuntu

304196: Course Name: – **Employability Skills and Mini Project**

On the completion of the course, student will be able to

CO1	Identify a need-based project to be executed as a team with systematic planning
CO2	Develop mini project (product) with PCB artwork design, soldering techniques,trouble shooting and necessary software tools.
CO3	Prepare a technical report based on the Mini project.
CO4	Deliver technical seminar based on the Mini Project work carried out.

BE 2012 Pattern SEMI and SEM II

Course Name: 404181 – **VLSI Design and Technology**

On the completion of the course, student will be able to

CO1	Model digital circuit with HDL, simulate, synthesis and prototype in PLDs
CO2	Understand chip level issues and need of testability.
CO3	Design analog & digital CMOS circuits for specified applications.

Course Name: 404182 – **Computer Networks**

On the completion of the course, student will be able to

CO1	Understand fundamental underlying principles of computer networking
CO2	Describe and analyze the hardware, software, components of a network and the interrelations.
CO3	Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies
CO4	Have a basic knowledge of the use of cryptography and network security;
C05	Have a basic knowledge of installing and configuring networking applications.
CO6	Specify and identify deficiencies in existing protocols, and then go onto select new and better protocols.

Course Name: 404183 – Microwave Engineering

On the completion of the course, student will be able to

CO1	Formulate the wave equation in wave guide for analysis.
CO2	Identify the use of microwave components and devices in microwave applications.
CO3	Understand the working principles of all the microwave tubes
CO4	Understand the working principles of all the solid state devices
CO5	Choose a suitable microwave tube and solid state device for a particular application
CO6	Carry out the microwave network analysis
CO7	Choose a suitable microwave measurement instruments and carry out the required measurements.

404184 – **Elective – I - Digital Image Processing**

On the completion of the course, student will be able to

CO1	Describe the fundamentals of DIP from human visual perception to image formation model.
CO2	Demonstrate fundamental concepts of low level image processing
CO3	Apply image processing techniques for object segmentation and recognition
CO4	Describe video signal representation and different algorithm for video processing.

Course Name: 404184 – **Elective I –** Embedded Systems & RTOS

On the completion of the course, student will be able to

CO1	Get insight of design metrics of Embedded systems to design real time applications to match recent trends in technology
CO2	Understand Real time systems concepts.
CO3	Understand Linux operating system and device drivers
CO4	Get to know the hardware – software co design issues and testing methodology for Embedded system.

Course Name: 404185 – **Elective – II - Electronic Product Design**

On the completion of the course, student will be able to

CO1	Describe the various considerations of product development from designer and user point of view.
CO2	Elaborate the different stages involved in hardware, software and PCB design for system development.
CO3	Describe different testing methods and debugging processes for system development
CO4	Explain the need and methods of documentation in product design.

Course Name: 404185 – **Elective – II – PLC & Automation**

On the completion of the course, student will be able to

CO1	Understand PLC architecture, PLC addressing concepts
CO2	Develop PLC ladder programs for simple industrial applications.
CO3	Design Automation systems for industrial applications.

Course Name: 404189 – **Mobile Communication**

On the completion of the course, student will be able to

C410.1	Explain and apply the concepts telecommunication switching, traffic and networks
C410.2	Analyze the telecommunication traffic
C410.3	Analyze radio channel and cellular capacity
C410.4	Explain and apply concepts of GSM and CDMA system.

Course Name: 404190 – **Broadband Communication Systems**

On the completion of the course, student will be able to

C411.1	Explain working principles of the key components of Fiber Optic Communication system.
C411.2	Estimate Power and Rise Time Budgets for a typical fiber optic link
C411.3	Discuss working principle of optical Amplifier, WDM and its components.

C411.4	Describe various satellite subsystems, key components and Orbital effects in Satellite Communication Systems.
C411.5	Estimate satellite link budget for up-link, down-link, and overall link.

Course Name: 404191 – **Elective – III–Audio and Video Engineering**

On the completion of the course, student will be able to

C412A.1	To study the analysis and synthesis of TV Pictures, Composite Video Signal, Receiver, Picture Tubes and Television Camera Tubes.
C412A.2	To study the various Colour Television systems with a greater emphasis on television standards.
C412A.3	To study the advanced topics in Digital Television and High Definition Television
C412A.4	To study audio recording systems such CD/DVD recording, Audio Standards, and Acoustics principles.

Course Name: 404192 – **Elective – IV - Wireless Networks**

On the completion of the course, student will be able to

C413A.1	Keep himself updated on latest wireless technologies and trends in the communication field
C413A.2	Understand the transmission of voice and data through various networks
C413A.3	Explain the issues involved in design and deployment LTE
C413A.4	Explain the issues involved in design and deployment VOIP

DEPARTMENT OF MECHANICAL ENGINEERING

Course Objective and Course Outcome

SE MECHANICAL SEMESTER-I	
Name Of Subject:	Engineering Mathematics – III (207002)
Course Objectives:	
1	Ordinary and partial differential equations applied to Mechanical engineering problems such as mechanical vibrations and heat transfer.
2	Integral Transform techniques such as Laplace transform, Fourier transform and applications to ordinary and partial differential equations in Vibration theory, Fluid dynamics, Heat transfer and Thermodynamics.
3	Statistical methods such as correlation, regression analysis and probability theory in analyzing and interpreting experimental data applicable to Reliability engineering.
4	Vector differentiation and integration applied to problems in Fluid Mechanics.
Course Outcomes:	
CO1	Solve higher order linear differential equations and apply to modeling and analyzing mass spring systems.
CO2	Apply Laplace transform and Fourier transform techniques to solve differential equations involved in Vibration theory, Heat transfer and related engineering applications.
CO3	Apply statistical methods like correlation, regression analysis in analyzing, interpreting experimental data and probability theory in testing and quality control.
CO4	Preform vector differentiation and integration, analyze the vector fields and apply to fluid flow problems.
CO5	Solve various partial differential equations such as wave equation, one and two dimensional heat flow equations.

Name Of Subject:	Manufacturing Process- I (202041)
Course Objectives:	
1	To make acquaintance of foundry processes pattern making and casting
2	To study metal forming processes such forging, rolling, extrusion and wire drawing.
3	To make study of different plastic molding processes
4	To study metal joining processes
5	To design and development of product with Sheet metal working process
6	Introduction to center lathe
Course Outcomes:	
CO1	Understand and analyze foundry practices like pattern making, mold making, Core making and Inspection of defects.
CO2	Understand and analyze Hot and Cold Working, Rolling, Forging, Extrusion and Drawing Processes.
CO3	Understand different plastic molding processes, Extrusion of Plastic and Thermoforming
CO4	Understand different Welding and joining processes and its defects
CO5	Understand, Design and Analyze different sheet metal working processes
CO6	Understand the constructional details and Working of Centre Lathe
Name Of Subject:	Computer Aided Machine Drawing (202042)
Course Objectives:	
1	To understand Parametric Modeling Fundamentals, Procedure, and "Shape before Size" Approach.

2	To develop an ability to Create Parametric 2-D Sketches, and Create and Edit Parametric Dimensions.
3	To develop an ability to Create Solid Models of machine components. The student should be able to apply these skills to the solution of a variety of practical problems and be able to employ their knowledge to solve more complicated problems.
4	To develop an ability to Create assembly models of simple machine (minimum 5 components). The student should be prepared to continue the study of computer aided machine drawing through further subjects/projects in further years of engineering.
5	To develop the ability to apply Limits, Fits, and Dimensional Tolerances, as well as Geometric Tolerances to components and assemblies on Engineering Drawings.
6	To develop an ability to create 2D drawings from 3D models
Course Outcomes:	
CO1	Understand the importance of CAD in the light of allied technologies such as CAM, CAE, FEA, CFD, PLM.
CO2	Understand the significance of parametric technology and its application in 2D sketching.
CO3	Understand the significance of parametric feature-based modeling and its application in 3D machine components modeling.
CO4	Ability to create 3D assemblies that represent static or dynamic Mechanical Systems.
CO5	Ability to ensure manufacturability and proper assembly of components and assemblies.
CO6	Ability to communicate between Design and Manufacturing using 2D drawings.
Name Of Subject:	Thermodynamics (202043)
Course Objectives:	
1	Identify and use units and notations in Thermodynamics.
2	State and illustrate first and second laws of Thermodynamics.

3	Explain the concepts of entropy, enthalpy, reversibility and irreversibility.
4	Apply the first and second laws of Thermodynamics to various gas processes and cycles.
5	To get conversant with properties of steam, dryness fraction measurement, vapor processes and Thermodynamic vapor cycles, performance estimation.
6	To get conversant with Psychrometric Charts, Psychrometric processes, human comfort conditions.
Course Outcomes:	
CO1	Apply various laws of thermodynamics to various processes and real systems.
CO2	Apply the concept of Entropy, Calculate heat, work and other important thermodynamic properties for various ideal gas processes.
CO3	Estimate performance of various Thermodynamic gas power cycles and gas refrigeration cycle and availability in each case.
CO4	Estimate the condition of steam and performance of vapour power cycle and vapour compression cycle.
CO5	Estimate Stoichiometric air required for combustion, performance of steam generators and natural draught requirements in boiler plants.
CO6	Use Psychromertic charts and estimate various essential properties related to Psychrometry and processes
Name Of Subject:	Material Science (202044)
Course Objectives:	
1	To acquaint students with the basic concepts and properties of Material Science
2	To impart a fundamental knowledge of Materials Processing
3	Selection and application of different Metals & Alloys
4	To understand the structure of Engineering Materials
5	To develop futuristic insight into Materials

Course Outcomes:	
CO1	Understand the basic concepts and properties of Material.
CO2	Understand about material fundamental and processing.
CO3	Select proper metal, alloys, nonmetal and powder metallurgical component for specific requirement
CO4	Detect the defects in crystal and its effect on crystal properties.flow problems.
CO5	Evaluate the different properties of material by studying different test
CO6	Recognize how metals can be strengthened by cold-working and hot working
TE MECHANICAL SEMESTER-I	
Name Of Subject:	Design of Machine Elements – I (302041)
Course Objectives:	
1	Student shall gain appreciation and understanding of the design function in Mechanical Engineering, different steps involved in designing and the relation of design activity with manufacturing activity.
2	The student shall learn to choose proper materials for different machine elements depending on their physical and mechanical properties. They will learn to apply the knowledge of material science in real life situations.
3	Student shall gain a thorough understanding of the different types of failure modes and criteria. They will be conversant with various failure theories and be able to judge which criterion is to be applied for a particular situation.
4	Student shall gain design knowledge of the different types of elements used in the machine design process, for e.g. fasteners, shafts, couplings etc. and will be able to design these elements for each application.
Course Outcomes:	

CO1	Ability to identify and understand failure modes for mechanical elements and design of machine elements based on strength.
CO2	Ability to design Shafts, Keys and Coupling for industrial applications.
CO3	Ability to design machine elements subjected to fluctuating loads.
CO4	Students able to analyze beams and Frames Stiffness method.
CO5	Ability to design fasteners and welded joints subjected to different loading conditions.
CO6	Ability to design various Springs for strength and stiffness.
Name Of Subject:	HEAT TRANSFER (302042)
Course Objectives:	
1	Identify the important modes of heat transfer and their applications.
2	Formulate and apply the general three dimensional heat conduction equations.
3	Analyze the thermal systems with internal heat generation and lumped heat capacitance.
4	Understand the mechanism of convective heat transfer
5	Determine the radiative heat transfer between surfaces.
6	Describe the various two phase heat transfer phenomenon. Execute the effectiveness and rating of heat exchangers.
Course Outcomes:	
CO1	Analyze the various modes of heat transfer and implement the basic heat conduction equations for steady one dimensional thermal system.
CO2	Implement the general heat conduction equation to thermal systems with and without internal heat generation and transient heat conduction.

CO3	Analyze the heat transfer rate in natural and forced convection and evaluate through experimentation investigation.
CO4	Interpret heat transfer by radiation between objects with simple geometries.
CO5	Analyze the heat transfer equipment and investigate the performance.
Name Of Subject:	Theory of Machine – II (302043)
Course Objectives:	
1	To develop competency in understanding of theory of all types of gears.
2	To understand the analysis of gear train.
3	To develop competency in drawing the cam profile.
4	To make the student conversant with synthesis of the mechanism.
5	To understand step-less regulations.
6	To understand mechanisms for system control – Gyroscope.
Course Outcomes:	
CO1	Student will be able to understand fundamentals of gear theory which will be the prerequisite for gear design.
CO2	Student will be able to perform force analysis of Spur, Helical, Bevel, Worm and Worm gear.
CO3	The student to analyze speed and torque in epi-cyclic gear trains which will be the prerequisite for gear box design.
CO4	Student will be able to design cam profile for given follower motions and understand cam Jump phenomenon, advance cam curves.
CO5	The student will synthesize a four bar mechanism with analytical and graphical methods.
CO6	A. The student will analyze the gyroscopic couple or effect for stabilization of Ship Aeroplane and Four wheeler vehicle.

	B. Student will choose appropriate drive for given application (stepped / step-less).
Name Of Subject:	Turbo Machines (302044)
Course Objectives:	
1	To provide the knowledge of basic principles, governing equations and applications of turbo machine.
2	To provide the students with opportunities to apply basic thermo-fluid dynamics flow equations to Turbo machines.
3	To explain construction and working principle and evaluate the performance characteristics of Turbo Machines.
Course Outcomes:	
CO1	Apply thermodynamics and kinematics principles to turbo machines.
CO2	Analyze the performance of turbo machines.
CO3	Ability to select turbo machine for given application.
CO4	Predict performance of turbo machine using model analysis.
Name Of Subject:	Metrology And Quality Control (302045)
Course Objectives:	
1	Select suitable instrument / gauge / method of inspection for determining geometrical and dimensional measurements.
2	Calibrate measuring instruments and also design inspection gauges.
3	Understand the advances in Metrology such as use of CMM, Laser, Machine Vision System for Metrology etc.
4	Select and apply appropriate Quality Control Technique for given application.
5	Select and Apply appropriate Quality Management Tool and suggest appropriate Quality Management System (QMS).

Course Outcomes:	
CO1	Understand the methods of measurement, selection of measuring instruments / standards of measurement, carryout data collection and its analysis.
CO2	Explain tolerance, limits of size, fits, geometric and position tolerances and gauge design
CO3	Understand and use/apply Quality Control Techniques/ Statistical Tools appropriately.
CO4	Develop an ability of problem solving and decision making by identifying and analyzing the cause for variation and recommend suitable corrective actions for quality improvement.

BE MECHANICAL SEMESTER-I

Name Of Subject:	Refrigeration and Air Conditioning (402041)
Course Objectives:	
1	Learning the fundamental principles and different methods of refrigeration and air conditioning.
2	Study of various refrigeration cycles and evaluate performance using Mollier charts and/ or refrigerant property tables.
3	Comparative study of different refrigerants with respect to properties, applications and environmental issues.
4	Understand the basic air conditioning processes on psychometric charts, calculate cooling load for its applications in comfort and industrial air conditioning.
5	Study of the various equipment-operating principles, operating and safety controls employed in refrigeration air conditioning systems
Course Outcomes: After the completion of the course the student should be able to -	
CO1	Illustrate the fundamental principles and applications of refrigeration and air conditioning system
CO2	Obtain cooling capacity and coefficient of performance by conducting test on vapor compression refrigeration systems

CO3	Present the properties, applications and environmental issues of different refrigerants
CO4	Calculate cooling load for air conditioning systems used for various applications
CO5	Operate and analyze the refrigeration and air conditioning systems.
Name of Subject:	CAD/CAM and Automation (402042)
Course Objectives: Objectives of the Course are	
1	Basics of modeling.
2	Discuss various geometries.
3	Discretization of the solid model.
4	Apply Boundary Conditions similar to real world.
5	Generate solution to ensure design can sustain the applied load conditions.
6	Discuss latest manufacturing methods.
Course Outcomes: At the end of the course the students will have an ability to	
CO1	Analyze and design real world components
CO2	Suggest whether the given solid is safe for the load applied.
CO3	Select suitable manufacturing method for complex components.
Name Of Subject:	Dynamics of Machinery (402043)
Course Objectives:	
1	To conversant with balancing problems of machines.

2	To make the student conversant with fundamentals of vibration and noise.
3	To develop competency in understanding of vibration and noise in Industry.
4	To develop analytical competency in solving vibration problems.
5	To make the student conversant with natural frequencies, Eigen values & Eigen vectors.
6	To understand the various techniques of measurement and control of vibration and noise.
Course Outcomes:	
CO1	Solutions to balancing problems of machines.
CO2	Ability to understand the fundamentals of vibration and Noise.
CO3	Ability to develop analytical competency in solving vibration problems.
CO4	Ability to understand measurement and control of vibration and noise.
CO5	Ability to calculate natural frequencies, Eigen values & Eigen vectors.
CO6	Ability to measure vibrations, vibration characteristics and understand various methods for vibration control for real life problem.
Name Of Subject:	Energy Audit and Management (402044A)
Course Objectives:	
1	Importance of Energy Management..
2	How to carry out Energy Audit
3	Methods to reduce consumption of energy and save cost..
4	How to improve energy efficiency of overall system.

5	Significance of Waste heat recovery and Cogeneration
Course Outcomes:	
CO1	Carry out Energy Audit of there residence / society / college where they are studying.
CO2	Carry out electrical tariff calculation and accurately predict the electricity bill required for the installation.
CO3	Suggest various methods to reduce energy consumption of the equipment / office / premises.
Name Of Subject:	Product Design and Development (402045B)
Course Objectives:	
1	Product design and development.
2	Hurdles in commercialization of product.
3	Importance of reverse engineering.
4	Focus of designing a product.
5	Design validation plan.
6	PLM and PDM
Course Outcomes:	
CO1	Design a sustainable product.
CO2	Develop commercial Product
CO3	Master in new techniques PLM and PDM

SE MECHANICAL SEMESTER-II

Name Of Subject:	Fluid Mechanics (202045)
Course Objectives:	
1	To understand of various properties of fluids
2	To learn fluid statics and dynamics.
3	To understand of Boundary layer, Drag, and Lift
4	To understand of Bernoulli's equation
5	To Know of various applications of Bernoulli's equation
Course Outcomes:	
CO1	Use of various properties in solving the problems in fluids
CO2	Use of Bernoulli's equation for solutions in fluids
CO3	Determination of forces drag and lift on immersed bodies
Name Of Subject:	Theory of Machines – I (202048)
Course Objectives:	
1	To make the student conversant with commonly used mechanism for industrial application.
2	To develop competency in drawing velocity and acceleration diagram for simple and complex mechanism.

3	To develop analytical competency in solving kinematic problems using complex algebra method.
4	To develop competency in graphical and analytical method for solving problems in static and dynamic force analysis.
5	To develop competency in conducting laboratory experiments for finding moment of inertia of rigid bodies,
Course Outcomes:	
CO1	Identify mechanisms in real life applications.
CO2	Perform kinematic analysis of simple mechanisms.
CO3	Perform static and dynamic force analysis of slider crank mechanism.
CO4	Determine moment of inertia of rigid bodies experimentally.
CO5	Analyze velocity and acceleration of mechanisms by vector and graphical methods.
Name Of Subject:	Engineering Metallurgy (202049)
Course Objectives:	
1	To acquaint students with the basic concepts of Metal Structure
2	To impart a fundamental knowledge of Ferrous & Non Ferrous Metal Processing
3	Selection and application of different Metals & Alloys
4	To Know Fundamentals of Metallography
5	To develop futuristic insight into Metals
Course Outcomes:	

CO1	Describe how metals and alloys formed and how the properties change due to microstructure
CO2	Apply core concepts in Engineering Metallurgy to solve engineering problems.
CO3	Conduct experiments, as well as to analyze and interpret data
CO4	Select materials for design and construction.
CO5	Possess the skills and techniques necessary for modern materials engineering practice
CO6	Recognize how metals can be strengthened by alloying, cold-working, and heat treatment
Name Of Subject:	Applied Thermodynamics (202050)
Course Objectives:	
1	To get familiar with fundamentals of I. C. Engines, Construction and working Principle of an Engine and Compare Actual, Fuel-Air and Air standard cycle Performance.
2	To study Combustion in SI and CI engines and its controlling factor in order to extract maximum power.
3	To study emission from IC Engines and its controlling method, Various emission norms.
4	Perform Testing of I. C. Engines and methods to estimate Indicated, Brake and Frictional Power and efficiencies
5	To understand theory and performance Calculation of Positive displacement compressor.
Course Outcomes:	
CO1	Classify various types of Engines, Compare Air standard, Fuel Air and Actual cycles and make out various losses in real cycles.
CO2	Understand Theory of Carburetion, Modern Carburetor, Stages of Combustion in S. I. Engines and Theory of Detonation, Pre-ignition and factors affecting detonation.
CO3	Understand Fuel Supply system, Types of Injectors and Injection Pumps, Stages of Combustion in CI Engines, Theory of Detonation in CI Engines and Comparison of SI and CI Combustion and Knocking and Factors affecting, Criteria for good combustion

	chamber and types.
CO4	Carry out Testing of I. C. Engines and analyze its performance.
CO5	Describe construction and working of various I. C. Engine systems (Cooling, Lubrication, Ignition, Governing, and Starting) also various harmful gases emitted from exhaust and different devices to control pollution and emission norms for pollution control.
CO6	Describe construction, working of various types of reciprocating and rotary compressors with performance calculations of positive displacement compressors.
Name Of Subject:	Electrical and Electronics Engineering (203152)
Course Objectives:	
1	Principle of operation and speed control of DC machines
2	Induction motor principle and its applications
3	Working principle of special purpose motors
4	Microcontrollers
5	Embedded systems terminologies and sensors
6	Data acquisition system for mechanical applications
Course Outcomes:	
CO1	Develop the capability to identify and select suitable DC motor / induction motor / special purpose motor and its speed control method for given industrial application.
CO2	Program Arduino IDE using conditional statements
CO3	Interfacing sensors with Arduino IDE

TE MECHANICAL SEMESTER-II

Name Of Subject:	Numerical Methods and Optimization (302047)
Course Objectives:	
1	Recognize the difference between analytical and Numerical Methods.
2	Effectively use Numerical Techniques for solving complex Mechanical engineering Problems.
3	Prepare base for understanding engineering analysis software.
4	Develop logical sequencing for solution procedure and skills in soft computing.
5	Optimize the solution for different real life problems with available constraints.
6	Build the foundation for engineering research.
Course Outcomes:	
CO1	Use appropriate Numerical Methods to solve complex mechanical engineering problems.
CO2	Formulate algorithms and programming.
CO3	Use Mathematical Solver.
CO4	Explain limits of accuracy, apply principles of theory of errors for correction of measurements & get solutions of problems & errors.
CO5	Analyze the research problem
Name Of Subject:	Design of Machine Elements – II -1 (302048)
Course Objectives:	

1	Enable students to attain the basic knowledge required to understand, analyze, design and select machine elements required in transmission systems.
2	Reinforce the philosophy that real engineering design problems are open-ended and challenging
3	Impart design skills to the students to apply these skills for the problems in real life industrial applications
4	Inculcate an attitude of team work, critical thinking, communication, planning and scheduling through design projects
5	Create awareness amongst students about safety, ethical, legal, and other societal constraints in execution of their design projects
6	Develop an holistic design approach to find out pragmatic solutions to realistic domestic and industrial problems
Course Outcomes:	
CO1	To understand and apply principles of gear design to spur gears and industrial spur gear boxes.
CO2	To become proficient in Design of Helical and Bevel Gear
CO3	To develop capability to analyse Rolling contact bearing and its selection from manufacturer's Catalogue.
CO4	To learn a skill to design worm gear box for various industrial applications.
CO5	To inculcate an ability to design belt drives and selection of belt, rope and chain drives.
CO6	To achieve an expertise in design of Sliding contact bearing in industrial applications.
Name Of Subject:	Refrigeration and Air Conditioning (302049)
Course Objectives:	
1	Learning the fundamental principles and different methods of refrigeration and air conditioning.
2	Study of various refrigeration cycles and evaluate performance using Mollier charts and/ or refrigerant property tables.
3	Comparative study of different refrigerants with respect to properties, applications and environmental issues.

4	Understand the basic air conditioning processes on psychometric charts, calculate cooling load for its applications in comfort and industrial air conditioning.
5	Study of the various equipment-operating principles, operating and safety controls employed in refrigeration air conditioning systems
Course Outcomes:	
CO1	Illustrate the fundamental principles and applications of refrigeration and air conditioning system
CO2	Obtain cooling capacity and coefficient of performance by conducting test on vapour compression refrigeration systems
CO3	Present the properties, applications and environmental issues of different refrigerants
CO4	Calculate cooling load for air conditioning systems used for various
CO5	Operate and analyze the refrigeration and air conditioning systems.
Name of Subject:	Mechatronics (302050)
Course Objectives: Objectives of the Course are	
1	Understand key elements of Mechatronics system, representation into block diagram
2	Understand concept of transfer function, reduction and analysis
3	Understand principles of sensors, its characteristics, interfacing with DAQ microcontroller
4	Understand the concept of PLC system and its ladder programming, and significance of PLC systems in industrial application
5	Understand the system modeling and analysis in time domain and frequency domain.
6	Understand control actions such as Proportional, derivative and integral and study its significance in industrial applications
Course Outcomes: At the end of the course the students will have an ability to	
CO1	Identification of key elements of mechatronics system and its representation in terms of block diagram

CO2	Understanding the concept of signal processing and use of interfacing systems such as ADC, DAC, digital I/O
CO3	Interfacing of Sensors, Actuators using appropriate DAQ micro-controller
CO4	Time and Frequency domain analysis of system model (for control application)
CO5	PID control implementation on real time systems
CO6	Development of PLC ladder programming and implementation of real life system.
Name Of Subject:	MANUFATCURING PROCESS – II (302051)
Course Objectives:	
1	To analyze and understand the metal cutting phenomena.
2	To select process parameter and tools for obtaining desired machining characteristic
3	To understand principles of manufacturing processes.
Course Outcomes:	
CO1	Student should be able to apply the knowledge of various manufacturing processes.
CO2	Student should be able to identify various process parameters and their effect on processes.
CO3	Student should be able to figure out application of modern machining.
CO4	Students should get the knowledge of Jigs and Fixtures for variety of operations.

BE MECHANICAL SEMESTER-II

Name Of Subject:	Power Plant Engineering (402047)
Course Objectives:	

1	To develop an ability to apply knowledge of mathematics, science, and engineering.
2	To develop an ability to design a system, component, or process to meet desired needs within realistic constraints.
3	To develop an ability to identify, formulate, and solve engineering problems.
4	To develop an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
Course Outcomes:	
CO1	Ability to have adequacy with Design, erection and development of energy conversion plants.
CO2	Optimization of Energy Conversion plant with respect to the available resources.
CO3	Acquire knowledge about detailed specification of Civil Work & to calculate its rate analysis.
CO4	Scope of alternative erection of optimized, suitable plant at the location depending upon geographical conditions.
Name Of Subject:	Mechanical System Design (402048)
Course Objectives:	
1	To develop competency for system visualization and design.
2	To enable student to design cylinders and pressure vessels and to use IS code.
3	To enable student select materials and to design internal engine components.
4	To introduce student to optimum design and use optimization methods to design mechanical components.
5	To enable student to design machine tool gearbox.
6	To enable student to design material handling systems.
7	Ability to apply the statistical considerations in design and analyze the defects and failure modes in

	components.
Course Outcomes:	
CO1	The student will understand the difference between component level design and system level design.
CO2	Ability to design various mechanical systems like pressure vessels, machine tool gear boxes, material handling systems, etc. for the specifications stated/formulated.
CO3	Ability to learn optimum design principles and apply it to mechanical components.
CO4	Ability to handle system level projects from concept to product.
Name Of Subject:	Refrigeration and Air Conditioning Equipment Design (402049A)
Course Objectives:	
1	Study of refrigeration cycles i.e. trans-critical cycle, cascade cycle, etc.
2	Understanding of materials and designs of refrigeration and air conditioning equipment like controls, evaporators, condensers, cooling towers
3	Learning of low temperature systems and heat pipe
Course Outcomes:	
CO1	Select the different components of refrigeration system i.e. condensers, evaporators, controls etc. for given applications
CO2	Demonstrate the concepts of design of evaporators and condensers for unitary systems
CO3	Analyses the performance of cooling tower and heap pipe.
CO4	Identify risks involved in projects, analyse the risks and control the risks using mathematical models, Perform value analysis.
CO5	Illustrate the methods for production of ultralow temperature

Name Of Subject:	Finite Element Analysis (402050B)
Course Objectives:	
1	To familiarize students with the displacement-based finite element method for displacement and stress analysis and to introduce related analytical and computer tools.
2	It provides a bridge between hand calculations based on mechanics of materials and machine design and numerical solutions for more complex geometries and loading states.
3	To study approximate nature of the finite element method and convergence of results are examined.
4	It provides some experience with a commercial FEM code and some practical modeling exercises.
Course Outcomes:	
CO1	Derive and use 1-D and 2-D element stiffness matrices and load vectors from various methods to solve for displacements and stresses.
CO2	Apply mechanics of materials and machine design topics to provide preliminary results used for testing the reasonableness of finite element results.
CO3	Identify the sources of air pollutants and their effect on human, plants and materials
CO4	Explain the inner workings of a finite element code for linear stress, displacement, temperature and modal analysis.
CO5	Interpret the results of finite element analyses and make an assessment of the results in terms of modeling (physics assumptions) errors, discretization (mesh density and refinement toward convergence) errors, and numerical (round-off) errors.

DEPARTMENT OF MECHANICAL ENGINEERING

Program Outcomes	
PO1	Engineering knowledge : An ability to apply knowledge of computing, mathematics, science and engineering fundamentals appropriate to complex engineering.
PO2	Problem analysis : An ability to define the problems and provide solutions by designing and conducting experiments, interpreting and analyzing data.
PO3	Design/development of solutions : An ability to design, implement and evaluate a system, process, component and program to meet desired needs within realistic constraints.
PO4	Conduct investigations of complex problems : An ability to investigate, formulates, analyze and provide an appropriate solution to the engineering problems.
PO5	Modern tool usage : An ability to use modern engineering tools and technologies necessary for engineering practices.
PO6	The engineer and society : An ability to analyze the local and global impact of computing on individuals, organizations and society.
PO7	Environment and sustainability : An ability to understand the environmental issues and provide the sustainable system.
PO8	Ethics : An ability to understand professional and ethical responsibility.
PO9	Individual and teamwork : An ability to function effectively as an individual or as a team member to accomplish the goal.
PO10	Communication : An ability to communicate effectively at different levels.
PO11	Project management and finance : An ability to keep abreast with contemporary technologies through lifelong learning.
PO12	Life-long learning : An ability to apply knowledge of principles of resource management and economics to provide better services in the field of technology.

DEPARTMENT OF MECHANICAL ENGINEERING

Program Specific Outcomes (PSOs)	
PSO1	Graduates of the program will achieve excellence in product design, thermal engineering and manufacturing system by acquiring knowledge in mathematics, science and designing principles.
PSO2	Graduate will be able to analyze, interpret and provide solutions to the real life mechanical engineering problems
PSO3	An ability to find out, articulate the local industrial problems and solve with the use of Mechanical Engineering tools for realistic outcomes.