



**THEEM COLLEGE OF ENGINEERING, BOISAR**  
 Approved By AICTE (New Delhi) Government of Maharashtra & DTE  
 Affiliated To University of Mumbai

▲ Village Betegaon, Near Union Park, Boisar Chilhar Road, Boisar (E), Tal.-Dist.-Palghar, 401501. Tel: - (02525) 284909 / 284926,  
 ●Telefax : (02525) 284 927 ●Email ID : info@theemcoe.org ●Website : www.theemcoe.org

PO's and CO's

Department of Automobile Engineering: -

**PO's**

Engineering Graduates will be able to:

- PO1.** Engineering Knowledge: Apply the knowledge of science, mathematics, engineering fundamentals and engineering specialization for research, innovation and solving automobile engineering problems.
- PO2.** Problem Analysis: Use the basic principles of natural science, mathematics and engineering for identifying and analyzing the automobile engineering problems to reach the suitable conclusions.
- PO3.** Design/Development of Solutions: Design solutions for automobile engineering problems to meet the specified needs with appropriate consideration to the environment, public health and safety.
- PO4.** Conduct Investigations of Complex Problems: Use research-based knowledge including design of experiments, data interpretation and synthesis of information to provide valid conclusions.
- PO5.** Modern Tool Usage: Select the appropriate techniques, resources, modern engineering including modelling and prediction for automobile engineering activities with an understanding of the limitations.
- PO6.** The Engineer and Society: Apply reasoning and logical thinking relevant to automobile engineering with understanding of consequent responsibilities towards societal, health, safety, legal and cultural issues.
- PO7.** Environment and Sustainability: Understand the cause of professional engineering solutions in societal and environmental contexts to conserve suitable environment for sustainable development.
- PO8.** Ethics: Apply ethical principles, commit to professional ethics and responsibilities and norms of the automobile engineering.
- PO9.** Individual and Teamwork: Function effectively as an individual or as a member or leader in diverse teams and in multidisciplinary settings.
- PO10.** Communication: Communicate effectively with engineering community in automobile engineering activities, be able to comprehend, write effective reports, design documentations and make effective presentation with clear instructions.
- PO11.** Project Management and Finance: Manage projects in multidisciplinary environment with the skill of handling monetary resources in one's own work.
- PO12.** Life-long Learning: Recognize the need for life-long learning in the broadest context of technological change.

CO's

Sem 3	Applied Mathematics III	Demonstrate the ability of using Laplace Transform in solving the Ordinary Differential Equations and Partial Differential Equations	Demonstrate the ability of using Fourier Series in solving the Ordinary Differential Equations and Partial Differential Equations	Solve initial and boundary value problems involving ordinary differential equations	Identify the analytic function, harmonic function, orthogonal trajectories	Apply bilinear transformations and conformal mappings	Identify the applicability of theorems and evaluate the contour integrals.
	Thermodynamics	Demonstrate application of the laws of thermodynamics to wide range of systems.	Write steady flow energy equation for various flow and non-flow thermodynamic systems	Compute heat and work interactions in thermodynamics systems	Demonstrate the interrelations between thermodynamic functions to solve practical problems.	Use steam table and mollier chart to compute thermodynamics interactions	Compute efficiencies of heat engines, power cycles etc.
	Strength of Materials	Demonstrate fundamental knowledge about various types of loading and stresses induced.	Draw the SFD and BMD for different types of loads and support conditions.	Analyse the stresses induced in basic mechanical components.	Estimate the strain energy in mechanical elements.	Analyse the deflection in beams.	Analyse buckling and bending phenomenon in columns, struts and beams.
	Production Process I	Demonstrate understanding of casting process	Illustrate principles of forming processes	Demonstrate applications of various types of welding processes.	Differentiate chip forming processes such as turning, milling, drilling, etc.	Illustrate the concept of producing polymer components and ceramic components	Distinguish between the conventional and modern machine tools.
	Material Technology	Identify various crystal imperfections, deformation mechanisms, and strengthening mechanisms	Demonstrate understanding of various failure mechanisms of materials.	Interpret Iron-Iron carbide phase diagram, and different phases in microstructures of materials at different conditions	Select appropriate heat treatment process for specific applications.	Identify effect of alloying elements on properties of steels	Illustrate basics of composite materials, Nano-materials and smart materials.
Sem 4	Applied Mathematics IV	Solve the system of linear equations using matrix algebra with its specific rules	Demonstrate basics of vector calculus	Apply the concept of probability distribution and sampling theory to engineering problems	Apply principles of vector calculus to the analysis of engineering problems	Identify, formulate and solve engineering problems	Illustrate basic theory of correlations and regression
	Fluid Mechanics	Define properties of fluids and classification of fluids	Evaluate hydrostatic forces on various surfaces and predict stability of floating bodies	Formulate and solve equations of the control volume for fluid flow systems	Apply Bernoulli's equation to various flow measuring devices	Calculate resistance to flow of incompressible fluids through closed conduits and over surfaces	Apply fundamentals of compressible fluid flows to relevant systems
	Industrial Electronics	Illustrate construction, working principles and applications of power electronic switches	Identify rectifiers and inverters for dc and ac motor speed control	Develop circuits using OPAMP and timer IC555	Identify digital circuits for industrial applications	Illustrate the knowledge of basic functioning of microcontroller	Analyse speed-torque characteristics of electrical machines for speed control
	Production Process II	Demonstrate understanding of metal cutting principles and mechanism	Identify cutting tool geometry of single point and multipoint cutting tool	Demonstrate various concepts of sheet metal forming operations	Demonstrate concepts and use of jigs and fixtures	Illustrate various non-traditional machining techniques	Illustrate concepts and applications of additive manufacturing
	Kinematics of Machinery	Define various components of mechanisms	Develop mechanisms to provide specific motion	Draw velocity and acceleration diagrams of various mechanisms	Draw Cam profile for the specific follower motion	Analyse forces in various gears	Select appropriate power transmission for specific application
Internal Combustion Engines	Demonstrate the working of different systems and processes of S.I. engines	Demonstrate the working of different systems and processes of C.I. engines	Illustrate the working of lubrication, cooling and supercharging systems.	Analyse engine performance	Illustrate emission norms and emission control	Comprehend the different technological advances in engines and alternate fuels	



Sem 5	Mechanical Measurements and Control	Classify various types of static characteristics and types of errors occurring in the system.	Classify and select proper measuring instrument for linear and angular displacement	Classify and select proper measuring instrument for pressure and temperature measurement	Design mathematical model of system/process for standard input responses	Analyse error and differentiate various types of control systems and time domain specifications	Analyse the problems associated with stability
	Heat Transfer	Identify the three modes of heat transfer (conduction, convection and radiation).	Illustrate basic modes of heat transfer	Develop mathematical model for each mode of heat transfer	Develop mathematical model for transient heat transfer	Develop mathematical model for transient heat transfer	Analyse different heat exchangers and quantify their performance
	Automotive Systems	Identify different automotive systems and subsystems.	Identify different automotive components.	Illustrate working and functions of various automotive components	Illustrate working and function of electric drive lines.	Comprehend working of Special vehicles through case study.	Identify and Demonstrate different vehicle layouts.
	Press Tool Design	Demonstrate various press working operations for mass production of sheet metal parts	Identify press tool requirements to build concepts pertaining to design of press tools	Prepare working drawings and setup for economic production of sheet metal components	Select suitable materials for different elements of press tools	Illustrate the principles and blank development in bent & drawn components	Elaborate failure mechanisms of pressed components, safety aspects and automation in press working
Sem 6	Chassis and Body Engineering	Illustrate different types of Vehicle structures	Comprehend various loads acting on vehicle body.	Illustrate different vehicle body styles.	Classify different materials related to vehicle body.	Discuss Aerodynamic concept related to vehicle body	Illustrate importance of thin walled structures in vehicle body elements.
	Machine Design I	Demonstrate understanding of various design considerations	Illustrate basic principles of machine design	Design machine elements for static as well as dynamic loading	Design machine elements on the basis of strength/ rigidity concepts	Use design data books in designing various components	Acquire skill in preparing production drawings pertaining to various designs
	Finite Element Analysis	Solve differential equations using weighted residual methods	Develop the finite element equations to model engineering problems governed by second order differential equations	Apply the basic finite element formulation techniques to solve engineering problems by using one dimensional elements	Apply the basic finite element formulation techniques to solve engineering problems by using two dimensional elements	Apply the basic finite element formulation techniques to find natural frequency of single degree of vibration system	Use commercial FEA software, to solve problems related to mechanical engineering.
	Mechanical Vibrations	Develop mathematical model to represent dynamic system.	Estimate natural frequency of mechanical system.	Analyse vibratory response of mechanical system.	Estimate the parameters of vibration isolation system.	Balance an existing unbalanced rotating and reciprocating system completely/partially.	Comprehend the application of condition monitoring and fault diagnosis on a live project/case study.
	Mechatronics	Identify the suitable sensor and actuator for a Mechatronics system	Select suitable logic controls	Analyse continuous control logics for standard input conditions	Develop ladder logic programming	Design hydraulic/pneumatic circuits	Design a Mechatronics system
	Automotive Materials	Identify the need for new alternative materials to improve efficiency of automobiles.	Distinguish between the materials requirements for various types of automobiles.	Estimate the role of different classes of materials for various automotive systems	Select proper material while designing any automotive subsystem.	Select advanced materials for specific automobile components.	Comprehend Ashby charts for material selection
Sem 7	Chassis Body Engineering	Design and implement knowledge practically of Vehicle structures	Develop efficient and safe designs with consideration of all constraints.				
	CAD/CAM/CAE	Identify proper computer graphics techniques for geometric modelling.	Transform, manipulate objects and store and manage data	Prepare part programming applicable to CNC machines.	Use rapid prototyping and tooling concepts in any real life applications.	Identify the tools for Analysis of a complex engineering component.	
	Automotive Design	Design automotive component to meet desired needs	Apply the fundamental knowledge of Applied Mechanics, Strength of Materials, Engineering Materials and Theory of Machine for actual design problems				
	Product Design and Development	To design the products as per the customer/industry requirements	To apply product design tools and techniques				
	Transportation Management Motor Industry	To improve existing transport management systems	To implement advance techniques in traffic management				
	Project I	Do literature survey/industrial visit and identify the problem	Apply basic engineering fundamental in the domain of practical applications	Cultivate the habit of working in a team	Attempt a problem solution in a right approach	Correlate the theoretical and experimental/simulations results and draw the proper inferences	Prepare report as per the standard guidelines.
Sem 8	Autotronics	Practically identify different automotive Electronics systems and subsystems.	Practically identify and demonstrate Systems like Battery, Alternator, Dynamo, Starter Motors, and Sensors etc.				
	Vehicle Dynamics	Ability to design automotive component to meet desired needs.	Competence to apply the fundamental knowledge of Applied Mechanics, Strength of Materials, Engineering Materials and Theory of Machine for actual design problems.	Develop analytical abilities to give solutions to automotive design problems.			
	Vehicle Maintenance	Effectively use automotive diagnostic tools in industries	Improve existing vehicle maintenance practices in industries.				
	Vehicle Safety	Understand vehicle design from safety point of view	Apply the concepts of accident reconstruction analysis in real world				
	Project II	Do literature survey/industrial visit and identify the problem	Apply basic engineering fundamental in the domain of practical applications	Cultivate the habit of working in a team	Attempt a problem solution in a right approach	Correlate the theoretical and experimental/simulations results and draw the proper inferences	Prepare report as per the standard guidelines.



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## PO's and CO's

### Department of Civil Engineering: -

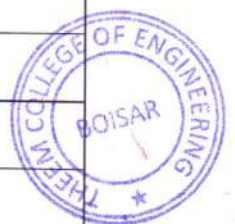
### PO's

A graduate of Civil engineering program will be able to:

- PO1. Apply the knowledge of engineering, science and mathematics for solving problems in all areas of civil engineering.
- PO2. Understand and analyze civil engineering problems and to reach a suitable conclusion by using basic principle of mathematics, science and civil engineering fundamentals.
- PO3. Develop solutions for civil engineering problems and design a competent system or process that reach the particular requirements considering social and environmental aspects.
- PO4. Apply research based knowledge and experiments, analysis and interpretation of data and reach a valid conclusion.
- PO5. Use and apply advance civil engineering equipments and modern techniques including prediction and modeling to complex engineering activities with understanding of limitations.
- PO6. Apply logical thinking to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the civil engineering practice.
- PO7. Able to understand the effect of civil engineering solution to the society and practice the sustainable development through knowledge obtained from civil engineering studies.
- PO8. Apply ethical principle and professional ethics, responsibilities and norms of the civil engineering practice.
- PO9. Function effectively as an individual, and as a member or a leader in civil engineering projects, multidisciplinary settings and among the technical experts.
- PO10. Able to communicate effectively with their peer groups, to write effective reports and prepare documentations, make effective presentation, and follow instructions clearly.
- PO11. Understand of management principles and apply them in multidisciplinary environment to manage large construction project.
- PO12. Recognize the need for long life learning to face locally & globally challenging environment.

### CO'S

Sem 3	Applied Mathematics-III	Students will be understand the basic concept of Laplace transform	Students will be able to apply linear transformation and conformal mapping	Students will evaluate contour integral and solve equation using Fourier integral.	Students will solve initial and B.V.P using ordinary differential equation and will be able to understand the concept of co-relation regression.				
	Surveying I	Students will understand basic principles, objectives and classifications of surveying and will be able to perform linear measurements by chain surveying along with ranging, offsetting.	Students will get an idea about different bearings and shall analyse the traverse with corrections by compass surveying.	Students will get the knowledge of different leveling concepts and will be able to find reduced levels at any point using different leveling instruments.	Students will plot contour justifying various characteristics and shall plot traverse using plane table and compute area of survey plot and volume of earthwork using different computational methods.	Students will handle the theodolite operation and able to find reduced level and angular measurements using different methods and study various corrections.	Students will understand tachemetry methods and able to find linear and angular measurements in both vertical and horizontal direction.		
	Strength Of Material	Student will be able to understand the concept of simple stress, strain and strain energy.	Student will calculate the shear force and bending moment for various types of flexural members.	Student will understand the principle planes, stresses and shear stresses in beam.	Students will understand the theory of simple bending in flexural members.	Students have understood with the concept of stresses in axially and eccentrically loaded vertical members.	Students will understand the thin cylindrical and spherical shell and torsion in circular shaft.		
	Engineering Geology	Students apply the core concepts of Geology with special focus in various Civil Engineering Projects.	Students can gain the knowledge and application of Tectonic plate theory, seismography & formation of various landforms existing on the Earth's Surface.	Students identify various minerals and its classification through the mode of formation, texture etc. And understand their applications in Civil Engineering Projects.	Students gain knowledge structural geology in order to understand the occurrence of various deformations on the surface of earth such as faults, folds, joints, etc, and the stratigraphy of India.	Students apply their knowledge with respect to various Geological Investigations and its importance to achieve stability and safety in various structures like dams, tunnels and reservoirs.	Apply their knowledge with respect to various Geological Investigations and its importance to achieve stability and safety in various structures like dams, tunnels and reservoirs.		
	Fluid Mechanics I	Students understand Properties of fluid and basic concepts applicable to fluid mechanics	Students will solve problems on Pascal's law, hydrostatic law and determination of Hydrostatic pressure and Centre of pressure	Students apply the concepts of buoyancy, Metacenter, metacentric height and liquids in relative equilibrium.	Students understand the concepts of ideal fluid flow and fluid kinematics.	Students understand the concepts of fluid dynamics such as Bernoulli's theorem and its applications.	Students understand visualize the flow through orifices, mouthpieces, notches and weirs.		
Sem 4	Building Material Construction	Students understand various types of structure and foundation.	Students study the classification, properties and manufacturing process of basic construction materials.	Students study the classification, properties and manufacturing process of basic construction materials.	Students understand types of formwork, flooring and roofs used in construction.	Students know various materials like glass, timber, metal, alloys & their various types for uses in construction.	Students study various building services, air conditioning and ventilation, acoustics and sound insulation, damp-proofing and water proofing techniques in construction.		
	Applied Mathematics IV	Students use matrix algebra with its specific rules to solve the system of linear equations.	Students understand and apply the concept of probability distribution and sampling theory to engineering problems.	Students apply principles of vector differential and integral calculus to the analysis of engineering problems.	Students identify, formulate and solve engineering problems.				
	Concrete Technology	Students study the ingredients of the concrete & Properties of cement & aggregate	Students study the details of concrete & concreting techniques and to differentiate between properties of fresh and hardened concrete.	Students can design concrete mix by I.S. method.	Students study about the HPC, admixtures and their application.	Students study various types of special concrete, its use and application.	Students perform various NDT on concrete structures and to study crack repair and rehabilitation of concrete structures		
	Surveying II	Students understand the principle, uses and importance of tachemetry.	Students will learn and analyse various methods tachemetry and their application in practical work.	Students understand the various types of curves and able to analysis setting out of horizontal curve.	Students learn analysis of setting out of vertical curves & works with suitable methods.	Students learn analysis of setting out of vertical curves & works with suitable methods.	Students will be able to plot contour maps and road section by field measurement.		
	Building Design And Drawing- I	Students will get an idea of load bearing, framed and Composite structure.	Students understand the concept of footing, types of footing, Doors, windows and stair-case	Students will be able to plan the building as per the bye laws and sun path diagram and able to execute the plan onto the field.	Students understand various terminologies of building drawing and local district rules and can draw the plan, elevation, section of the building.	Students will be able to plan the bungalow as per the bye laws and principal of planning.	Students will be able to draw the line diagram of water supply, sanitary and electrical layouts.		
	Fluid Mechanics- II	Students get familiar with concepts of major and minor losses due to various pipe fittings.	Students get familiar with concepts of major and minor losses due to various pipe fittings.	Students will be able to evaluate pressure drop in pipe flow using hagen-poiseuille's equation for laminar flow in a pipe	Students do understand the concept of Prandtl's mixing theory and solve turbulent flow problems.	Students do distinguish the types of compressible flow based on mach number.	Students will be able to analyze and solve problems on stagnation properties.		
Sem 5	Structural Analysis-I	Students will be able to draw SFD, AFD and BMD of determinate frame with internal hinge.	Students will be able to find the slope and deflection of beams using these methods	Students will be able to find the deflection and slope in portal frames using Energy methods.	Students get the concept of influence line diagram and can draw influence line for determinate structures.	Students can analyze the arches, suspension bridges and three ringed stiffness girder	Students will be able to find the stresses in struts, unsymmetrical section and can find shear centre for various sections.		
	Geotechnical Engineering-I	Students understand properties of soil and also able to understand interrelationship between soil properties	Students will be able to understand and analyse particle size and plasticity characteristic and also able to classify the soil	Students will learn to calculate phenomenon such as permeability and seepage	Students will understand principle stress and shear strength developed in soil	Students will understand phenomenon such as compaction, consolidation of soil	Students will learn to conduct various methods of investigation and test on soil		
	Building Design & Drawing- II	Students learn and understand the planning concepts, rules, regulations, various types of authorities for public building	Students get knowledge and able to draw one point & two point perspective drawings for public buildings.	Students learn to understand redevelopment concept and residential planning	Students get familiar with objective and principles of town planning.	Students get knowledge of architecture & modular planning by using computer in building planning & Design.	Students able to understand green building concept and its certification method.		



Sem 5	Applied Hydraulics- I	Students able to understand the momentum principle, moment of momentum equation and applications of hydraulic machines	Students able to understand the significance of dimensionless numbers, concept of dimensional homogeneity and different types of model laws and their applications	Students able to determine force exerted on stationary flat plates which held normal and vertical to jet and also for curved plate	Students able to understand about the general layout, working procedure of hydro electric plates and calculations of efficiencies for different turbines	Students will be able to understand the working procedure of centrifugal pumps, series parallel operations involved and reciprocating pumps	Students gets the knowledge of applications of different types hydraulic machines like hydraulic rams, hydraulic accumulator, press, hydraulic intensifiers and hydraulic lifts		
	Structural Analysis- II	Students identify stable, unstable, determinate and indeterminate structures.	Students will be able to determine the deflection of determinate structures due to temperatures effect & settlement.	Students will analyse the indeterminate structures by force methods.	Students can analyse the indeterminate structures by displacement methods.	Students get the idea about plastic analysis and will be able to determine shape factor, plastic moment carrying capacity and collapse load.			
	Transportation Engineering- I	Students will be able to understand the elements of Air Transportation such as terminal building, parking facilities, apron, hangars, markings and lightings, airport drainage, ATC etc.	Students able to design the airport elements such as runway orientation, length, gate and taxiway.	Students able to understand elements of water transportation like harbours, ports and breakwater including study of facilities and equipment's used.	Students will be able to decide the Cross Section of the Permanent way and suggest suitable ballast, sleepers, rail and their failures and fasteners.	Students will be able to understand the Cross Section of the Permanent way and suggest suitable ballast, sleepers, rail and their failures and fasteners.	Students will be able to understand and design the geometric elements of Railway Line such as Gradient, Curves, Super Elevation, Turnouts etc.	Students will be able to understand working of yards, signalling systems, maintenance of railway track and its construction and modernization	
Sem 6	Geotechnical Engineering - II	Students understand concept of stability of slope and study various method of evaluating stability of slope.	Students will be able to understand lateral earth pressure theories and method to calculate active and passive earth pressure also able to check stability of retaining structure	Students will be able to calculate bearing capacity to design various footing such as square, rectangle etc.	Students will be able to understand necessity of pile foundation and also able to design and calculate load on pile.	Students able to understand concept of underground conduit and estimation of strut load in braced cut.	Students will understand application of reinforced soil.		
	Environmental Engineering- I	Students will understand the importance of sanitation. They will also learn to estimate water demand using population forecasting methods.	Students will learn to give layout of distribution system which is suitable for particular location.	Students get idea about whole water treatment process and will be able to design sedimentation tank and rapid sand filter.	Students get the idea about different coagulants, disinfectant, iron removal, defluoridation, Reverse osmosis and hardness removing methods.	Students get the idea about how to manage the solid waste in the society.	Students will be able to give plumbing layout and improve the sanitation by providing modern plumbing systems with water efficient future.		
	Applied Hydraulics- II	Students will understand the boundary layer theory and boundary layer separation on the submerged bodies.	Students will understand the impact of engineering solutions for boundary layer theory in the context of submerged bodies.	Students will develop the understanding of the flow phenomena and parameters in channel section.	Students shall design most efficient channel section	Students will understand the different slope profiles and its effect on the flow characteristics.	Students will apply the specific energy concepts on various channel sections.	Kennedy's and Lacey's theory for designing irrigation channels	
	Design & Drawing Of Steel Structures	Students get the idea of the properties of steel and working stress method & limit state method.	Students will be able to design of simple connections and bracket connections with bolted & welded.	Students get the idea about failures of tension member and design of tension member.	Students get the idea about failures of compression member and design of compression member as strut & column.	Students will be able to design column bases.	Students will be able to design laterally supported and unsupported beam.	Students will be able to design a truss.	Students will be able to design a plate girder using IS code.
	Theory Of Reinforced And Prestressed Concrete	Students will understand the concept of reinforced concrete & working stress method (WSM).	Students will analyse & design various types of beam& columns by WSM	Students will design slab, footing & shear bonds in structure by WSM.	Students will understand basic design principles, methods, losses & analysis of prestressed concrete.	Students will learn the general design principles of a prestressed concrete member.	Students will Understand working of yards, signalling systems, maintenance of railway track and its construction and modernization.		
	Transportation Engineering- II	Students will be able to understand to Design geometric elements of pavements	Students will be able to provide suitable design based on available material and its characteristics and apply construction techniques	Students will be able to understand the drainage system and their role in preventing failure	Students will be able to carryout functional and structural evaluation and thereby applying techniques to strengthen the distressed pavement.	Students will be able to carry out traffic planning and operation of traffic elements and their role in traffic control.	Students will be able to understand concepts related to Bridge Engineering, its types and components.		
Sem 7	Quantity Survey, Estimation & Valuation	Students can read, understand and interpret plans, sections, detailed drawings and specifications for a construction project. To study the various methods of detailed and approximate estimates	Students will be able to emphasize the importance of relevant IS: 1200-1964 codes and relevant Indian Standard specifications, taking out quantities from the given requirements of the work, and drafting specifications.	Students can conduct a material and labour survey to understand the current market rates for the various materials required for construction and the different categories of labour required. To prepare specifications of various types, prepare specifications for the various items as a part of tender documents. Understanding the importance and use of specification.	Students will be able to perform the rate analysis for various items standard and non-standard and the use of DSR in this process.	Students will be able to study the process of tendering and its various stages, various types of contracts, its suitability and validity as per the Indian Contract Act of 1872 and draft various clauses and conditions of a contract. Will be able to understand the arbitration process.	Students can study assessment of the value of a property with or without structure. Study the Valuation table and formulas for assessing different types of properties.		
	ENVIRONMENTAL ENGINEERING II	Students will be able to determine quantity of waste water and also design the sewer line for a population of particular city	Students will analyse waste water sample and suggest a suitable solution to remove the impurities from water.	Students get the idea about working and design of secondary treatment units and sludge disposal standards.	Students get the idea about advanced water treatment used for removal of nutrients from waste water and how to calculate oxygen deficit.	Students will be able to give plumbing layout and improve the sanitation by providing modern plumbing systems with water efficient fixtures.	Students shall be able to carry out analysis of air quality and understand how it affects human health. They will also learn about pollution controlling measures		
	IRRIGATION ENGINEERING	Students will be able collect data and calculate the demand of water for agricultural land	Students will be able to derive hydrographs and predict yield of catchment.	Students can apply their knowledge on ground water, well hydraulics to estimate safe yield	Students will be able to investigate and control level of sedimentation in reservoir.	Students will perform stability analysis and design various hydraulic structures.	Students can analyse and carry out design of water resource distribution system.		
	LIMIT STATE METHOD FOR REINFORCED CONCRETE STRUCTURE	Students will develop the clear understanding of the concepts of the design of reinforced concrete structure using ULM and LSM.	Students will understand the concept of ULM and apply it in analysis and design of beams.	Students will understand the concept of ULM and apply it in analysis and design of beams.	Students will independently or as a member of the team design structural member like beam, column, slab and footing by using LSM.				
	Traffic Engineering & Control	Students will understand the all the traffic characteristics such as speed, journey time, hydrodynamic analogies, queuing theory and entropy in traffic engineering.	Students will understand all the traffic surveys such as O&D, Parking, Accident etc. required for effective traffic management system and to correlate the concepts related to highway capacity.	Students will understand, plan and design all the important elements on the roads like signal, rotary, traffic management systems and street lighting.	Students will apply statistical analysis in traffic engineering				
	SOLID WASTE MANAGEMENT	Students will understand the all the traffic characteristics such as speed, journey time, hydrodynamic analogies, queuing theory and entropy in traffic engineering.	Students will understand all the traffic surveys such as O&D, Parking, Accident etc. required for effective traffic management system and to correlate the concepts related to highway capacity.	Students will understand, plan and design all the important elements on the roads like signal, rotary, traffic management systems and street lighting.	Students will apply statistical analysis in traffic engineering				
	Advance Structural Analysis	Students will understand the all the traffic characteristics such as speed, journey time, hydrodynamic analogies, queuing theory and entropy in traffic engineering.	Students will understand all the traffic surveys such as O&D, Parking, Accident etc. required for effective traffic management system and to correlate the concepts related to highway capacity.	Students will understand, plan and design all the important elements on the roads like signal, rotary, traffic management systems and street lighting.	Students will apply statistical analysis in traffic engineering				
	Design And Drawing Of Reinforced Concrete Structures	Students will understand the complete analysis and design of residential and industrial buildings using relevant IS codes.	Students will understand the complete analysis and design of different types of retaining walls.	Students will understand the complete analysis and design of different types of water tanks using relevant IS codes by working stress method.	Students be well versed with concepts of civil engineering techniques and ability to use it in practice				
	Construction Engineering	Students will understand the different types of standard/special equipment used in the construction industry and learn the different sources of equipment, economic life and depreciation cost of equipment.	Students will be able to determine owning and operating costs, evaluate maintenance and repair costs.	Students will understand the various equipment related to earth moving, drilling and blasting, pile driving, pumping, stone crushing, air compressors, equipment for moving materials etc.	Students will understand the complex processes involved in the construction of tunnels.	Students will understand various soil stabilization techniques such as sand drains and stone columns, use of geotextiles and chemicals, diaphragm wall, rock anchors, foundation grouting, etc.	Students will Understand the concept of mass concreting, vacuum concreting and modern slip forms and to understand different types of cladding and their arrangements.		
	Sem 8	Construction Management	Students will be able to understand and apply Management principles, its significance in Construction Management and managing resources. They can also plan, schedule, execute and control projects effectively using resources.	Students will know the unique features, life cycle of project. Understanding the roles and responsibilities of the agencies involved. It gives an idea about organizing and mobilizing resources, design an effective layout etc.	Students will be able to demonstrate capability for preparing project networks and work out best possible project duration. Students shall be able to draw bar charts, for different stages of Planning. Analyse Network to find Critical Path. Use PERT method for particular projects, deducing time estimates and finding slack. Finding the probability of project completion time using statistical tools.	Students will be able to implement Materials Management, the methods used for inventory control. They get an idea of Manpower planning, selection & recruitment, training, performance evaluation. Understand basics of Finance management, sources of funds, their pros & cons based on project economic appraisal. Students learn the method of Resource levelling and Resource smoothing. Students get a basic introduction to Project management software.	Students will understand various records to be maintained, writing progress reports and updating the network at regular intervals. Students are able to achieve Time Cost optimization using compression, decompression techniques. Understanding reasons for Time Over run and Cost overrun and corrective measures in such situation. Student understands the importance of Quality, checks to be performed, prepare Quality manual, use statistical quality control. Understanding IS 14000.	Implement the safety as well as quality aspects during the execution of civil engineering project. Students shall be able to identify causes of accidents, workout cost of accidents, identifying Occupational hazards. Health & safety campaign. Understanding various legislation, their objectives, applicability and eligibility in projects.	
Transportation Planning And Economics		Students will be able to understand and apply Land use transport models for transportation planning. They will also be able to understand travel forecasting principles and techniques in planning	Students get to understand the various cost and benefit related to transport project. And they will also be able to compare feasibility of projects using net present value and rate of return from projects.	Students will be able to compare characteristics and application of various mass rapid transit system used in urban transportation					



Industrial Waste Treatment	Students will be able to understand and apply Land use transport models for transportation planning. They will also be able to understand travel forecasting principles and techniques in planning.	Students get to understand the various cost and benefit related to transport project. And they will also be able to compare feasibility of projects using net present value and rate of return from projects.	Students will be able to compare characteristics and application of various mass rapid transit system used in urban transportation					
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H. J. THIM TRUST'S

# THEEM COLLEGE OF ENGINEERING, BOISAR

Approved By AICTE (New Delhi) Government of Maharashtra & DTE  
Affiliated To University of Mumbai

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## PO's and CO's

### Department of Computer Engineering: -

### PO's

A graduate of Civil engineering program will be able to:

- PO1: Engineering Knowledge:** Apply knowledge of mathematics, science and Computer Engineering to solve complex Engineering problems  
**PO2: Problem Analysis:** Identify, formulate, research literature and analyze complex engineering problems to arrive at valid conclusions.  
**PO3: Design & Development of Solutions:** Design and Develop System architecture, algorithm, hardware component, or Data Flow Diagram to meet desired needs with real time constraints.  
**PO4: Investigation of Complex Problem:** Analyze algorithm, interpret data and calculate time and space complexity to arrive at valid conclusions.  
**PO5: Modern Tools Usage:** Apply upgraded tools and techniques in modeling and design of Computer interface.  
**PO6: Engineer and Society:** Apply the knowledge to assess societal, health, safety, legal and cultural issue and consequent responsibilities to Computer Engineer.  
**PO7: Environment & Sustainability:** Demonstrate knowledge and an understanding of an impact of engineering solution on environment and need for sustainable development  
**PO8: Ethics:** Commit to professional ethics, responsibilities and norms of engineering practice.  
**PO9: Individual & Team work:** Work effectively as an individual, and as a member or Team leader in different areas.  
**PO10: Communication:** Effectively communicate, write report, design documentation and make presentations.  
**PO11: Project management & Finance:** Demonstrate knowledge and an understanding of management principles and apply them while managing projects.  
**PO12: Lifelong Learning:** Recognize needs for and engage in learning, understanding, and applying new ideas in the context of technological change.

### CO'S

Sem 3	Applied Mathematics III	Understand complex variable theory, application of harmonic conjugate to get orthogonal trajectories and analytic function.	Plot the image of the curve by a complex transformation from z-plane to w-plane.	Expand the periodic function by using Fourier series and complex form of Fourier series $l e^{m\pi s}$	Understand the concept of Laplace transform and inverse Laplace transform of various functions and its application to solve ordinary differential equations.	Apply the concept of Z-transformation and its inverse of the given sequence.	Apply the concept of Correlation and Regression to the engineering problems.	
	Object Oriented Programming Methodology	Understand features and concepts of object oriented programming.	Solve various computational problems using constructs such as if-else.	Understand the concepts of classes and objects in detail.	Understand the importance of interfaces and classes.	Understand the use of multithreading, packages, lists and wrapper classes.	Handle exceptions and program applets.	
	Data Structures	Study different data structures.	Implement different operations on stack and queue.	Implement different operations on Link list.	Implement different operations on trees.	Handle different traversal techniques using graph.	Select appropriate sorting techniques for a given problem.	Select appropriate searching techniques for a given problem.
	Digital Logic Design and Analysis	Understand different number systems and their conversions	Analyze and minimize Boolean expressions.	Design and analyze combinational circuits.	Design and analyze sequential circuits	understand the basic concepts of VHDL.	study basics of TTL and CMOS Logic families.	
	Discrete Structures	reason logically.	understand use of functions, graphs and trees in programming applications.	understand use of groups and codes in Encoding-Decoding .	express recursive functions of other subjects like Data Structures as recurrence relation.			
	Electronic Circuits and Communication Fundamentals	understand the use of semiconductor devices in circuits and modify it as per requirement	understand the significance of power amplifiers in day to day applications along with the importance of oscillators.	understand the basic concepts of operational amplifier along with its application.	understand the fundamentals of electronic communication and its application.	apply knowledge of electronic devices and circuits to communication applications.	study basic concepts of information theory.	
Sem 4	Analysis of Algorithms	calculate time complexity and space complexity of an algorithm	analyze different divide and conquer problems	analyze different greedy method problems.	analyze different dynamic programming problems	analyze different backtracking problems	analyze different string matching algorithms.	select appropriate problem solving strategies
	Computer Organization and Architecture	understand basic structure of computer.	perform computer arithmetic operations.	Ability to understand control unit operations.	design memory organization that uses banks for different word size operations.	understand the concept of cache mapping techniques.	understand the concept of I/O organization.	conceptualize instruction level parallelism.
	Data Base Management systems	have the ability to reason logically.	understand use of functions, graphs and trees in programming applications.	understand use of groups and codes in Encoding-Decoding .	express recursive functions of other subjects like Data Structures as recurrence relation.	get the idea of ACID properties used in transaction. They will get to understand the concept of deadlock handling and how it should be prevented or detected.	get the idea of various techniques used for query optimization.	
	Theoretical Computer Science	Get a conceptual understanding of the fundamentals of alphabets, grammar languages.	Develop an understanding of different types of Turing machines and their applications.	Classify and differentiate between the power and limitations of theoretical models of computations.	Grasp the design of basic machines, regular expressions, deterministic and non deterministic machines.	Understand the various problems including the halting problems and undecidability.	Compare different types of languages and machines.	
	Computer Graphics	Understood basic concepts of computer graphics	Acquired knowledge about drawing basic shapes such as lines, circle ellipses.	Got basic knowledge of windowing and clipping.	Acquired knowledge about Illumination Models and Surface Rendering	Learnt about processing of basic shapes by various processing algorithms.	Acquired knowledge about Color Models	



Sem 5	Microprocessor	Understand Processor Architecture.	Create assembly language and mixed language programs for 8086 based system.	Design system using memory chips and peripheral chips for 8086 microprocessor	illustrate techniques to improve performance of microprocessors.	Distinguish between RISC and CISC		
	Operating Systems	Understand basic knowledge, functions and services of Operating system as system software	Design functions and services and learn various scheduling algorithms.	Identify the role of process synchronization towards increasing throughput of the system	Solve the deadlock problems, resource allocation and apply various techniques.	Analyze study and implementation of memory, I/O and file management.	Recognize the various data structures used by different OS like Unix Linux and Windows 7	
	Structured and Object Oriented Analysis and Design	understand and apply Techniques to get the System Requirements.	understand and present System Requirement in standard format	understand and Analyse Feasibility for System Requirements	understand and Model different System Requirements.	design different Databases required for various Systems as per the needs of an Organisations.	get the idea of various UML Diagrams.	
	Computer Networks	develop an understanding of computer network, protocol, topology and the concept of OSI layers.	conceptual understanding of the guided and unguided media.	understand Flow control, error control, framing With the aloha and CSMA.	understand the concept of v4 and IPv6 addresses, subnetting with the routing algorithm.	understand the concept of socket programming with the congestion control.	understand the concept application layer services and SNMP.	
	Web Technologies	Understand Processor Architecture.	Create assembly language and mixed language programs for 8086 based system.	Design system using memory chips and peripheral chips for 8086 microprocessor	illustrate techniques to improve performance of microprocessors.	Distinguish between RISC and CISC		
Sem 6	System Programming and Compiler Construction	Understand system program and application program.	Learn the basics of assembler, compiler loader and macroprocessor.	Understand different types of software tools.	Study different phases of compiler.	Implement different types of parsers.	Apply different code optimization and generation techniques on given code.	
	Software Engineering	get a conceptual understanding of the Software engineering, Software processing models and Metrics	develop an understanding of different types of Cost estimation Models and the software scheduling and Planning	develop and understanding of Risk management and software configuration management with version and change control	grasp the design of software and understand the concept of software architecture and user interface design with Software quality assurance and quality metrics	understand the concept of Black box, white box and oo testing.	understand the concept of software maintenance and reverse engineering with web engineering and TDD process	
	Distributed Databases	get the idea of distributed database systems, issues in designing, and architectures of DDB	get the idea about fragmentation, allocation and various transparencies in Distributed Database design	get an idea of transaction management, concurrency control and various algorithms for concurrency control in distributed database.	understand Deadlock detection techniques, prevention, and avoidance and recovery protocols in distributed database systems.	get acquainted with phases of distributed query processing and global query optimization algorithms.	get an idea of Heterogeneous database architecture and various issues in heterogeneous databases.	execute Xquery on XML database file and get idea about various applications of XML in distributed database systems.
	Mobile Communication and Computing	Understand GSM and CDMA cellular architecture	Design and configure wireless access points	Use network simulator tool to simulate mobile network.	Implement small android based application.	Understand basics of wireless local area networks	Solve security issues in mobile computing.	
	Project Management	Define characteristics of a project	Conceptualize IT project management	Study and describe risk in environment and the management challenges for effective project management	Apply the project management principles across all phases of a project	Implement different phases of IT projects.	Demonstrate use of tools and techniques for the management of a project plan, monitor and controlling a project schedule and budget, tracking project progress.	
Sem 7	Digital Signal Processing	Understand the concept of Discrete time Signal and perform signal manipulation.	Perform classification of DT System and will be able to understand concept of IIR and FIR System.	Evaluate DFT and analyze the properties of DFT.	Calculate DFT using FFT Flowgraph.	Understand Fast DFT Algorithms.	Understand the concept of DSP Processor and real time DSP Applications.	
	Cryptography and System Security	understand a variety of generic security threats and vulnerabilities, identify and analyze particular security problems for a given application	understand the principles and practices of basic and advanced cryptographic techniques and its classifications.	understand the various symmetric key cryptographic techniques, their design and modes of operations along with their applications.	understand the various public key cryptographic techniques, their design and modes of operations along with their applications.	distinguish between their original data and any modified or corrupted data during transmission through a network using Cryptographic hash functions.	understand the various authentication protocols and their real time applications.	create an awareness among themselves about individual and organizational security while communicating within or outside a network with the help of firewalls, IDS, passwords, etc.
	Artificial Intelligence	develop a basic understanding of AI building blocks presented in intelligent agents	Understand working of different types of agents and environments.	Solve problems using different search strategies and reasoning and apply different learning algorithms to solve problems	Infer and explain knowledge and reasoning in uncertain domain and different methods of learning.	Develop a plan for a given search problem to design and develop the AI applications	Evaluate applications of expert system and NLP.	
	Software Architecture	Understand the architectural concepts, importance and role of software architecture	Recognize major software architectural styles, design patterns and framework	Analyze Components and different types of Connectors, their role in software architecture	Understand the modeling techniques and types of analysis for a problem and selection among them	Implement software architecture using different frameworks	Design software architecture for non-functional and domain specific software systems	
Sem 8	Data Warehouse and Mining	Get an idea of designing data warehouse for a given organization	Extract meaningful data from large database	Understand the concepts of applying and implementing algorithms	Identify which algorithm to use for efficient results	Learn various data mining techniques	Implement algorithms for decision making strategies	
	Human Machine Interaction	Knowledge of basic building blocks of human machine interaction	design user centric interfaces.	design innovative and user friendly interfaces.	apply HMI in their day-to-day activities.	criticize existing interface designs, and improve them.	Design application for social and technical task.	
	Parallel and distributed Systems	Apply the principles and concept in analyzing and designing the parallel and distributed system	Gain knowledge on the challenges and opportunities faced by parallel and distributed systems.	Understand the middleware technologies that support distributed applications such as RPC, RMI and object based middleware.	Improve the performance and reliability of distributed and parallel programs.	Study the concepts of resource and process management.		
	Digital Forensic	understand the basic definitions and focus on the procedures for identification, preservation and extraction of electronic evidences and the evidence gathering methodology	focus on the auditing and investigation of network and host based evidences.	analyze and document the information gathered and prepare a testimonial evidence and also analyze the challenges in evidence handling.	experience a hands-on environment of forensic tools and resources.	understand the various system requirements for system administrators and forensic analysts and also understand the process of forensic duplication.	differentiate between the various possible attacks on a host or network based device and how to investigate such a live system and the various laws against cyber-crime.	



  
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PO's and CO's

Department of Electrical Engineering: -

**PO's**

A graduate of Civil engineering program will be able to:

- PO-1:** Students should be able to apply knowledge of mathematics, science and engineering fundamentals and Engineering in all aspects of Electrical Engineering.
- PO-2:** Students should be able to identify, formulate and analyse complex Electrical Engineering problems reaching substantiated conclusions using basic knowledge of mathematics, science and engineering.
- PO-3:** Students should be able to design solutions for complex engineering problems and design system components to meet specific needs while considering public health, society, environment and safety.
- PO4:** students should be able to design and conduct experiment, as well as to analyse and interpret data.
- PO-5 :** Students should be able to apply the techniques of using appropriate tools to investigate, analyse, design, simulate and /or fabricate/commission complete system involving generation, transmission and distribution of Electrical energy.
- PO-6:** Students should be able to apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering practice.
- PO-7:** Students should be able to understand the impact of professional engineering solutions on society and environment and demonstrate knowledge of and need for sustainable development.
- PO-8:** Students should be able to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO-9:** Students should be able to work effectively as an individual and as a member or leader in diverse teams and in multi-disciplinary settings.
- PO-10:** Students should be able to communicate effectively on complex engineering activities with the engineering community and with society at large.
- PO-11:** Students should be able to be familiar with project management problems and basic financial principles for multi-disciplinary work.
- PO-12:** Students should be able to recognize the need for identifying contemporary issues to changing technical scenario and an ability to engage in life-long learning to update himself /herself.

**CO'S**

Sem 3	Applied Mathematics-III	To demonstrate basic knowledge of Laplace Transform.	To evaluate problems of Fourier series, Bessel Functions.	To solve Vector Algebra in electrical engineering.	To use Complex Variable in their engineering problems.			
	Electronic Devices and Circuits	To identify the different types of diodes and their applications in electronic circuits	To analyze the dc and ac parameters of BJT JFET, and differential amplifiers	To demonstrate and analyze the effects of various parameters on performance of BJT and JFET amplifier.	To analyze the effects of negative feedback in BJT and JFET amplifiers.	To identify the effects of cascading in BJT and JFET amplifiers.	To analyze the different types of oscillators.	
	Conventional & Non-conventional Power Generation	Familiar with the reserved energy resources and basics of power generation calculations.	Familiar with techniques of power generation, operation and maintenance of thermal power plant.	Familiar with power generation using Hydro power plant, nuclear power plant, Diesel power plant and gas turbine power plant.	Familiar with power generation using non conventional sources of energy and their advantages over conventional power generation.			
	Electrical & Electronics Measurement	To illustrate the working principle of measurement instruments.	To analyse the working of various analog and digital instruments in electrical measurements.	To analyse the concept of extension of range of meters used in electrical measurements.	To analyse the performance of bridges used in electrical measurement process.	To illustrate the need for calibration process in instruments.	To analyse the performance of transducers involved in electrical measurement.	
	Electrical Machine-I	Familiar with the basic knowledge of Electro-Magnetism & Electro-Mechanical energy conversion.	Familiar with the working principle, performance, control and applications of Electrical DC Generator.	Familiar with the working principle, performance, control, testing and applications of Electrical DC Motor.	Familiar with the working principle, performance, control and applications of Stepper motor.			
	Object Oriented Programming and Methodology Lab	To apply fundamental programming constructs.	To illustrate the concept of packages, classes and objects.	To elaborate the concept of strings, arrays and vectors.	To implement the concept of inheritance and interfaces.	To implement the notion of exception handling and multithreading.	To develop GUI based application.	
Sem 4	Applied Mathematics IV	To develop the proactive approach towards the selection of methods of solution of engineering problems in calculus.	To compute Eigen values and Eigen vectors.	To identify different probability distribution, learn sampling technique.	To evaluate complex integrals and use their applications in electrical engineering problems.			
	Power System-I	To illustrate the general structure of power system.	To illustrate purpose of different mechanical components of overhead transmission lines.	To determine transmission line parameters for different configurations.	To analyze the performance of short, medium and Long transmission line	To analyze the performance of transmission line for different loading condition .a	To illustrate safety norms and regulations related to underground cables and grounding techniques.	
	Electrical Machine-II	To illustrate the working principle of single phase and three phase transformer	To illustrate the working principle of auto-transformer	To analyse various type of connections of three phase transformer.	To analyse performance of transformer under various operating conditions	To illustrate various design aspects of transformer.	To analyse the characteristics of CT and PT	





Sem 4	Electromagnetic Field and wave Theory	To apply knowledge of mathematics and physics in electrical engineering field.	To analyze electrostatic and static magnetic fields.	To analyze the effect of material medium on electric and magnetic fields.	To analyze and formulate time varying electric and magnetic fields.	To analyze wave generation and its propagation in different media.	To analyze static magnetic field and electrostatic field distribution using software tool.
	Analog and Digital Integrated Circuits	To illustrate various performance parameters and characteristics of operational amplifier.	To illustrate various linear and non-linear application of operational amplifiers.	To design and analyse linear voltage regulators and multivibrators.	To do various conversion of number systems and illustrate logic families.	To build, design and analyse combinational circuits.	To build, design and analyse sequential circuits.
	Electrical Network	To analyze electrical network using different Network theorems.	To analyze electrical network using Graph theory.	To analyze the effect of switching conditions on Electrical networks using Differential equations.	To analyze the effect of switching conditions on Electrical networks using Laplace Transform.	To develop transfer function model of system using two port network parameters.	To analyze time domain behavior from pole zero plot
Sem 5	Power System - II	To understand different kind of faults on transmission line.	To analyse symmetrical fault	To analyse symmetrical components and unsymmetrical faults.	To illustrate and analyse power system transients	To understand insulation co-ordination in power system.	To understand and analyse corona on transmission line.
	Electrical Machines - III	To illustrate the working principle of three phase induction motor	To analyse and evaluate performance of three phase induction motors under various operating conditions	To illustrate various speed control and starting methods of three phase induction motor.	To illustrate the working principle of single phase induction motor	To analyse the performance of single phase induction motor.	To design three phase induction motor
	Control System - I	To model electrical and electromechanical system using transfer function.	To illustrate methodology for simplification of system	To model and analyse given system in state space	To analyse steady state condition of given system	To analyse the transient and stability conditions of physical system	
	Power Electronics	Select and design power electronic converter topologies for a broad range of energy conversion applications.	Analyse and simulate the performance of power electronic conversion systems.	Analyse various single phase and three phase power converter circuits and understand their applications.	Apply the basic concepts of power electronics to design the circuits in the fields of AC and DC drives, power generation and transmission and energy conversion, industrial applications.	Identify and describe various auxiliary circuits and requirements in power electronics applications such as Gate driver circuit, and snubber circuits along with electrical isolation and heat sinks	
	Utilization of Electrical Energy	To understand and analyse the power factor for improving the quality of supply.	To analyse different type of traction systems.	To understand modern tools to control electric traction motors.	To understand concept of electrical heating and welding and their application.	To understand different methods of cooling systems used in domestic electric appliances.	
	Business Communication and Ethics	Design a technical document using precise language, suitable vocabulary and apt style.	Develop the life skills/ interpersonal skills to progress professionally by building stronger relationships.	Demonstrate awareness of contemporary issues knowledge of professional and ethical responsibilities.	Apply the traits of a suitable candidate for a job/higher education, upon being trained in the techniques of holding a group discussion, facing interviews and writing resume/SOP.	Deliver formal presentations effectively implementing the verbal and non-verbal skills.	
Sem 6	Protection and Switchgear Engineering	To select the appropriate switching/protective device for substations.	To discriminate between the application of circuit breaker and fuses as a protective device.	To understand the basic concept of relay, types of relay and their applications in power system.	To select the specific protection required for different components of power system according to the type of fault.	To apply the specific protection provided for different types of transmission lines.	
	Electrical Machines - IV	To determine the performance parameters of synchronous machines graphically and analytically by conducting different test.	To analyse the performance parameters of synchronous machines.	To understand the concept of direct and quadrature axis parameters of synchronous machines.	To understand and analyse the operation of synchronous motor.	To analyse abc to dq0 transformation and steady state operation of synchronous machine.	To understand the operation and analyse control of BLDC motors.
	Signal processing	To discriminate continuous and discrete time signals and systems.	To understand the transformation of discrete time signal to Z domain.	To analyse frequency response of systems using Z domain.	To understand discrete and fast Fourier transform.	To design FIR system.	To design IIR System.
	Microcontroller and its Applications	To understand the features and architecture of PIC 18 microcontroller.	To understand the instructional set and apply to basic arithmetic and logical operations.	To understand the supportive devices of PIC 18 microcontrollers.	To understand the interfacing of PIC 18 microcontroller and its peripheral.	To understand the coding of PIC 18 microcontroller using C language.	To design general purpose applications of PIC 18 microcontroller.
	Control System - II	To understand the basic design of various compensators.	To design compensators using root locus techniques.	To design compensators using frequency response techniques.	To design compensators using state variable approach.	To illustrate basics of digital control system.	To design digital compensators.
Sem 7	Micro-grid	To identify and describe the evolution Microgrid, its features and barriers.	To select, size and design the various microgrid resources.	To model, analyze and design the power electronics (PE) interfaces for various microgrid sources	To identify and describe the role communication in Microgrid realization.	To identify and describe various operational strategies and protection schemes suitable for Microgrid.	To apprise the different standards applicable for microgrid deployment
	Power System Operation & Control	To develop ability to analyze and use various methods to improve stability of power systems.	To understand the need for generation and control of reactive power.	To impart knowledge about various advanced controllers such as FACTS controllers with its evolution, principle of operation, circuit diagram and applications.	To illustrate the automatic frequency and voltage control strategies for single and two area case and analyze the effects, knowing the necessity of generation control	To understand formulation of unit commitment and economic load dispatch tasks and solve it using optimization techniques.	
	High Voltage DC Transmission	Understand HVDC transmission system with various links & working of its entire component.	Understand & analyze working of converters with and without overlap.	Know the various control schemes involved in HVDC system.	Identify various types of faults in HVDC & use the corresponding protection schemes.	Improve the quality of power transmitted using various filters.	
	Electrical Machine Design	Students will be able to know the basic knowledge of Magnetic, Electrical, Conducting and Insulating materials used in electrical machines	Students will be able to relate the physical dimensions of different parts of the transformer to the rating..	Students will be able to exposed to the optimization in induction motor design.	Able to know the performance measurement of three phase induction motor and three phase transformer.	Able to analyse and solve designing numericals based on three phase transformer	
Sem 8	Control System-II	Students will have knowledge of different compensating methods and the automation of basic systems using PLC					
	Renewable Energy & Energy Storage System	Understand current scenario of depleting world's production and reserves of fossil fuels, bad impact of fossil fuel power plants on environment and the means of mitigating these issues with different renewable energy alternatives based distributed generation.	Understand the process of power generation through solar thermal & solar photovoltaics.	Understand the process of power generation through Wind Energy system (WES), Fuel cell technology, biomass, tidal, Ocean Thermal Electric Conversion, geothermal, and Micro-hydro, etc.	Understand and describe the importance of various forms of energy storage, importance of storage system in new power generation scenario, their characteristics and performance with various applications.		
	Design Management & Auditing of Electrical System	Familiar with the basics of Electrical power system.	Familiar with the knowledge of designing of electrical distribution network.	Familiar with the Energy Monitoring, Targeting & Management of Electrical system.	Familiar with the electrical energy audit & energy efficient system design.		
Sem 8	Drives & Control	Gain an ability to design and conduct performance experiments, as well as to identify, formulate and solve drives related problems.					
	Power System Planning & Reliability	Should be able to make a Generation System Model for the Power system in terms of frequency and duration of failure.	Should be able to calculate reliability indices of the power system based on system model.	Should be able to get load flow analysis.	Should be able to get optimized system	To study Bidding and Tendering process studied	Should be able to plan a small Generation and Transmission System, predict its behavior, do the required change in order to achieve reliability.



Flexible AC Transmission System	Understand the concept of FACTS & necessity of load compensation taking into account the general system considerations.	Understand & analyze the working of FACTS controller used for shunt compensation.	Understand & analyze the working of FACTS controller used for series compensation.	Mitigate the problems of voltage & phase angle regulation with the help of FACTS controller.	Understand & analyze the working of combined shunt & series controller.	
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**PO's and CO's**

**Department of Electronics & Telecommunication Engineering: -**

**PO's**

A graduate of electronics and telecommunication engineering program will be able to:

- PO1: Engineering Knowledge: Acquire and apply knowledge of Mathematics, Science and Electronics and Telecommunication Engineering fundamentals to solve complex engineering problems
- PO2: Problem Analysis: Identify, formulate and analyze complex Electronics and Telecommunication Engineering problems to derive conclusions
- PO3: Design & Development of Solutions: Design algorithm, system, and circuit to develop solutions for complex Electronics and Telecommunication systems to meet desired needs.
- PO4: Conduct investigation of Complex Problem: Design and conduct experiments, analyze and interpret data for analog, digital Electronics and Telecommunication systems.
- PO5: Modern Tools Usage: Identify and apply appropriate techniques and modern engineering tools in the modeling and design of Electronics and Telecommunication Engineering practice.
- PO6: Engineer and Society: Apply appropriate knowledge to assess societal, health, safety, legal and cultural issue and consequent responsibilities to the professional engineering practice.
- PO7: Environment & Sustainability: Understand the impact of Electronics and Telecommunication Engineering solutions on society and environment for sustainable development.
- PO8: Ethics: Apply knowledge of Electronics and Telecommunication Engineering in profession with ethical responsibilities.
- PO9: Individual & Team work: Function effectively both as an individual and as a member or a leader in a multidisciplinary team.
- PO10: Communication: Effectively communicate, write report, design documentation and make presentations for engineering community and society.
- PO11: Project management & Finance: Demonstrate knowledge and an understanding of management principles and apply them while managing projects.
- PO12: Lifelong Learning: Recognize the need and engage independently for lifelong learning in the context of technological changes.

**CO'S**

Sem 3	Applied Mathematics-III	To understand the basic concept of Laplace Transformation	To solve Fourier Transformation	To solve Vector differentiation and integration	To understand basic knowledge of Complex Variable and Bessel's Function		
	Electronic Devices and Circuits I	Understand the basic components like resistor, capacitor, inductor and analyze the characteristics of PN junction Diodes	Do analysis design of rectifiers with filters and design of zener voltage regulator	Understand operation of BJT and design and analyse different configuration of the BJT amplifier	Understand operation of JFET and design and analyse the FET amplifier		
	Digital System Design	Understand various number systems and codes and their inter conversions. Also perform arithmetic operations	Understood Boolean algebra for minimization and implementation of logic functions and various Combinational circuits	Analyze design and implement sequential logic circuits	Analyze digital systems using PLD and Simulate and Implement Combinational and sequential circuits using VHDL systems.		
	Circuit Theory and Networks	Apply their knowledge in analysing Circuits by using network theorems.	Apply the time and frequency method of analysis.	Find the various parameters of two port network.	Apply network topology for analyzing the circuit	Synthesize the network using passive elements.	
	Electronic Instrumentation and Control	Understand the various types of sensors and transducers as well.	Students will get the idea about data acquisition system. And will be able to find the transfer function of a system.	Find time domain and frequency domain analysis of system and the stability using root locus technique as well.	To find stability using bode plot method and will understand Different stability analysis methods.		
	OOP using JAVA Laboratory	Code a program using java constructs.	Understand fundamental features of an object oriented language: object classes and interfaces, exceptions and libraries of object collections.	Develop a program that efficiently implements the algorithm for given tasks.	Utilize the knowledge acquired in this course to develop higher level algorithms.		
	Applied Mathematics IV	To understand Euler's Lagrange's equation and higher order derivatives	To understand importance of vector spaces in electronics and telecommunication engineering	Apply method of calculus of variations to specific systems, demonstrate ability to manipulate matrices and compute eigenvalues and eigenvectors	To understand the relevance of complex variables in various facets of engineering		



Sem 4	Analog Electronics II	Know about the various frequency responses of BJT and MOSFET amplifiers. They also got the idea of the effects of various capacitors along with the merger of various configurations.	Understand about the basic difference between the implementation of BJT and MOSFET based differential amplifiers. They also got the idea of the CMRR along with the small signal analysis.	Perform analysis of BJT, MOSFET current sources. They will also be able to overcome the drawbacks of Two transistor current sources by using the special ones.	Distinguish between the various types of power amplifiers which would help them design the required ones according to the given specifications.	Get the idea of the effect of HF and its impact on op-amp gain. They will also be able to use them in many practical applications where the demand of voltage gain would be very high.	Get the idea of voltage regulators in different configurations.
	Microprocessors and Peripherals	Students will get the idea of Architecture of 8085 and 8086 Microprocessor	Understand Instruction set and programming of 8086 and students will be able to do interfacing with 8086 and applications.	Students will get the knowledge of ADC, DAC interfacing with 8086 and its application	Perform 8086 Microprocessor interfacing, also get the basic idea of advanced microprocessors.		
	Wave Theory and Propagation	Students will get the understanding of basic laws of electrostatics and magnetostatics in vector form.	Get the understanding of the propagation of wave in different media like dielectric and conducting media by solving wave equation and find parameters of media	Calculate energy transported by means of electromagnetic waves from one point to another and to study polarization of waves.	Solve electromagnetic problems using different numerical methods.	Understand with the propagation of the waves by different types such as ground waves and space waves.	Get acquainted with the factors affecting the wave during its propagation and understand sky wave propagation, related parameters such as MUF, skip distance and critical frequency
	Signals and Systems	Understand types of signals in the time and frequency domains and its significance.	Understand system, classification of system and analysis of system using Laplace transform.	To find the z transform of signals and Fourier series of continuous and discrete time signals as well.	Students will get the idea about continuous time Fourier transform and discrete time Fourier transform which is useful in understanding behavior of Electronics circuits and communication system.		
	Control Systems	Understand the fundamental concepts of control system, types of models, signals and their response.	Find the mathematical modeling of system, Controllability and Observability of the system	Understand the stability analysis in time and frequency domain.	Get the idea about optimal and adaptive control system		
Sem 5	Microcontrollers and Applications	Get the idea of difference between microprocessor and microcontroller, purpose advantages of microcontroller 8051.	To understand different operations, instructions, assembly programming and applications of 8051 microcontroller hardware and software.	Understand architecture of ARM7, data types, different codes, movement operations, loops, assembly programming for ARM7 as well.	Get the idea about embedded system, its applications digital camera, stepper motor controller.		
	Analog Communication	Students will the idea about basics of communication system and understand the need of modulation and demodulation.	Recieve knowledge of amplitude modulation of demodulation and angle modulation and demodulation as well.	To understand different types of radio receiver and the sampling techniques for different types of signals.	To understand the concept of different pulse modulation techniques, TDM and FDM		
	Random Signal Analysis	Apply theory of probability in identifying and solving relevant problems	Define and differentiate between random variables through the use of Cumulative distribution function CDF and probability distribution function PDF as well as marginal and conditional CDF, PDF.	Get the basic idea of functions random process and will be able to determine the response of a linear time invariant system to a random process	Got the basic idea of sequence of random variables, convergence, markov chain and queuing theory		
	RF Modeling and Antennas	Design lumped and distributed element filters	Identify basic antenna parameters required for the analysis of simple wire antennas	Describe various antenna structures and differentiate them on the basis of their application and performance.	Analyze and design antenna arrays and study wireless transmit-receive systems		
	Integrated Circuits	Understand the fundamentals and areas of applications for the Integrated Circuits using OPAMP.	Design filters, oscillators and non linear application like generators, rectifiers and comparators	Design Special Purpose Integrated Circuits like 555 timer with real time applications	Understand the differences among different voltage regulators and their uses and analyze Counters, Shift Registers and ALU		
Sem 6	Digital Communication	Understand the basics of information theory and coding techniques	Determine methods to mitigate inter symbol interference in baseband transmission system	Describe and determine the performance of different error control coding schemes for the reliable transmission of digital representation of signals and information over the channel	Understand various spreading techniques and determine bit error performance of various digital communication systems		
	Discrete Time Signal Processing	To understand Transform Analysis of Linear Time Invariant System	To design filters and their implementation using various techniques	To understand multi rate signal processing	To understand various techniques for approximations in digital signal processing parlance and applications of the same		
	Computer Communication and Telecom Networks	To understand various principles of network applications	To understand the transport layer protocols and their reliability	To understand various network layer services and protocols	To understand various data link layer services, protocols and physical layer services		
	Television Engineering	Get the understanding of the basics of Analog TV systems	Students will get the understanding of the basics of picture transmission and reception	Become well conversant with new development in video engineering.	Understand, use and working principles of latest display like HDTV, LCD, LED, Plasma and large plat panel monitors.		
	Operating Systems	Understand the role of an operating system and Compare between different algorithms used for management and scheduling of processes, Memory and input-output operation.	To understand File Management and Input Output Management	To understand Unix and Linux Operating System	To understand Real time operating systems		
Sem 7	VLSI Design	Get basic idea of scaling and its effect, fabrication steps and Lambda rules	Get the idea about the different design styles and the difference between them	Design different types of inverters with static and dynamic analysis	Get the idea about the static and dynamic RAM, different flash memories, read and write process in the memory		
	Image and Video Processing	Understand basics of Image aand video processing and use various transforms to interpret and analyze 2D signals	Perform time and frequency domain image enhancement and image restoration	Understand methods for image segmentation and various morphological tools used for practical applications.	understand basics of video processing and various methods of motion estimation		
	Mobile Communication	To get the idea of different multiple access techniques, basics of cellular system and processes in cellular systems.	To understand the idea of different 2G technologies i.e. GSM , IS-95 CDMA, architecture and channels in CDMA	Get the idea of evolution of GSM to 3G technology, Architecture of IMT 2000	To understand the difference in 3G/4G technology, mobile adhoc network, mobility management, wireless sensor network and RFID technology		
	Optical Communication and Networks	Get the idea about properties of light, types of fiber	Get the idea about the structure of light sources, detectors & multiplexers.	Get the knowledge of various components used in optical network system & losses in optical fiber.	Know the designing & operating principals of modern communication system.		
	Microwave and Radar Engineering	Get the idea about Microwave frequency, their bands and application.	Get the idea about the different types of waveguides and the microwave components with the help of Scattering parameters	Design different matching methods using Z & ZY Smith chart. The differents matching are Lumped matching, Single stub matching and Double stub matching	Get the idea about the principle of RADAR, its range equation, Doppler effect and various types of RADAR and different application		
Sem 7	Data Compression & Encryption	To compress any given text sequence using various techniques	To understand various image, audio and video compression standards.	To understand various security goals and encryption standards	To understand symmetric and asymmetric key cryptography techniques and their implications in network security		
	Wireless Networks	Describe the phases of planning and design of mobile wireless networks	Compare personal area network ( PAN) technologies such as Zigbee, Bluetooth etc	To understand details of sensor network architecture, traffic related protocols, transmission technology etc	To Understand middleware protocol and network management issues of sensor networks		



Satellite communication and Networks	Get the idea about basic concept of satellite system & launching techniques.	Get the idea of space segment subsystems & earth segment.	Analyze link budget for satellite link.	Get knowledge of various access methods & satellite applications.		
Internet and Voice Communication	To understand TCP/IP networking model and configuration of Application Layer	To understand Transport layer and its underlining functions in TCP Protocol	To understand the Internet Protocol and its various standards and services	To understand the real time working of audio and video in communication		
Telecom Network Management	Demonstrate broad knowledge of fundamental principles and technical standards underlying telecom networks	To understand Internet Management using SNMP Protocol	To understand various broadband networks and services	To understand various network and telecommunication management principles		



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PO's and CO's

Department of Information Technology Engineering: -

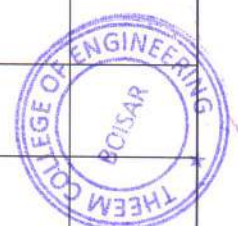
**PO's**

A graduate of electronics and telecommunication engineering program will be able to:

- PO 1: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.(Engineering knowledge)
- PO 2: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.(Problem analysis)
- PO 3: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.(Design/development of solutions)
- PO 4: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.(Conduct investigations of complex problems)
- PO 5: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.(Modern tool usage)
- PO 6: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.(The engineer and society)
- PO 7: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.(Environment and sustainability)
- PO 8: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.(Ethics)
- PO 9: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.(Individual and team work)
- PO 10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.(Communication)
- PO 11: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.(Project management and finance)
- PO 12: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.(Life-long learning)

**CO's**

Sem 3	Applied Mathematics-III	Students will be able to apply the Set theory and Relation concepts.	Students will be able to apply the Functions and define the recursive functions.	Students will be able to apply Laplace transform to different applications.	Students will be able to apply Inverse Laplace transform to different applications.	Students will be able to identify the permutations and combinations.	Students will be able to define variable and also identify the mapping.			
	Logic Design	Students will be able to understand the concepts of various components to design stable analog circuits.	Students will be able to represent numbers and perform arithmetic operations.	Students will be able to minimize the Boolean expression using Boolean algebra and design it.	Students will be able to analyze and design combinational circuit.	Students will be able to design and develop sequential circuits.	Students will be able to translate real world problems into digital logic formulations using VHDL.			
	Data Structures & Analysis	Students will be able to select appropriate data structures as applied to specified problem definition.	Students will be able to implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures.	Students will be able to implement Linear and Non-Linear data structures.	Students will be able to implement appropriate sorting/searching technique for given problem.	Students will be able to design advance data structure using Non-Linear data structure.	Students will be able to determine and analyze the complexity of given Algorithms.			
	Database Management System	Student should be able to explain the features of database management systems and Relational database.	Student should be able to design conceptual models of a database using ER modeling for real life applications and also construct queries in Relational Algebra.	Student should be able to create and populate a RDBMS for a real life application, with constraints and keys, using SQL.	Student should be able to retrieve any type of information from a data base by formulating complex queries in SQL.	Student should be able to analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.	Student should be able to build indexing mechanisms for efficient retrieval of information from a database.			
	Principle of Communications	Students will be able to differentiate analog and digital communication systems.	Students will be able to identify different types of noise occurred, its minimization and able to apply Fourier analysis in frequency & time domain to quantify bandwidth requirement of variety of analog and digital communication systems.	Students will be able to design generation & detection AM, DSB, SSB, FM transmitter and receiver.	Students will be able to apply sampling theorem to quantify the fundamental relationship between channel bandwidth, digital symbol rate and bit rate.	Students will be able to explain different types of line coding techniques for generation and detection of signals.	Students will be able to describe Electromagnetic Radiation and propagation of waves.			
Sem 4	Applied Mathematics-IV	Students will be able to apply the Number Theory to different applications using theorem.	Students will be able to apply probability and understand PDF.	Students will be able to understand sampling theory and correlation.	Students will be able to apply the graphs and trees concepts to different applications.	Students will be able to understand group's theory.	Students will be able to understand the Lattice theory.			
	Computer Networks	Students will be able to describe the functions of each layer in OSI and TCP/IP model.	Students will be able to explain the functions of Application layer and Presentation layer paradigms and Protocols.	Students will be able to describe the Session layer design issues and Transport layer services.	Students will be able to classify the routing protocols and analyze how to assign the IP addresses for the given network.	Students will be able to describe the functions of data link layer and explain the protocols.	Students will be able to explain the types of transmission media with real time applications.			
	Operating Systems	Student should be able to describe the important computer system resources and the role of operating system in their management policies and algorithms.	Student should be able to understand the process management policies and scheduling of processes by CPU.	Students will be able to evaluate the requirement for process synchronization and coordination handled by operating system.	Student should be able to describe and analyze the memory management and its allocation policies.	Student should be able to identify use and evaluate the storage management policies with respect to different storage management technologies.	Student should be able to identify the need to create the special purpose operating system.			
	Computer Organization and Architecture	Students will be able to describe basic organization of computer and the architecture of 8086 microprocessor.	Students will be able to implement assembly language program for given task for 8086 microprocessor.	Students will be able to demonstrate control unit operations and conceptualize instruction level parallelism.	Students will be able to demonstrate and perform computer arithmetic operations on integer and real numbers.	Students will be able to categorize memory organization and explain the function of each element of a memory hierarchy.	Students will be able to identify and compare different methods for computer I/O mechanisms.			
	Automata Theory	Students will be able to understand, design, construct, analyze and interpret Regular languages, Expression and Grammars.	Students will be able to design different types of Finite Automata and Machines as Acceptor, Verifier and Translator.	Students will be able to understand, design, analyze and interpret Context Free languages, Expression and Grammars.	Students will be able to design different types of Push down Automata as Simple Parser.	Students will be able to design different types of Turing Machines as Acceptor, Verifier, Translator and Basic computing machine.	Students will be able to compare, understand and analyze different languages, grammars, Automata and Machines and appreciate their power and convert Automata to Programs and Functions.			



Sem 5	Computer Graphics and Virtual Reality	Students shall have understood basic concepts of computer graphics.	Students shall have understood algorithms to scan convert the basic geometrical primitives, transformations, Area filling, clipping.	Students shall have understood the fundamentals of animation, Virtual reality the related technologies, and shall be able to describe applications of Virtual Reality.							
	Operating Systems	Student will learn important computer system resources and their management policies, algorithms used by operating systems.	Student will understand what makes a computer system function and the primary PC components.	Student will understand the working of an OS as a manager of various resources.	Student will implement some of the functions of OS such as scheduling policies, page replacement algorithms, IPC.						
	Microcontroller and Embedded Systems	Ability to understand basic structure embedded systems.	Ability to understand basic structure microcontroller.	Ability to understand basic concepts used in embedded system.	Ability to program microcontroller.	Ability to design conceptual embedded system.					
	Advanced Database Management Systems	Construct complex queries using SQL to retrieve and manipulate information in a database.	Design and implement full fledged real life applications integrated with database systems.	Clearly understand how databases are actually stored and accessed. How transaction ACID properties are maintained and how a database recovers from failures.	Apply security controls to avoid any type of security incidents on vital database systems.	Design advanced data systems using Object based systems or Distributing databases for better resource management.	Understand the importance of enterprise data and be able to organize data to perform analysis on the data and take strategic decisions.				
	Open Source Technologies	After this course students will be able to apply knowledge of the linux shell commands for working on the linux environment.	After this course students will be able to apply knowledge of the linux administration commands for performing network and system security administration.	After this course students will be able to apply knowledge of servers to configure various servers like FTP, Web server, DNS, etc.	After this course students will be able to create simple apps for the Android OS.						
	Business Communication and Ethics	A learner will be able to communicate effectively in both verbal and written form and demonstrate knowledge of professional and ethical responsibilities.	A learner will be able to participate and succeed in Campus placements and competitive examinations like GATE, CET.	A learner will be able to possess entrepreneurial approach and ability for life-long learning.	A learner will be able to have education necessary for understanding the impact of engineering solutions on Society and demonstrate awareness of contemporary issues.						
Sem 6	Software Engineering	Meet the Information Technology Program Objectives of identifying and solving engineering problems.	To understand principles, concepts, methods, and techniques of the software engineering approach to producing quality software for large, complex systems.	To function effectively as a member of a team engaged in technical work.	To think critically about ethical and social issues in software engineering for different applications.						
	Distributed Systems	The student gains clear understanding of fundamental principles of Distributed Systems along with design and implementation of key mechanisms, Clock Synchronization, Election Algorithms, Mutual Exclusion, Message Communication, Process and Resource Scheduling etc.	The student understands the message communication, remote procedure call and Remote method invocation (RPC and RMI) along with group communication.	Emphasis is on developing applications using current distributed computing technologies like EJB, CORBA and NET.	Student should be able to develop/design distributed system/applications for an enterprise using SOA.						
	System And Web Security	Upon successful completion of the course the student will be able to differentiate between authentication and authorization.	Upon successful completion of the course the student will be able to explain the basic idea behind access control and compare the various access control policies and models.	Upon successful completion of the course the student will be able to explain the need for security protocols in the context of use with Internetbased applications.	Upon successful completion of the course the student will be able to explain the basic idea behind firewalls and intrusion detection systems and how they work.	Upon successful completion of the course the student will be able to explain malicious software and typical software solutions used in dealing with viruses and worms.	Upon successful completion of the course the student will be able to understand and explain various issues related to program security and web security.				
	Data Mining and Business Intelligence	On successful completion of this course students should be able demonstrate an understanding of the importance of data mining and the principles of business intelligence.	On successful completion of this course students should be able to prepare the data needed for data mining algorithms in terms of attributes and class inputs, training, validating, and testing files.	On successful completion of this course students should be able implement the appropriate data mining methods like classification, clustering or association mining on large data sets.	On successful completion of this course students should be able define and apply metrics to measure the performance of various data mining algorithms.	On successful completion of this course students should be able apply BI to solve practical problems : Analyze the problem domain, use the data collected in enterprise apply the appropriate data mining technique, interpret and visualize the results and provide decision support.					
	Advanced Internet Technology	On successful completion of this course students should be able develop Keyword Generation, Using Google Analytics etc.	On successful completion of this course students should be able to demonstrate Responsive Web Design.	On successful completion of this course students should be able to demonstrate Amazon/Google or yahoo mashup.							
Sem 7	Software Project Management	Upon completion of the course, students should be able to articulate similarities and differences between IT projects and other types of projects.	Upon completion of the course, students should be able to justify an IT project by establishing a business case.	Upon completion of the course, students should be able to develop a project charter.	Upon completion of the course, students should be able to develop a work breakdown structure for an IT project Estimate resources (time, cost, human being, etc.)	Upon completion of the course, students should be able to establish task inter-dependencies.	Upon completion of the course, students should be able to construct and analyze a network diagram.	Upon completion of the course, students should be able to identify IT project risks and develop risk mitigation strategies.	Upon completion of the course, students should be able to ensure the quality of the project using various standards.	Upon completion of the course, students should be able to demonstrate Team work and team spirit and how to overcome the conflicts.	
	Cloud Computing	After completion of the course the learner should be able to differentiate different computing techniques.	After completion of the course the learner should be able to compare various cloud computing providers/ Software.	After completion of the course the learner should be able to handle Open Source Cloud Implementation and Administration.	After completion of the course the learner should be able to understand risks involved in cloud computing.						
	Intelligent System	Students will develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents.	Students will be able to choose an appropriate problem-solving method and knowledge-representation scheme.	Students will develop an ability to analyze and formalize the problem (as a state space, graph, etc) and select the appropriate search method.	Students will be able to develop/demonstrate/build simple intelligent systems or classical toy problems using different AI techniques.						
	Wireless Technology	Understand the new trends in mobile/wireless communications networks.	Understand the characteristics of mobile/wireless communication channels.	Understand the multiple radio access techniques.	Understand the multiuser detection techniques.						
	E-Commerce and EBusiness										
	Project I	The learner should be able to prepare a synopsis of the work selected.									



Sem B	Storage Network Management and Retrieval	Students will be able to evaluate storage architectures, including storage subsystems, SAN, NAS, and IP-SAN, also define backup, recovery.	Examine emerging technologies including IP-SAN.	Define information retrieval in storage network and identify different storage virtualization technologies.						
	Big Data Analytics	At the end of this course a student will be able to understand the key issues in big data management and its associated applications in intelligent business and scientific computing.	At the end of this course a student will be able to acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce and NO SQL in big data analytics.	At the end of this course a student will be able to interpret business models and scientific computing paradigms, and apply software tools for big data analytics.	At the end of this course a student will be able to achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc.					
	Computer Simulation and Modeling	Understand the meaning of simulation and its importance in business, science, engineering, industry and services	Identify the common applications of discrete-event system simulation. Practice formulation and modeling skills.	Understand simulation languages Ability to analyze events and inter-arrival time, arrival process, queuing strategies, resources and disposal of entities	An ability to perform a simulation using spreadsheets as well as simulation language/package	Ability to generate pseudorandom numbers using the Linear Congruential Method	Ability to perform statistical tests to measure the quality of a pseudorandom number generator	Ability to define random variate generators for finite random variables	Ability to analyze and fit the collected data to different distributions	
	Software Testing & Quality Assurance									
	Project II	The learner should be able to demonstrate the product that is implemented.	The learner should be able to produce the proper documentation of the work	The learner should be able to work in team and communicate with peers.	The learner should be able to develop skills required by the industry					



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## PO's and CO's

### Department of Mechanical Engineering: -

#### PO's

Engineering Graduates will be able to:

**PO-1:** Apply basic knowledge of mathematics, science and engineering principles to solve technical problems, related directly to Mechanical Engineering.

**PO-2:** Design and analyze system components, or processes, to meet the desired needs in Mechanical Engineering.

**PO-3:** Design system and conduct experiments to find suitable solution in the field of Mechanical engineering.

**PO-4:** Identify, visualize, formulate and solve engineering problems in the field of Mechanical Engineering.

**PO-5:** Ability to bring technology transfer to toil the society and environment. Use techniques, skills, and modern engineering tools necessary for engineering practice with appropriate considerations for constraints.

**PO-6:** Ability to use adaptable research solutions to showcase impact of technology development on society, by applying scientific reasoning methodologies, appropriate and relevant skills towards the understanding of the impact of engineering solutions on the society in a global and social context.

**PO-7:** Impart knowledge on contemporary issues about society and environment.

**PO-8:** Apply ethical principles and responsibilities during professional practice.

**PO-9:** Function effectively as team member/leader in a multi-disciplinary team and create user friendly environment.

**PO-10:** Communicate effectively in oral, written, visual and graphical modes within team, and group environments.

**PO-11:** Apply different techniques, skills and modern engineering tools necessary for engineering projects.

**PO-12:** Recognize the need for professional advancement by engaging in lifelong learning.

#### CO'S

Sem 3	Applied Mathematics III	Demonstrate the ability of using Laplace Transform in solving the Ordinary Differential Equations and Partial Differential Equations	Demonstrate the ability of using Fourier Series in solving the Ordinary Differential Equations and Partial Differential Equations	Solve initial and boundary value problems involving ordinary differential equations	Identify the analytic function, harmonic function, orthogonal trajectories	Apply bilinear transformations and conformal mappings	Identify the applicability of theorems and evaluate the contour integrals.
	Thermodynamics	Demonstrate application of the laws of thermodynamics to wide range of systems.	Write steady flow energy equation for various flow and non-flow thermodynamic systems	Compute heat and work interactions in thermodynamics systems	Demonstrate the interrelations between thermodynamic functions to solve practical problems.	Use steam table and mollier chart to compute thermodynamics interactions	Compute efficiencies of heat engines, power cycles etc.
	Strength of Materials	Demonstrate fundamental knowledge about various types of loading and stresses induced.	Draw the SFD and BMD for different types of loads and support conditions	Analyse the stresses induced in basic mechanical components.	Estimate the strain energy in mechanical elements.	Analyse the deflection in beams.	Analyse buckling and bending phenomenon in columns, struts and beams.
	Production Process	Demonstrate understanding of casting process	Illustrate principles of forming processes	Demonstrate applications of various types of welding processes.	Differentiate chip forming processes such as turning, milling, drilling, etc.	Illustrate the concept of producing polymer components and ceramic components.	Distinguish between the conventional and modern machine tools.
	Material Technology	Identify various crystal imperfections, deformation mechanisms, and strengthening mechanisms	Demonstrate understanding of various failure mechanisms of materials.	Interpret Iron-iron carbide phase diagram, and different phases in microstructures of materials at different conditions.	Select appropriate heat treatment process for specific applications.	Identify effect of alloying elements on properties of steels	Illustrate basics of composite materials, Nano-materials and smart materials.
Sem 4	Applied Mathematics IV	Solve the system of linear equations using matrix algebra with its specific rules	Demonstrate basics of vector calculus	Apply the concept of probability distribution and sampling theory to engineering problems	Apply principles of vector calculus to the analysis of engineering problems	Identify, formulate and solve engineering problems	Illustrate basic theory of correlations and regression
	Fluid Mechanics	Define properties of fluids and classification of fluids	Evaluate hydrostatic forces on various surfaces and predict stability of floating bodies	Formulate and solve equations of the control volume for fluid flow systems	Apply Bernoulli's equation to various flow measuring devices	Calculate resistance to flow of incompressible fluids through closed conduits and over surfaces	Apply fundamentals of compressible fluid flows to relevant systems
	Industrial Electronics	Illustrate construction, working principles and applications of power electronic switches	Identify rectifiers and inverters for dc and ac motor speed control	Develop circuits using OPAMP and timer IC555	Identify digital circuits for industrial applications	Illustrate the knowledge of basic functioning of microcontroller	Analyse speed-torque characteristics of electrical machines for speed control
	Production Process II	Demonstrate understanding of metal cutting principles and mechanism	Identify cutting tool geometry of single point and multipoint cutting tool	Demonstrate various concepts of sheet metal forming operations	Demonstrate concepts and use of jigs and fixtures	Illustrate various non-traditional machining techniques	Illustrate concepts and applications of additive manufacturing
	Kinematics of Machinery	Define various components of mechanisms	Develop mechanisms to provide specific motion	Draw velocity and acceleration diagrams of various mechanisms	Draw Cam profile for the specific follower motion	Analyse forces in various gears	Select appropriate power transmission for specific application
	Internal Combustion Engines	Demonstrate the working of different systems and processes of S.I. engines	Demonstrate the working of different systems and processes of C.I. engines	Illustrate the working of lubrication, cooling and supercharging systems.	Analyse engine performance	Illustrate emission norms and emission control	Comprehend the different technological advances in engines and alternate fuels
	Mechanical Measurement and Control	Classify various types of static characteristics and types of errors occurring in the system.	Classify and select proper measuring instrument for linear and angular displacement	Classify and select proper measuring instrument for pressure and temperature measurement	Design mathematical model of system/process for standard input responses	Analyse error and differentiate various types of control systems and time domain specifications	Analyse the problems associated with stability

Sem 5	Heat Transfer	Identify the three modes of heat transfer (conduction, convection and radiation).	Illustrate basic modes of heat transfer	Develop mathematical model for each mode of heat transfer	Develop mathematical model for transient heat transfer	Demonstrate and explain mechanism of boiling and condensation	Analyse different heat exchangers and quantify their performance
	Dynamics of Machinery	Demonstrate working Principles of different types of governors and Gyroscopic effects on the mechanical systems	Illustrate basic of static and dynamic forces	Determine natural frequency of element/system	Determine vibration response of mechanical elements / systems	Design vibration isolation system for a specific application	Demonstrate basic concepts of balancing of forces and couples
	Machining Sciences And Tool Design	Calculate the values of various forces involved in the machining operations	Design various single and multipoint cutting tools	Analyse heat generation in machining operation and coolant operations	Illustrate the properties of various cutting tool materials and hence select an appropriate tool material for particular machining application	Demonstrate the inter-relationship between cutting parameters and machining performance measures like power requirement, cutting time, tool life and surface finish	Demonstrate basic concepts of balancing of forces and couples
Sem 6	Metrology and Quality Engineering	Demonstrate inspection methods and different gauges	Illustrate working principle of measuring instruments and calibration methodology	Illustrate basic concepts and statistical methods in quality control	Demonstrate characteristics of screw threads, gear profile, and tool profile	Illustrate the different sampling techniques in quality control	Illustrate different nondestructive techniques used for quality evaluation
	Machine Design ? I	Demonstrate understanding of various design considerations	Illustrate basic principles of machine design	Design machine elements for static as well as dynamic loading	Design machine elements on the basis of strength/ rigidity concepts	Use design data books in designing various components	Acquire skill in preparing production drawings pertaining to various designs
	Finite Element Analysis	Solve differential equations using weighted residual methods	Develop the finite element equations to model engineering problems governed by second order differential equations	Apply the basic finite element formulation techniques to solve engineering problems by using one dimensional elements	Apply the basic finite element formulation techniques to solve engineering problems by using two dimensional elements	Apply the basic finite element formulation techniques to find natural frequency of single degree of vibration system	Use commercial FEA software, to solve problems related to mechanical engineering
	Refrigeration and Air Conditioning	Demonstrate fundamental principles of refrigeration and air conditioning	Identify and locate various important components of the refrigeration and air conditioning system	Illustrate various refrigeration and air conditioning processes using psychrometric chart	Design Air Conditioning system using cooling load calculations.	Estimate air conditioning system parameters	Demonstrate understanding of duct design concepts.
	Mechatronics	Identify the suitable sensor and actuator for a mechatronics system	Select suitable logic controls	Analyse continuous control logics for standard input conditions	Develop ladder logic programming	Design hydraulic/pneumatic circuits	Design a mechatronic system
Sem 7	Machine Design- II	Select appropriate gears for power transmission on the basis of given load and speed.	Design gears based on the given conditions.	Select bearings for a given applications from the manufacturers catalogue.	Select and/or design belts for given applications.	Design cam and follower and clutches	
	CAD/CAM/CAE	Identify proper computer graphics techniques for geometric modelling.	Transform, manipulate objects and store and manage data.	Prepare part programming applicable to CNC machines.	Use rapid prototyping and tooling concepts in any real life applications.	Identify the tools for Analysis of a complex engineering component.	
	Mechanical Utility Systems	Describe operating principles of compressors and pumps	Evaluate performance of reciprocating/rotary compressors	Evaluate performance of reciprocating/rotary compressors	Interpret possibilities of energy conservation in pumping and compressed air systems		
	Production Planning and Control	To provide a comprehensive exposure to Production Planning & Control (PPC) and its significance in Industries.	To acquaint students with various activities of PPC.	To give insight into the ongoing & futuristic trends in the control of inventory.	To appraise about need and benefits of planning functions related to products and processes.	To give exposure to production scheduling and sequencing	
	Power Plant Engineering	Comprehend various equipments/systems utilized in power plants	Discuss types of reactors, waste disposal issues in nuclear power plants	Illustrate power plant economics			
	Operations Research	Illustrate the need to optimally utilize the resources in various types of industries.	Apply and analyze mathematical optimization functions to various applications.	Demonstrate cost effective strategies in various applications in industry.			
Sem 8	Design of Mechanical Systems	Design material handling systems such as hoisting mechanism of EOT Crane, belt conveyors.	Design engine components such as cylinder, piston, connecting rod and crankshaft from system design point of view.	Design pumps for the given applications.	Prepare layout of machine tool gear box and select number of teeth on each gear.		
	Industrial Engineering and Management	Illustrate the need for optimization of resources and its significance in manufacturing industries, in order to enhance overall productivity.	Develop capability in integrating knowledge of design along with other aspects of value addition in the conceptualization and manufacturing stage of various products.	Demonstrate the concept of value analysis and its relevance.	Manage and implement different concepts involved in methods study and understanding of work content in different situations.	Describe different aspects of work system design and facilities design pertinent to manufacturing industries.	Identify various cost accounting and financial management practices widely applied in industries.
	Refrigeration and Air Conditioning	Discuss fundamental refrigeration and air conditioning principles	Identify and locate various important components of the refrigeration and air conditioning system	Illustrate various refrigeration and air conditioning processes using psychrometric chart	Design and analyze complete air conditioning system		
	Renewable Energy Sources	Demonstrate need of different renewable energy sources and their importance	Calculate and analyse utilization of solar and wind energy	Illustrate design of biogas plant	Estimate alternate energy sources India		
	Automobile Engineering	Demonstrate & explain various systems in an automobile	Describe importance and features of different systems like axle, differential, brakes, steering, suspension, wheel and balancing etc.	Explain principle of operation, construction and applications of various sensors used in modern automobile.			



  
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