## Teerthanker Mahaveer University Faculty of Engineering

# **B.Tech. (Civil Engineering)**

### Programme Outcome

PO -1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO -2	Problem analysis & Solving: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first Principles of mathematics, natural sciences, and engineering sciences.
PO -3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO -4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO –6	Social Interaction & effective citizenship: Apply reasoning informed by the Contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the Knowledge of, and need for sustainable development.
PO –8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO –9	Attitude (Individual and teamwork): Function effectively as an individual, and as member or leader in diverse teams, and in multi-disciplinary settings.
PO -10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clean instructions.

PO -11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO –12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PO13	Entrepreneurship: An Entrepreneurship cuta cross every sector of human life including the field of engineering, engineering entrepreneurship is the process of harnessing the business opportunities in engineering and turning it into profitable commercially viable innovation.
PO14	Inter personal skills: Inter personal skills involve the ability to communicate and build relationships with others. Effective interpersonal skills can help the students during the Job interview process and can have appositive impact on your career advancement.
PO15	Technology savvy/usage: Being technology savvy is essentially one's skill to be smart with technology. This skill reaches far beyond 'understanding' the concepts of how technology works and encompasses the 'utilization' of such modern technology for the purpose of enhancing productivity and efficiency.

### Programme Specific Outcomes (PSOs)

PSO -1	Understanding and Remembering fundamental concepts of assigned
	courses of each semester.
PSO –2	Designing, supervising, testing and evaluating foundations and superstructures for residences, public buildings, industries, irrigation structures, powerhouses, highways, railways, airways, docks and harbours.
PSO –3	Designing building by survey, map and plan layouts for buildings, structures and alignments for canal sand roads.
PSO -4	Analyzing water resources hydrological systems to estimate safe and assured withdrawals, and specify, design, and evaluate water conveying systems, hydraulic machines and surge systems.
PSO -5	Specifying, selecting and formulating environmental engineering systems.

#### **Course Outcomes**

EAS 116	CO1.	Understanding the concepts of eigenvalues and eigenvectors,
		Optimization & derivatives of functions of several variables,
		partial and total differentiation, implicit functions.
	CO2.	Understanding the concepts of curl and divergence of vector
		field.
	CO3.	Understanding of Green's theorem, Gauss Theorem, and
		Stokes theorem.

	CO4.	Applying the concept of Leibnitz's theorem for successive
		derivatives.
	CO5.	Analyzing the intangibility of a differential equation to find the
		optimal solution of first order first degree equations.
	CO6.	Evaluating the double integration and triple integration using
		Cartesian, Polarco-ordinates and the concept of Jacobian of
		transformation.
EAS 112	CO1.	Understanding the basic concepts of interference, diffraction
		and polarization.
	CO2.	Understanding the concept of bonding in solids and
		semiconductors.
	CO3.	Understanding the special theory of relativity.
	CO4.	Applying special theory of relativity to explain the
		phenomenon of length contraction, time dilation, mass-energy
		equivalence etc.
	CO5.	Applying the concepts of polarized light by the Brewster's and
		Malus Law
EAS 162	CO1.	Understanding of the operation of various models of optical
		devices.
	CO2.	Understanding types of Semiconductors using Hall
		experiments.
	CO3.	Applying the concept of interference, polarization & dispersion
		in optical devices through Newton's ring, Laser, polarimeter &
		spectrometer.
	CO4.	Applying the concept of resonance to determine the AC
		frequency using sonometer & Melde's apparatus.
	CO5.	Applying the concept of resolving & dispersive power by a
		prism.
EAS 113	CO1.	Understanding the concept of softening & purification of
		water.
	CO2.	Understanding calorific value & combustion, analysis of coal,
		Physical & Chemical properties of hydrocarbons & quality
		improvements.
	CO3.	Understanding the concept of lubrication, Properties of
		Refractory & Manufacturing of cements.
	CO4.	Applying the concepts of the mechanism of polymerization
		reactions, Natural and synthetic rubber & vulcanization.
	CO5.	Applying the concepts of spectroscopic & chromatographic
		techniques.
EAS 163	CO1.	Understanding the concepts of Hardness of water.
	CO2.	Analyzing & estimating of various parameters of water.
	CO3.	Analyzing of Calorific value of Solid fuel by Bomb calorimeter &
		Liquid Fuels by Junkers Gas Calorimeter.

	CO4.	Analyzing of open & closed Flash point of oil by Clevel and &
		Pensky's Martens apparatus.
	CO5.	Analyzing of viscosity of lubricating oil using Redwood
		Viscometer.
EEE 117	CO1.	Understanding the basics of Network, AC Wave form and its
		characteristics.
	CO2.	Understanding the basic concept of Measuring Instruments,
		Transformers & three phase Power systems.
	CO3.	Understanding the basic concepts of Transformer.
	CO4.	Understanding the basic concept of power measurement using
		two wattmeter methods.
	CO5.	Applying the concept of Kirchhoff's laws and Network
		Theorems to analyze complex electrical circuits.
EEE 161	CO1.	Understanding the concepts of Kirchoff & Voltage law.
	CO2.	Understanding the concepts of dcnet work theorem.
	CO3.	Analyzing the energy by a single-phase energy meter.
	CO4.	Analyzing the losses and efficiency of Transformer on different
		load conditions.
	CO5.	Analyzing the electrical circuits using electrical and electronics
		components on bread board.
EEC 111	CO1.	Understanding the concepts of electronic components like
		diode, BJT&FET.
	CO2.	Understanding the applications of pn junction diode as clipper,
		clamper, rectifier & regulator whereas BJT&FETasamplifiers
	CO3.	Understanding the functions and applications of operational
		amplifier-based circuits such as differentiator, integrator, and
		inverting, non inverting, summing & differential amplifier.
	CO4.	Understanding the concepts of number system, Boolean
		algebra and logic gates.
	CO5.	Applying the knowledge of series, parallel and electromagnetic
		circuits.
EEC 161	CO1.	Understanding the implementation of diode-based circuits.
	CO2.	Understanding the implementation of Operational amplifier
		based circuits.
	CO3.	Analyzing the characteristics of ph junction diode & BJT.
	CO4.	Analyzing the different parameters for characterizing different
		circuits like rectifiers, regulators using diodes and BJTs.
	CO5.	Analyzing the truth tables through the different type's adders.
TMU 101	CO1.	Understanding environmental problems arising due to
		constructional and developmental activities.
	CO2.	Understanding the natural resources and suitable methods for
		conservation of resources for sustainable development.
	CO3.	Understanding the importance of ecosystem and biodiversity

		and its conservation for maintaining ecological balance.
	CO4.	Understanding the types and adverse effects of various
		environmental pollutants and their abatement devices.
	CO5.	Understanding Green house effect, various Environmental
		laws, impact of human population explosion, environment
		protection movements, different disasters and their
		management.
TMUGE101	CO1.	Remembering and understanding of the basic of English
		grammar and vocabulary.
	CO2.	Understanding of the basic Communication process.
	CO3.	Applying correct vocabulary and tenses in sentences
		construction.
	CO4.	Analyzing communication needs and developing
		communication strategies using both verbal & non-verbal
		method.
	CO5.	Drafting applications in correct format for common issues.
EME 161	CO1.	Understanding the concepts of Engineering Drawing.
	CO2.	Understanding how to draw and represent the shape, size &
		specifications of physical objects.
	CO3.	Applying the principles of projection and sectioning.
	CO4.	Applying the concepts of development of the lateral surface of
		a given object.
	CO5.	Creating isometric projection of the given orthographic
		projection.
EME 162	CO1.	Understanding the concepts to prepare simple wooden joints
		using wood working tools.
	CO2.	Applying the techniques to produce fitting jobs of specified
		dimensions.
	CO3.	Applying the concepts to prepare simple lap, butt, Tand corner
		joints using arc welding equipment.
	CO4.	Applying the concepts of black smithyandla the machine to
		produce different jobs.
	CO5.	Creating core and moulds for casting.
EAS 211	CO1.	Understanding the concepts of the wave, diffusion and Laplace
		equations & Fourier series.
	CO2.	Understanding the methods of separation of variables.
	CO3.	Understanding the concepts of Fourier series' representation
		of single variable function.
	CO4.	Applying Laplace transform to determine the complete
		solutions of linear ODE.
	CO5.	Applying the method of variations of parameters to find
		solution of equations with variable coefficients.
EAS 212	CO1.	Understanding the basic concepts of interference, diffraction

		and polarization.
	CO2.	Understanding the concept of bonding in solids and
		semiconductors.
	CO3.	Understanding the special theory of relativity.
	CO4.	Applying special theory of relativity to explain the
		phenomenon of length contraction, time dilation, mass-energy
		equivalence etc.
	CO5.	Applying the concepts of polarized light by the Brewster's and
		Malus Law.
EAS 262	CO1.	Understanding of the operation of various models of optical
		devices.
	CO2.	Understanding types of Semiconductors using Hall
		experiments.
	CO3.	Applying the concept of interference, polarization & dispersion
		in optical devices through Newton's ring, Laser, polarimeter &
		spectrometer.
	CO4.	Applying the concept of resonance to determine the AC
		frequency using sonometer & Melde's apparatus.
	CO5.	Applying the concept of resolving & dispersive power by a
		prism.
EAS 213	CO1.	Understanding the concept of softening & purification of
		water.
	CO2.	Understanding calorific value & combustion, analysis of coal,
		Physical & Chemical properties of hydrocarbons & quality
		improvements.
	CO3.	Understanding the concept of lubrication, Properties of
		Refractory & Manufacturing of cements.
	CO4.	Applying the concepts of the mechanism of polymerization
		reactions, Natural and synthetic rubber & vulcanization.
	CO5.	Applying the concepts of spectroscopic & chromatographic
		techniques.
EAS 263	CO1.	Understanding the concepts of Hardness of water.
	CO2.	Analyzing & estimating of various parameters of water.
	CO3.	Analyzing of Calorific value of Solid fuel by Bomb calorimeter &
		Liquid Fuels by Junkers Gas Calorimeter.
	CO4.	Analyzing of open & closed Flash point of oil by Cleveland &
		Pensky's Martens apparatus.
	CO5.	Analyzing of viscosity of lubricating oil using Redwood
		Viscometer.
EEE 217	CO1.	Understanding the basics of Network, AC Waveform and its
		characteristics.
	CO2.	Understanding the basic concept of Measuring Instruments,
		Transformers & three phase Power systems.

	CO3.	Understanding the basic concepts of Transformer.
	CO4.	Understanding the basic concept of power measurement using
		two wattmeter methods.
	CO5.	Applying the concept of Kirchhoff's laws and Network
		Theorems to analyze complex electrical circuits.
EEE 261	CO1.	Understanding the concepts of Kirchoff & Voltage law.
	CO2.	Understanding the concepts of dcnet work theorem.
	CO3.	Analyzing the energy by a single-phase energy meter.
	CO4.	Analyzing the losses and efficiency of Transformer on different
		load conditions.
	CO5.	Analyzing the electrical circuits using electrical and electronics
		components on bread board.
EEC 211	CO1.	Understanding the concepts of electronic components like
		diode, BJT&FET.
	CO2.	Understanding the applications of pn junction diode as clipper,
		clamper, rectifier & regulator whereas BJT & FET as amplifiers
	CO3.	Understanding the functions and applications of operational
		amplifier-based circuits such as differentiator, integrator, and
		inverting, non-inverting, summing & differential amplifier.
	CO4.	Understanding the concepts of number system, Boolean
		algebra and logic gates.
	CO5.	Applying the knowledge of series, parallel and electromagnetic
		circuits.
EEC 261	CO1.	Understanding the implementation of diode-based circuits.
	CO2.	Understanding the implementation of Operational amplifier-
		based circuits.
	CO3.	Analyzing the characteristics of ph junction diode & BJT.
	CO4.	Analyzing the different parameters for characterizing different
		circuits like rectifiers, regulators using diodes and BJTs.
	CO5.	Analyzing the truth tables through the different type's adders.
ECS 212	01.	Understanding the concept of various components of
		Computer system
	CO2.	Understanding the Object-Oriented Programming Language
	602	concepts.
	CO3.	Analyzing basic programming
	04.	Appropriate the concepts of programming solutions for distinct
	COF	Applying the concents of scalable solutions through function
ECS 262	$CO_1$	Apprying the concepts of scalable solutions through function
ELS 202		in Clapsuage
	<u> </u>	Applying to propage programming colutions for creating
		problems
	<u> </u>	Applying to propare scalable solutions through functions
	LU3.	Apprying to prepare scalable solutions through functions.

	CO4.	Applying basic elements of a C program including arithmetic
		and logical operators, functions, control structures, and arrays
	CO5.	Analyzing basic mathematical problem and their solutions
		through programming.
TMUGE201	CO1.	Remembering & understanding the basics of English Grammar
		and Vocabulary.
	CO2.	Understanding the basics of Listening, Speaking & Writing
		Skills.
	CO3.	Understanding principles of letter drafting and various types of
		formats.
	CO4.	Applying correct vocabulary and grammar in sentence
		construction while writing and delivering presentations.
	CO5.	Analyzing different types of listening, role of Audience &
		Locale in presentation.
EME261	CO1.	Understanding the concepts of Engineering Drawing.
	CO2.	Understanding how to draw and represent the shape, size &
		specifications of physical objects.
	CO3.	Applying the principles of projection and sectioning.
	CO4.	Applying the concepts of development of the lateral surface of
		a given object.
	CO5.	Creating isometric projection of the given orthographic
		projection.
EME262	CO1.	Understanding the concepts to prepare simple wooden joints
		using wood working tools.
	CO2.	Applying the techniques to produce fitting jobs of specified
		dimensions.
	CO3.	Applying the concepts to prepare simple lap, butt, Tand corner
		Joints using arc welding equipment.
	CO4.	Applying the concepts of blacksmithyandla the machine to
	<u> </u>	Creating core and maying foreasting
FCF 211	CO5.	Creating core and moulds forcasting.
ECE 311		and numps for Newtonian fluids
	<u> </u>	Inderstanding & solving hydrostatic problems
	CO2.	Analyzing the pressure distribution for incompressible fluids
	CO4	Applying the principle of Bernoulli's equation to solve fluid
		related problems
	CO5.	Analyzing the performance characteristics and operational
		constraints of the appropriate kind of pumps. turbines
ECE 361	CO1.	Understanding different types of flow.
	CO2.	Verifying Bernoulli's theorem.
	CO3.	Measuring the velocity of flow at different points in a pipe.
	CO4.	Calibration of a norifice meter and venturi meter and to study

		the variation of the co-efficient of discharge with the Reynolds
		number.
	CO5.	Determining the surface tension of given fluid and
		determination of head loss for a sudden enlargement and
		sudden contraction.
ECE 312	CO1.	Understanding the different methods and techniques of
		surveying and their application in surveying.
	CO2.	Applying modern surveying techniques, skills and tools to solve
		surveying problems.
	CO3.	Analyzing the angles and distances in the field.
	CO4.	Analysing topography of the area using contour maps.
	CO5.	Creating Plan, Orientation and maps.
ECE 360	CO1.	Demonstrating knowledge of various surveying methods.
	CO2.	Conducting a chain survey and compass survey.
	CO3.	Determining angles and distances in the field using compass
		and theodolite.
	CO4.	Applying modern surveying techniques, Conduct leveling
		survey and be able to do RL calculations.
	CO5.	Creating topography of the area cross section using contour
		maps.
ECE 313	CO1.	Selecting appropriate material for construction of buildings.
	CO2.	Designing and testing the material either in laboratory or in
		the field before their actual use at the site.
	CO3.	Identifying the methods for defect and preservation of timber.
	CO4.	Analyzing dampness and its preventive measures.
	CO5.	Demonstrating the manufacturing of clay bricks in kiln, work at
		site for shallow foundation, beams adcolumnsat nearby site.
ECE 362	CO1.	Preparing the site-plan of a purposed residential building.
	CO2.	Preparing the ELEVATION & SECTION of the given model by using Aut
		odeskRevitArchitecture.
	CO3.	Creating a PLAN of a given 2 B.H.K (Bedroom, Hall & Kitchen)
		model.
	CO4.	Creating of an elevation & section of the given 2 B.H.K
		(Bedroom, Hall & Kitchen) plan.
	CO5.	Creating the 2D & 3D model of the given 2 B.H.K (Bedroom,
		Hall & Kitchen) plan.
ECE 314	CO1.	Understanding the functional role of ingredients of concrete.
	CO2.	Outlining the importance of testing of cement and its
		properties.
	CO3.	Designing different grades of concrete.
	CO4.	Summarizing the concept of workability and testing of
		concrete.
	CO5.	Applying fundamental knowledge in the fresh and hardened

		properties of concrete.
EME 311	CO1.	Understanding the system of forces, free body diagrams and
		resultant of forces and/or moments.
	CO2.	Applying the laws of mechanics to determine efficiency of
		simple machines with consideration of friction.
	CO3.	Analyzing the load sand support reactions on a structural
		member.
	CO4.	Analyzing the planner areas and location of their centroid.
	CO5.	Evaluating the internal reactions in a beam; draw correct
		shear-force and bending moment diagrams.
ECE 363	CO1.	Demonstrating knowledge of properties of various building
		materials.
	CO2.	Determining the setting time, specific gravity and compressive
		strength of Cement.
	CO3.	Determining the flakiness and elongation index, specific
		gravity and compressive strength of aggregate.
	CO4.	Determining Work ability of the concrete.
	CO5.	Designing Concrete Mix.
TMUGA-301	CO1.	Solving complex problems using Crisscross method, base
		method and square techniques.
	CO2.	Applying Allegation.
	CO3.	Evaluating the different possibilities of various reasoning
		based problems in series, Blood relation and Direction.
	CO4.	Operationalizing the inter-related concept of Percentage in
		Profit Loss and Discount, Si/Cland Mixture/Allegation.
ECE 411	CO1.	Understanding basic concepts and practices of remote sensing
		and Geographic Information Systems (GIS).
	CO2.	Understanding the role of complex network systems that
		handles Geo-information.
	CO3.	Applying GIS analysis to address geospatial problems.
	CO4.	Analysing the primary data using a Global Positioning System
		(GPS).
	CO5.	Applying the knowledge to use advance surveying tools such
		as total station and EDM instruments.
ECE 461	CO1.	Understanding and impart the knowledge of basic principles of
		surveying, different types of surveying and applications.
	CO2.	Analysing and preparing a map or a plan to represent an area
		on a horizontal plan.
	CO3.	Analysing the concept sand fundamentals of GIS.
	CO4.	Analysing the relative position of any object or point of the
		earth.
	CO5.	Creating various methods through the knowledge of modern
		science and the technology and use them in the field.

ECE 412	CO1.	Understanding the behaviour of materials under different
		stress and strain conditions.
	CO2.	Understanding the concept of Hoop and Longitudinal stresses.
	CO3.	Applying bending moment, Shear force, bending stress and
		Shear tress distribution diagrams for beams.
	CO4.	Analyzing solid mechanics problems using classical methods
		and energy methods.
	CO5.	Evaluating the deflection for beams under different loading condition.
ECE 462	CO1.	Understanding the basic experiments on bending, torsion,
		compression and hardness test.
	CO2.	Understanding the adequacy of mechanical and structural
		elements under different loads is essential for the design and
		safe evaluation of any kind of structure.
	CO3.	Understanding the theory of elasticity including
		strain/displacement and Hooke's law relationships
	CO4.	Evaluating the allowable load sand associated allowable
		stresses before mechanical failure
	CO5.	Analyzing the stress, strain, and deflection suffered by bi-
		dimensional (and simple tridimensional) structural elements
		when subjected to different loads (e.g. normal, shear, torsion,
		bending and combined loads).
ECE 413	CO1.	Understanding the role of geology in the site selection, design
		and construction.
	CO2.	Understanding the soil and rocks using basic classification
		system for construction upon it.
	CO3.	Understanding the structure present in rock and to apply
	604	ground improvement techniques.
	CO4.	Applying index properties of soil viz., moisture content,
		siovo apalysis
	CO5	Analyzing and understand soil characterization and the Unified
	005.	Soil Classification System
ECE 463	CO1.	Understanding the concept of minerals and rocks.
	CO2.	Understanding various physical and chemical properties of
		rocks.
	CO3.	Analysing the shear strength parameters for field conditions.
	CO4.	Analysing the Characteristics and classifying soils.
	CO5.	Creating topographical map for various contour map.
ECE 414	CO1.	Understanding the geometric design of high way components.
	CO2.	Understanding the components and layout of stations, yards,
		and signalling, interlocking and control systems.
	CO3.	Understanding various components of dock sand harbours.

	CO4.	Applying the characteristics of traffic for the design of signals,
		intersections and rotaries.
	CO5.	Analysing the railway track geometrically.
ECE 464	CO1.	Understanding the safe working temperature of volatile
		pavement material.
	CO2.	Analysing various properties of pavement material like
		hardness, toughness etc.
	CO3.	Analysing the various type of pavement materials.
	CO4.	Analysing the quality control tests on pavements and
		pavement materials.
	CO5.	Analysing the various flexible pavement.
TMUGE401	CO1.	Understanding knowledge of grammar to face competitive
		exams.
	CO2.	Understanding advance English language by using variety of
		words i.e. idioms and phrase in variety of sentences in
		functional context.
	CO3.	Understanding listening for effective communication.
	CO4.	Applying their English grammar knowledge in day today
		context.
	CO5.	Applying writing and comprehensive skills in English.
ECE 511	CO1.	Remembering role of steel as structural material.
	CO2.	Understanding the behavior and properties of structural steel
		members.
	CO3.	Applying the relevant industry codes of practice.
	CO4.	Analyzing the different design philosophies.
	CO5.	Evaluating and designing different structural member's life
		tension, members, beams, compression and bending.
ECE 512	CO1.	Remembering basic geotechnical concepts.
	CO2.	Understanding the properties of soil.
	CO3.	Applying the procedure to find out the bearing capacity of soil.
	CO4.	Analyzing the soil including sub surface soil and apply them for
		the classification of soil.
	CO5.	Evaluating the strength of the soil.
ECE 562	CO1.	Understanding the procedure for collection of soil samples for
		testing in the lab.
	CO2.	Determining the index properties of soil.
	CO3.	Determining the engineering properties of soil.
	CO4.	Identifying soil based on standard practice.
	CO5.	Classifying the soil based on standard geotechnical engineering
		practice.
ECE 513	CO1.	Remembering the classification and basic concepts of civil
		engineering structures.
	CO2.	Understanding the behavior of determinate structures.

	CO3.	Applying the techniques to draw ILD for of statically
		determinate structures.
	CO4.	Analyzing the determinate structures by Slope Deflection and
		Moment Distribution Method.
	CO5.	Evaluating the displacements of statically determinate
		structures by strain energy methods.
ECE 563	CO1.	Determining flexural rigidity of a given beam
	CO2.	Calculating deflections of truss structure sand curved members
	CO3.	Applying equations of equilibrium to structures and compute
		their actions
	CO4.	Analysing the behavior of columns
	CO5.	Evaluating horizontal displacement of two hinged arch
		practically and analytically.
ECE 514	CO1.	Remembering the properties of concrete.
	CO2.	Understanding the general mechanical behavior of reinforced
		concrete.
	CO3.	Applying the different design philosophies of RCC structure.
	CO4.	Analyzing and design flexural, compression members.
	CO5.	Analyzing and design for deflection and crack control of
		reinforced concrete member.
ECE 515	CO1.	Remembering the various components of hydrologic cycle that
		affects the movement of water in the earth
	CO2.	Understanding various Stream flow measurements technique
	CO3.	Applying concepts of movement of ground water beneath the
		earth
	CO4.	Analyzing the water requirements of the crops irrigation and
		various irrigation techniques, requirements of the crops
	CO5.	Creating the unlined and lined irrigation canals.
ECE 564	CO1.	Understanding the importance of working in a team.
	CO2.	Applying rules to collect data fora road alignment of (L-section
		and cross-section) a given gradient connecting any two
		stations.
	CO3.	Calculating earthwork in a highway project.
	CO4.	Drawing and Interpreting the contours.
	CO5.	Creating a topographical plan of a given area.
TMUGA-501	CO1.	Applying the concepts of modern mathematics Divisibility rule,
		Remainder Theorem, HCF/LCM in Number System.
	CO2.	Relating the rules of permutation and combination,
		Fundamental Principle of Counting to find the probability.
	CO3.	Applying calculative and arithmetical concepts of ratio,
		Average and Percentage to analyze and interpret data.
	CO4.	Correlating the various arithmetic concepts to check
		sufficiency of data

TMUGS-501	CO1.	Utilizing effective verbal and non-verbal communication
		techniques informal and informal settings
	CO2.	Understanding and analyzing self and devising a strategy for
		self growth and development.
	CO3.	Adapting a positive mindset conducive for growth through
		optimism and constructive thinking.
	CO4.	Utilizing time in the most effective manner and avoiding
		procrastination.
	CO5.	Making appropriate and responsible decisions through various
		techniques like SWOT, Simulation and Decision Tree.
ECE 611	CO1.	Remembering the design concept for plate girders and various
		types of stiffeners.
	CO2.	Understanding and designing of moment resistant
		connections.
	CO3.	Applying the relevant industry codes of practice for designing
		of the beam column connections.
	CO4.	Analysing and understanding an overall view of industrial
		buildings, Trusses etc.
	CO5.	Analysing and Designing of steel structures by plastic analysis.
ECE 612	CO1.	Remembering the basic needs for supplying water and factors
		affecting consumption of water.
	CO2.	Understanding the characteristics of supply water and waste
		water.
	CO3.	Applying modern principles and philosophies of waste water
		treatment.
	CO4.	Analyzing the per capita water demand, future population and
		methods of distribution of water supply.
	CO5.	Evaluating and designing unit processes for conventional and
		advanced waste water treatment systems.
ECE 661	CO1.	Remembering the properties of water.
	CO2.	Understanding the physical, chemical and biological
		characteristics of water and wastewater.
	CO3.	Applying the experimental results to compare with standards
		and deliberate based on the purpose of analysis.
	CO4.	Analyzing the type & degree of treatment, for water and waste
		water.
	CO5.	Creating the significance of experimental results in
		environmental engineering practices.
ECE 613	CO1.	Remembering analysis of indeterminate structure.
	CO2.	Understanding of equilibrium and compatibility equations to
		determine response of statically determinate and
		indeterminate structures.
	CO3.	Applying internal forces and reactions indeterminate and

		indeterminate structures subjected to moving loads.
	CO4.	Analyzing displacements and internal forces of statically
		indeterminate structures by classical, iterative and matrix
		methods.
	CO5.	Evaluating moments and forces on two hinged three hinged
		circular and parabolic arches.
ECE 614	CO1.	Remembering different types of estimates in different
		situations.
	CO2.	Understanding valuation of assets.
	CO3.	Applying the analysis of rates and bill preparation at different
		locations
	CO4.	Analyzing tender and contract documents and project reports.
	CO5.	Evaluating the estimates of various structures.
ECE 662	CO1.	Remembering the necessary commands of Audesk Quantity
		Take off software.
	CO2.	Understanding the steps for importing and exporting the files.
	CO3.	Applying the concepts for drawing and planning plumbing and
		electrical fitting drawing of residential and multi storied
		buildings.
	CO4.	Analyzing the total quantity of various material components
		for a residential and multistoried building.
	CO5.	Creating the complete project report.
ECE 615	CO1.	Remembering the various IS codes relevant to the design of
		R.C.C. member as applicable to industry.
	CO2.	Understanding various losses in pre-stressed concrete.
	CO3.	Applying the relevant industry codes of practice for designing
		the flats lab, retaining wall, water tank etc.
	CO4.	Analyzing and designing the structures having special design
		requirements like flat slab, curved beams, and different types
		of footings, water tank, slab-culverts.
	CO5.	Evaluating the ultimate bending moment capacity of steel
		members considering both yielding and lateral buckling.
TMUGE601	CO1.	Remembering adequate knowledge of grammar and
		vocabulary through prescribed text to address competitive
		exams.
	CO2.	Understanding the value of listening to understand the basic
		content.
	CO3.	Understanding the usage of English grammar in day-to-day-
		context.
	CO4.	Understating about the skills required incorporate world.
	CO5.	Applying writing and comprehensive skills in English.
ECE 613	CO1.	Understanding the importance of value education in life and
		method of self-exploration.

	CO2.	Understanding 'Natural Acceptance' and Experiential
		Validation-as the mechanism for self-exploration.
	CO3.	Applying right understanding about relationship and physical
		facilities.
	CO4.	Analysing harmony in myself, harmony in the family and
		society, harmony in the nature and existence.
	CO5.	Evaluating human conduct on ethical basis.
TMUGA-601	CO1.	Recognizing the rules of Crypt-arithmetic and relate the mto
		find out the solutions.
	CO2.	Illustrating the different concepts of Height and Distance and
		Functions.
	CO3.	Employing the concept of higher level reasoning in Clocks,
		Calendars and Puzzle Problems.
	CO4.	Correlating the various arithmetic and reasoning concepts in
		checking sufficiency of data.
TMUGS-601	CO1.	Communicating effectively in a variety of public and inter
		personal settings.
	CO2.	Applying concepts of change management for growth and
		development by understanding inertia of change and
		mastering the Laws of Change.
	CO3.	Analyzing scenarios, synthesizing alternative sand thinking
		critically to negotiate, resolve conflicts and develop cordial
		interpersonal relationships.
	CO4.	Functioning in a team and enabling other people to act while
		encouraging growth and creating mutual respect and trust.
	CO5.	Handling difficult situations with grace, style, and
		professionalism.
ECE 711	CO1.	Remembering the General guideline for concrete design as per
		Indian codes, concrete design using STAADPRO.
	CO2.	Understanding the theory governing the structural behavior of
		various elements like bar, beam and truss applying Finite
		Element Analysis (FEA).
	CO3.	Understanding the history of AUTODESK 3D S-MAX.
	CO4.	Understanding the Element of STAADPRO and its advantages
		over conventional method
	CO5.	Analyzing, Designing and optimizing for basic structural
		members using STADDPRO.
ECE 761	CO1.	Drawings hearforce and bending moment diagram of simply
		supported Beams with different load conditions.
	CO2.	Determining the stress sand deflection of acanti lever with
		aimerent load conditions.
	CO3.	Creating a furniture object using AUTODESK 3DS-MAX with
		wooden tinish.

	CO4.	Creating a 3 seater sofa with centre table by using AUTODESK
		3DS–MAX with Rendering.
	CO5.	Applying StaadPro softwarefor analysis of a simple building.
ECE 712	CO1.	Understanding the basic principles of remote sensing.
	CO2.	Understanding the advantage sand limitations of
		photogrammetry.
	CO3.	Applying the GPS for various applications.
	CO4.	Applying Remote Sensing in different Fields.
	CO5.	Applying Remote Sensing in Civil Engineering.
ECE 713	CO1.	Understanding the detailed survey
	CO2.	Applying the applicable industry design codes relevant to the
		design, construction and maintenance of pavements.
	CO3.	Evaluating the strength of different pavement materials.
	CO4.	Evaluating and strengthening the existing pavements.
	CO5.	Analysis and Design of flexible and Concrete Pavements using
		different methods
ECE 715	CO1.	Remembering various types of transportation system.
	CO2.	Understanding the significance of transportation planning.
	CO3.	Understanding the various Transportation Facilities and use if
		IT init.
	CO4.	Analyzing the travel demand.
	CO5.	Evaluating the transport planning proposals.
ECE 717	CO1.	Understanding the basic concepts of GIS technology.
	CO2.	Understanding different types of Map projections.
	CO3.	Applying GIS in various sectors.
	CO4.	Analyzing the capabilities of GIS.
	CO5.	Analysing GIS software for making Maps.
ECE 718	CO1.	Understanding railway track components, their materials, size,
		function and importance
	CO2.	Understanding the geometric design of railway track.
	CO3.	Understanding various components in diverging, merging and
		crossings of railway tracks, stations, yards, signaling,
		interlocking and control systems.
	CO4.	Analyzing the runway elements.
	CO5.	Evaluating the various layouts of airport.
ECE 719	CO1.	Remembering Earthquake and related terminology
	CO2.	Understanding the types of seismic forces and the techniques
		to prevent failure of structures.
	CO3.	Understanding degrees of freedom.
	CO4.	Analyzing and Designing of earthquake resistant structures.
	CO5.	Analyzing the Modeling of R.C. Buildings for earthquake.
ECE 720	CO1.	Understanding the various codes related with R.C.C. design.

	CO2.	Analyzing and Designing of the grid floor and deep beams.
	CO3.	Analyzing and Designing of elevated water tanks.
	CO4.	Analyzing and Designing of chimneys.
	CO5.	Analyzing and Designing of portal frames.
ECE 721	CO1.	Understanding the various techniques used in pre-stressing.
	CO2.	Understanding the various codal provisions in pre-stressed
		concrete.
	CO3.	Analyzing conditions.
	CO4.	Analyzing and designing simple pre-stressed concrete
		members like beam, slabs, and Electric poles.
	CO5.	Evaluating and Estimating the various losses in prestress
		concrete.
ECE 722	CO1.	Understanding the concept to FFEM.
	CO2.	Understanding the Finite Element Formulation Techniques
		using different methods.
	CO3.	Applying FEM for Two and Three-Dimensional Solids.
	CO4.	Analyzing the barbeams and truss element by FEM.
	CO5.	Analyzing the structures by discretizing the member with
		number of nodes.
ECE 723	CO1.	Understanding the maintenance techniques of buildings.
	CO2.	Understanding methods for strengthening of the foundations
		of buildings, RC beams, columns and slabs.
	CO3.	Understanding various methods of crack repair.
	CO4.	Understanding Jacketing and strengthen techniques.
	CO5.	Evaluating various construction chemicals and their effect on
		cement mortar and concrete.
EHM 734	CO1.	Understanding the role of managerial economics in
		engineering perspective.
	CO2.	Understanding different market structures and price
		determination in different market conditions.
	CO3.	Understanding the concepts of national income, inflation, and
		business cycles.
	CO4.	Applying the concepts of demand analysis.
	CO5.	Evaluating fixed cost, variable cost, average cost, marginal
		cost, Opportunity cost.
ECE 734	CO1.	Remembering the important concepts in the field of solid and
		hazardous waste management
	CO2.	Understanding of problems of municipal waste, biomedical
		waste, hazardous waste, e-waste, industrial waste etc.
	CO3.	Applying the most common techniques for preventing,
		minimizing, recycling, disposing and treatment of waste
	CO4.	Applying suitable technical solutions for treatment of
		municipal and industrial waste.

	CO5.	Analyzing the collection system and transfer of solid waste.
ECE 811	CO1.	Understanding the concept of Project management for
		construction industry.
	CO2.	Understanding and applying the different tools for time
		management.
	CO3.	Applying the tools related to time management for solving the
		construction management problems.
	CO4.	Evaluating the Time Cost Trade-off and Resource Scheduling
		problems.
	CO5.	Evaluating the ways of monitoring and controlling the project
		tools for resource scheduling like PERT and CPM.
ECE 812	CO1.	Understanding different water storage structures like gravity
		dams, earth dams.
	CO2.	Understanding different hydraulic phenomena in the design of
		hydraulic structures.
	CO3.	Understanding hydro power engineering project.
	CO4.	Understanding river training works.
	CO5.	Analyzing diversion head works required in irrigation system
		and cross-drainage structures.
EHM 833	CO1.	Understanding the concepts and skills needed to run a
		business successfully.
	CO2.	Applying the steps of project formulation and market research.
	CO3.	Analyzing the techno economic feasibility of a project.
	CO4.	Analyzing various growth strategies in small scale industry.
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	CO5.	Evaluating breakeven point, working capital requirements, and