



GURU NANAK INSTITUTE OF TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

PROGRAM EDUCATIONAL OBJECTIVES

PEO 1: Graduates shall have the ability to apply knowledge across the Branches and in emerging areas of CE/ME/EEE/ECE/CSE/IT for higher studies, research, employability and handle the realistic problems.

PEO 2: Graduates shall have good communication skills, to possess ethical conduct, sense of responsibility to serve the society, and protect the environment.

PEO 3: Graduates shall have strong foundation in academic excellence, soft skills, managerial skills, leadership qualities and understand the need for lifelong learning for a successful professional career.

PROGRAM SPECIFIC OBJECTIVES

PSO.1: Civil Engineering graduates shall demonstrate sound knowledge in analysis, design, laboratory investigations and construction aspects of civil engineering infrastructure, along with good foundation in mathematics, basic sciences and technical communication.

PSO.2: Civil Engineering graduates will have a broad understanding of economical, environmental, societal, health and safety factors involved in infrastructural development, and shall demonstrate ability to function within multidisciplinary teams with competence in modern tool usage.

PSO.3: Civil Engineering graduates will be motivated for continuous self-learning in engineering practice and/ or pursue research in advanced areas of civil engineering in order to offer engineering services to the society, ethically and responsibly.



PROGRAMME OUTCOMES:

Engineering Graduates will be able to:

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



COURSE OUTCOMES

PROGRAMME: B.TECH	DEGREE: UG	A.Y: 2019-20	SEMESTER: I&II
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S.No	Year/ Sem	Course Name	Course Outcomes (Student will be able to understand)
1	I-I	Mathematics-I	CO1: Write the matrix representation of a set of linear equations and to analyse the solution of the system of equations
			CO2: Reduce the quadratic form to canonical form using orthogonal transformations. Analyse the nature of sequence and series
			CO3: Solve the applications on the mean value theorems. Evaluate the improper integrals using Beta and Gamma functions.
			CO4: Find the extreme values of functions of two variables with/ without constraints
2	I-I	Programming For Problem Solving	CO1: Demonstrate the basic knowledge of computer hardware and software.
			CO2: Ability to write algorithms and draw flow charts for solving problems.
			CO3: Ability to code a given logic in C programming language.
			CO4: Implementing different searching and sorting techniques for problem solving.
3	I-I	Engineering Physics	CO1: An understanding of Physics helps engineers understand the working and limitations of existing devices and techniques, which eventually leads to new innovations and improvements..
			CO2: In the present course, the students can gain knowledge on the mechanism of physical bodies upon the action of forces on them, the generation, transmission and the detection of the waves, Optical Phenomena like Interference, diffraction, the principles of lasers and Fibre Optics..
			CO3: Various chapters establish a strong foundation on the different kinds of characters of several materials and pave a way for them to use in at various technical and engineering applications
			CO4: The knowledge of Physics relevant to engineering is critical for converting ideas into technology
4	I-I	Engineering Graphics	CO1: Preparing working drawings to communicate the ideas and information.
			CO2: Read, understand and interpret engineering drawings.



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5	I-II	Engineering Mechanics	CO1: Determine resultant of forces acting on a body and analyze equilibrium of a body subjected to a system of forces.
			CO2: Solve problem of bodies subjected to friction.
			CO3: Find the location of centroid and calculate moment of inertia of a given section.
			CO4: Understand the kinetics and kinematics of a body undergoing rectilinear, curvilinear, rotatory motion and rigid body motion
			CO5: Solve problems using work energy equations for translation, fixed axis rotation and plane Motion and solve problems of vibration.
6	I-II	Mathematics-II	CO1: Identify whether the given differential equation of first order is exact or not.
			CO2: Solve higher differential equation and apply the concept of differential equation to real world problems.
			CO3: Evaluate the multiple integrals and apply the concept to find areas, volumes, centre of mass and Gravity for cubes, sphere and rectangular parallelepiped
			CO4: Evaluate the line, surface and volume integrals and converting them from one to another.
7	I-II	Chemistry	CO1 The knowledge of atomic, molecular and electronic changes, band theory related to conductivity
			CO2: The required principles and concepts of electrochemistry, corrosion and in understanding the problem of water and its treatments.
			CO3 The required skills to get clear concepts on basic spectroscopy and application to medical and other fields.
			CO4: The knowledge of configurational and conformational analysis of molecules and reaction mechanisms.
8	I-II	English	CO1: Use English Language effectively in spoken and written forms.
			CO2: Comprehend the given texts and respond appropriately.
			CO3: Communicate confidently in various contexts and different cultures.
			CO4: Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.
10	II- I	Surveying and Geomatics	CO1: Apply the knowledge to calculate angles, distances and levels
			CO2: Identify data collection methods and prepare field notes
			CO3: Understand the working principles of survey instruments, measurement errors and corrective measures
			CO4: Interpret survey data and compute areas and volumes, levels by different type of equipment and relate the knowledge to the modern equipment and methodologies
			CO1: Describe the concepts and principles, understand the theory of elasticity including strain/displacement and Hooke's



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11	II- I	Strength of Materials - I	law relationships; and perform calculations, related to the Strength of structured and mechanical components.
			CO2: Recognize various types loads applied on structural components of simple framing geometries and understand the nature of internal stresses that will develop within the components.
			CO3: To evaluate the strains and deformation that will result due to the elastic stresses developed within the materials for simple types of loading.
			CO4: Analyse various situations involving structural members subjected to plane stresses by application of Mohr's circle of stress
			CO5: Frame an idea to design a system, component, or process
12	II- I	Probability and Statistics	CO1: Formulate and solve problems involving random variables and apply statistical methods for analysing experimental data.
			CO2: The basic ideas of statistics including measures of central tendency, correlation and regression.
13	II- I	Fluid Mechanics	CO1: Understand the broad principles of fluid statics, kinematics and dynamics
			CO2: Understand definitions of the basic terms used in fluid mechanics and characteristics of fluids and its flow
			CO3: Understand classifications of fluid flow
			CO4: Be able to apply the continuity, momentum and energy principles
14	II-I	Engineering Geology	CO1: Site characterization and how to collect, analyse, and report geologic data using standards in engineering practice
			CO2: The fundamentals of the engineering properties of Earth materials and fluids.
15	II-II	Basic Electrical and Electronics Engineering	CO1: To analyse and solve electrical circuits using network laws and theorems.
			CO2: To understand and analyse basic Electric and Magnetic circuits
			CO3: To study the working principles of Electrical Machines
			CO4: To introduce components of Low Voltage Electrical Installations
			CO5: To identify and characterize diodes and various types of transistors
16	II-II	Basic Mechanical Engineering for Civil Engineers	CO1: To understand the mechanical equipment for the usage at civil engineering systems
			CO2: To familiarize with the general principles and requirement for refrigeration, manufacturing
			CO3: To realize the techniques employed to construct civil engineering systems.
17	II-II	Building Materials, Construction and Planning	CO1: Define the Basic terminology that is used in the industry
			CO2: Categorize different building materials, properties and their uses
			CO3: Understand the Prevention of damage measures and good workmanship



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			CO4: Explain different building services
18	II-II	Strength of Materials - II	CO1: Describe the concepts and principles, understand the theory of elasticity, and perform calculations, relative to the strength of structures and mechanical components in particular to torsion and direct compression.
			CO2: To evaluate the strains and deformation that will result due to the elastic stresses developed within the materials for simple types of loading
			CO3: Analyse strength and stability of structural members subjected to Direct, and Direct and Bending stresses.
			CO4: Understand and evaluate the shear centre and unsymmetrical bending
			CO5: Frame an idea to design a system, component, or process
19	II-II	Hydraulics and Hydraulic Machinery	CO1: Apply their knowledge of fluid mechanics in addressing problems in open channels and hydraulic machinery.
			CO2: Understand and solve problems in uniform, gradually and rapidly varied flows in open channel in steady state conditions.
			CO3: Apply dimensional analysis and to differentiate the model, prototype and similitude conditions for practical problems
			CO4: Get the knowledge on different hydraulic machinery devices and its principles that will be utilized in hydropower development and for other practical usages
20	II- II	Structural Analysis - I	CO1: An ability to apply knowledge of mathematics, science, and engineering
			CO2: Analyse the statically indeterminate bars and continuous beams
			CO3: Draw strength behaviour of members for static and dynamic loading
			CO4: Calculate the stiffness parameters in beams and pin jointed trusses.
			CO5: Understand the indeterminacy aspects to consider for a total structural system.
			CO6: Identify, formulate, and solve engineering problems with real time loading
21	III-I	Concrete Technology	CO1: Identify Quality Control tests on concrete making materials
			CO2: Understand the behaviour of fresh and hardened concrete.
			CO3: Design concrete mixes as per IS and ACI codes.
			CO4: Understand the durability requirements of concrete
			CO5: Understand the need for special concretes
22	III-I	Design of Reinforced Concrete Structures	CO1: Design RC Structural elements
			CO2: Design RC Structural elements
			CO3: Design Reinforced Concrete slabs
			CO4: Design the Reinforced Concrete Columns and footings
			CO5: Design structures for serviceability
			CO6: Design staircases, canopy
23	III-I	Water Resources	CO1: Analyse hydro-meteorological data
			CO2: Estimate abstractions from precipitation



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		Engineering	CO3: Compute yield from surface and subsurface basin
			CO4: Develop rainfall-runoff models
			CO5: Formulate and solve hydrologic flood routing models
			CO6: Estimate runoff, design discharge from catchment
24	III-I	Fundamentals of Management	CO: The students understand the significance of management in their profession. The various Management Functions like Planning, Organizing, Staffing, Leading, motivation and Control aspects are learnt in this course. The students can explore the management Practices in their domain area.
			CO1: Design tension and compression members.
			CO2: Design beams and beam columns
			CO3: Design bolt and weld connections
			CO4: Design built up members and Column base
			CO5: Design of plate girders and Roof Trusses
25	III- II	Design of Steel Structures	
26	III- II	Environmental Engineering	CO1: Analyse characteristics of water and wastewater
			CO2: Estimate the quantity of drinking water and domestic wastewater generated
27	III- II	Soil Mechanics	CO3: Design components of water supply systems Design sewerage system
			CO1: Understand the mechanism Behaviour of Soil for different loads.
			CO2: and from Soil Condition will be able to determine properties of soil
28	III- II	Ground water development and management	CO: At the end of the course, the student will be able to Understand Ground Water occurrence, Ground Water Movement Well constructional etc...
			CO1: Understand Plan highway networks
			CO2: Design highway geometrics.
			CO3: Design flexible and rigid pavements.
			CO4: Design Intersections and prepare traffic management plans
29	IV-I	Transportation Engineering	
30	IV- I	Estimation Quantity Surveying and Valuation	CO1: Do estimation of Buildings, Roads and Canals.
			CO2: Understand contracts and specification.
31	IV- I	Construction Technology and Management.	CO1: Understand the roles and responsibilities of a project manager
			CO2: Prepare schedule of activities in a construction project
			CO3: Identify the equipment used in construction.
			CO4: Understand safety practices in construction industry
			CO5: Prepare tender and contract document for a construction project
32	IV-I	Watershed Management	CO1: Identify causes of soil erosion
			CO2: Plan and design soil conservation measures in a watershed



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			CO3: Plan and design water harvesting and groundwater recharge structures
			CO4: Plan measures for reclamation of saline soils.
33	IV-I	Traffic Engineering	CO1: Understand basics principles of Traffic Engineering.
			CO2: Analyse parking data and model accidents.
			CO3: Determine capacity and LOS.
			CO4: To provide engineering techniques to achieve Safe and efficient movement of people and goods on roadways
34	IV-II	Remote Sensing and GIS	CO1: Retrieve the information content of remotely sensed data
			CO2: Analyse the energy interactions in the atmosphere and earth surface features
			CO3: Interpret the images for preparation of thematic maps.
			CO4: Apply problem specific remote sensing data for engineering applications
			CO5: Analyse spatial and attribute data for solving spatial problems
35	IV-II	Water Resources Systems Analysis	CO1: Apply concepts of systems analysis for planning of water resources systems
			CO2: Perform basic economic analysis to evaluate the economic feasibility of water resources and environmental engineering projects
			CO3: Formulate and solve deterministic optimization models for design and operation of water resources systems
			CO4: Formulate and solve stochastic and fuzzy optimization problems for decision making under uncertainty
36	IV-II	Industrial Waste Water Treatment.	CO1: Identify the characteristics of industrial wastewaters
			CO2: Describe pollution effects of disposal of industrial effluent
			CO3: Identify and design treatment options for industrial wastewater
			CO4: Formulate environmental management plan