



ARMET
Alamuri Ratnamala
Institute of Engineering and Technology
(Run by Koti Vidya Charitable Trust)
Accredited by NAAC with 'B+' Grade
ISO 9001:2015 CERTIFIED

COURSE OUTCOMES OF CIVIL ENGINEERING

ACADEMIC YEAR: 2019-20

SECOND YEAR, SEMESTER-III

SUBJECT: STRENGTH OF MATERIALS

Course Outcomes:

- Understand the concepts of shear force, bending moment, axial force for statically determinate beams and compound beams having internal hinges; and subsequently, its application to draw the shear force, bending moment and axial force diagrams.
- Analyze the flexural members for its structural behavior under the effect of flexure (bending), shear and torsion either independently or in combination thereof.
- Study the behavior of the structural member under the action of axial load, bending and twisting moment.
- Study the deformation behavior of axially loaded columns having different end conditions and further, evaluate the strength of such columns.
- The successful completion of the course will equip the students for undertaking the courses dealing with the analysis and design of determinate and indeterminate structures.

SUBJECT: ENGINEERING GEOLOGY

Course Outcomes:

- Understand the significance of geological studies for safe, stable and economic design of any civil Engineering structure.
- Demonstrate the knowledge of geology to explain major geological processes such as formation of Mountain, ocean and the occurrence and distribution of earthquakes and volcanoes.
- Explain various geological structures like folds, faults, joints, unconformity, their origin and distribution which are very essential in the design and construction of dams, tunnels and any other major civil engineering project.
- Understand methods of surface and subsurface investigation, advantages and disadvantages caused due to geological conditions during the construction of dam and tunnel.
- Understand the causes and prevention of natural hazard like earthquake, landslide, volcano etc. will help student to meet the specific needs with suitable considerations for public health and safety.

- Prepare effective reports mentioning advantages and disadvantages caused due to geological condition and can evaluate any site for civil engineering project.

SUBJECT: FLUID MECHANICS I

Course Outcomes:

- Define various properties of fluids, state and explain different types of laws and principles of fluid Mechanics.
- Interpret different forms of pressure measurement and Calculate Hydrostatic Force and its Location for a given geometry and orientation of plane surface.
- Compute force of buoyancy on a partially or fully submerged body and analyse the stability of a Floating body.
- Distinguish velocity potential function and stream function and solve for velocity and acceleration of a fluid at a given location in a fluid flow.
- Derive Euler's Equation of motion and Deduce Bernoulli's equation.
- Measure velocity and rate of flow using various devices.

SUBJECT: APPLIED MATHEMATICS III

Course Outcomes:

- Solve the Ordinary and Partial Differential Equations using Laplace Transformation.
- Solve Ordinary and Partial Differential Equations using Fourier series.
- Solve initial and boundary value problems involving ordinary differential equations
- Fit the curve using concept of correlation and regression.
- Apply bilinear transformations and conformal mappings
- Identify the applicability of theorems and evaluate the contour integrals.

SUBJECT: SURVEYING I

Course Outcomes:

- Apply principles of surveying and leveling for civil engineering works.
- Measure vertical and horizontal plane, linear and angular dimensions to arrive at solutions to basic Surveying problems.
- Perform various practical and hence projects using different surveying instruments.
- Apply geometric principles for computing data and drawing plans and sections.
- Analyze the obtained spatial data and compute areas and volumes and represent 3D data on plane Surfaces (2D) as contours.

SECOND YEAR, SEMESTER-IV

SUBJECT: STRUCTURAL ANALYSIS-1

Course Outcomes:

- Understand the behavior of various statically determinate structures including compound structures having an internal hinge for various loadings.
- Analyze these structures to find out the internal forces such as axial force, shear force, bending Moment, twisting moments, etc.
- Evaluate the displacements / deflections in beams and frames under the action of loads. They will be able to obtain the response of the beams under the action of moving loads
- Analyze the structures such as arches and suspension bridges and study the behavior of eccentrically loaded columns.
- Analyze the section with respect to unsymmetrical bending and shear center.

SUBJECT: FLUID MECHANICS II

Course Outcomes:

- Interpret different pipe fittings and evaluate the fluid velocity considering major and minor losses.
- Solve pipe network problems by Hardy cross method.

- Distinguish the types of compressible flow and understand concept of boundary layer theory.
- Evaluate pressure drop in pipe flow using Hagen-Poiseuille's equation for laminar flow in a pipe.

SUBJECT: BUILDING MATERIALS AND CONSTRUCTION TECHNOLOGY

Course Outcomes:

- Identify and list the various building materials, their properties and symbols.
- Identify the properties of ingredients of concrete, interpret and design concrete mix for various Grades.
- Explain and interpret manufacturing process of basic construction materials and understand various masonry construction and finishes.
- Perform tests on various materials.

SUBJECT: BUILDING DESIGN AND DRAWING

Course Outcomes:

- Students will be able to list down the types of structures and its various components (for eg. doors, windows, staircase, foundations etc.)
- Students will be able to explain various concepts pertaining to building design and drawing (for eg. principles of planning, architectural planning, green buildings etc.)
- Students will be able to apply principles of planning, architectural planning and building bye laws while designing and preparing building drawings.
- Students will be able to calculate and analyze various technical details of a building (for eg. Carpet area, FSI etc.) from its drawings.
- Students will be able to design various components of buildings (for eg. staircases etc.) as well as buildings as a whole, given the requirements of the building owner and local D.C. laws.
- Students will be able to prepare drawings (for eg. plans, elevation, perspective views etc.) of the designed components of buildings as well as buildings as a whole.

SUBJECT: SURVEYING II

Course Outcomes:

- Operate Total Station & GPS for desired accuracy in surveying and establish survey control of determined accuracy using Total Station, GPS, GIS and remote sensing.
- Set out various types of curves by linear and angular methods
- Compute setting out data from survey and design information.

- Generate and manipulate field survey data and incorporate design data using specialized software's
- Appreciate the role of various governmental authorities in maintaining cadastral survey records.

SUBJECT: APPLIED MATHEMATICS-IV (AM-IV)

Course Outcomes:

- Solve the system of linear equations using matrix algebra with its specific rules.
- Illustrate 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.

THIRD YEAR, SEMESTER-V

SUBJECT: STRUCTURAL ANALYSIS-II

Course Outcomes:

- Understand the behavior of various statically indeterminate structures subjected to static loads and Variation in temperature.
- Analyze the structures using displacement parameters to find out the internal forces such as axial Force, shear force, bending moment, twisting moments, etc. for beams, 2D portal frames with
- Various loads and boundary conditions, which becomes the basis for structural design.
- Contrast between the concept of force and displacement methods of analysis of indeterminate Structures. Also, the elastic curve in beams and frames under the action of loads.
- Understand the concept of plastic hinge, plastic moment carrying capacity, shape factor and Collapse load for single and multiple span beams.
- Find out the approximate dimensions of beams and columns using the approximate method for giving the input in design software. The knowledge gained in this subject shall also be useful

for application in the structural design in later years and also useful in the civil engineering field for the analysis purpose.

- Demonstrate the ability to extend the knowledge gained in this subject for their higher years UG Programme subjects such as Advanced Structural Analysis and Advanced Structural Mechanics in which they will be dealing with the indeterminate structures.

SUBJECT: GEOTECHNICAL ENGINEERING-I

Course Outcomes:

- Understand the soil types, index and engineering properties and relationship between various unit Weights & other parameters.
- Classify the soil with a view towards assessing the suitability of a given soil for use; either to use it to support a structure (e.g. embankment) or to construct a structure therein (e.g. foundation)
- Understand the use of geo synthetics in soil to improve soil properties.
- Evaluate the compaction characteristics in laboratory & field and hence interpret the results with Compaction specifications.
- Interpret soil boring data for foundation design.
- Conduct laboratory experiments to collect, analyze, interpret and present the data.

SUBJECT: APPLIED HYDRAULICS

Course Outcomes:

- Apply the concepts of fluid dynamics to solve pipe bend and sprinkler problems.
- Analyze dimensional problems and explain model laws.
- Explain the working and functions of Francis, Kaplan and Pelton wheel turbines.
- Explain the basic concepts of open channel hydraulics and measure discharge through open Channels.
- Identify the occurrence of hydraulic jump and its parameters
- Explain uniform flow, non-uniform flow and establish mathematical relationships.

SUBJECT: ENVIRONMENTAL ENGINEERING-I

Course Outcomes:

- Understand the water supply system, its components and water demand by various consumers. Understand and analyze the quality of water and will be able to conduct the quality control test on Samples.
- Understand the different processes in the water treatment facility.
- Design the different units of treatment for water treatment plants.
- Understand the components of building water supply system, storage and rain water harvesting.
- Understand the problems of air and noise pollution. Besides, they will be prepared to contribute
- Practical solutions to environmental problems in our society.

SUBJECT: TRANSPORTATION ENGINEERING-I

Course Outcomes:

- To get an insight of the development in all the fields of highway engineering and familiarized with different surveys required to be carried out for the implementation of the highway project; to understand the phase of engineering which deals with the planning and geometrics design of streets, highways and abutting land in the context of safe and convenient traffic operations thereon.
- To know the required properties of the different materials to be used in the construction of Highways and other allied structures, to understand characterization of the materials and to Evaluate their suitability; understand the principle of soil stabilization, utilization of geo synthetics in the construction of highway and allied structures
- To understand the classification of different types of pavements, factors to be considered in the design of pavements, approaches for designing the different types of pavements and can the flexible and rigid pavements be using IRC Specifications
- To get an insight into the methods of construction of different types of pavements; along with the importance of highway drainage and various methods of providing the drainage; also, to Understand the elements of bridge engineering.
- To illustrate different distresses in the pavements, evaluate the pavements in terms of its functional and structural adequacy and arrive upon the rehabilitation measures.

- To explain methods to strengthen the distressed pavements, low volume and low-cost road and also to understand the significance of the drainage in the field of highway engineering including different methods of providing the drainage in the highways.

SUBJECT: ADVANCED CONCRETE TECHNOLOGY

Course Outcomes:

- Know the various materials and properties in concrete.
- Understand the Mix design by different methods.
- Understand the various properties of special concrete.
- Get a thorough knowledge of Fibre Reinforced Concrete.
- Know the different procedures for testing concrete.
- Understand the concept of durability of concrete.

THIRD YEAR, SEMESTER-VI

SUBJECT: GEOTECHNICAL ENGINEERING-II

Course Outcomes:

- Students will be able to evaluate the consolidation parameters for the soil.
- Students will be able to calculate the shear strength parameters for the soil.
- Students will be able to calculate the factors of safety of different types of slopes under various soil conditions, analyze the stability of slopes, calculate lateral earth pressures and analyze the stability of retaining walls.
- Students will be able to calculate bearing capacity of shallow foundations using theoretical and Field methods, calculate load bearing capacity of individual as well as group of pile foundations and their settlement using theoretical and field methods
- Students will be able to explain conduits and calculate the load carried by the struts of a braced cut under various soil conditions.
- Students will be able to explain ground improvement techniques.

SUBJECT: DESIGN AND DRAWING OF STEEL STRUCTURES

Course Outcomes:

- Explain the Limit State Design philosophy as applied to steel structures.
- Predict the behavior and design members subjected to axial compression, tension and their connection.
- Predict the behavior and design members subjected to bending, shear and their connection.
- Calculate loading for a truss and design the complete truss.
- Demonstrate ability to follow IS codes, design tables and aids in analysis and design steel structures.
- Analyze and design the commercial steel structures and prepare drawing with complete detailing.

SUBJECT: TRANSPORTATION ENGINEERING-II

Course Outcomes:

- Understand the various systems of railway, airport, water transportation and the components of pway and its construction, yards, modernization of railway track.
- Apply the concept of geometric design of railway track and railway traffic control.
- Understand airport planning, obstructions and orientation of runway.
- Apply the concept of geometric design of runway, taxiway, etc. and the knowledge of various signaling system for air traffic control
- Understand the system of water transportation, types of breakwater, harbours and port facilities equipment.
- Understand the basic idea about the bridge engineering.

SUBJECT: ENVIRONMENTAL ENGINEERING – II

Course Outcomes:

- Explain wastewater collection systems in buildings and municipal areas and to determine the quantity of wastewater and storm water production. Also, gain the knowledge of the construction of new sewer line and importance of sewer appurtenances.
- Explain and analyze the characteristics of wastewater and design the primary treatment for wastewater.

- Explain on-site treatment methods and solve Analyze and design wastewater treatment systems (ASP, Aerated lagoon and Oxidation ponds).
- Identify and apply proper treatment for reclamation and reuse of wastewater and disposal.
- Explain sludge characteristics and processing methods.
- To provide knowledge of solid waste collection system, characteristics of solid waste and to identify hazardous waste. Study related to plastic waste management will be studied.

SUBJECT: WATER RESOURCES ENGINEERING-I

Course Outcomes:

- Classify various types of irrigation projects
- Explain different irrigation methods and effective use of water resources.
- Calculate the crop water requirements and irrigation requirement.
- Derive hydrographs and calculate runoff of a catchment area.
- Explain the steady state and unsteady state conditions of any aquifer and design water wells.
- Estimate the capacity of a reservoir for different purposes.

SUBJECT: ADVANCED CONSTRUCTION EQUIPMENT COURSE OUTCOMES

Course Outcomes:

- Understand the use/applications of various conventional construction equipment and select the best out of them for a particular site requirement.
- Know modern methods/equipment used for underground as well as underwater tunneling.
- Compare conventional and modern methods of formwork on the basis of productivity, reuse value, ease of erection and dismantling, flexibility offered and overall cost.
- Understand the techniques involved and the equipment required thereof for construction of various transporting facilities.
- Gain knowledge about the setting up of different kinds of the power generating structures.
- Select proper equipment for construction of transporting facilities based on requirements

BE, SEMESTER-VII

SUBJECT: QUANTITY SURVEY, ESTIMATION & VALUATION

Course Outcomes:

- Apply the measurement systems to various civil engineering items of work.
- Draft the specifications for various items of work & determine unit rates of items of works
- Estimate approximate cost of the structures by using various methods& prepare detailed Estimates of various civil engineering structures by referring drawings.
- Assess the quantities of earthwork &construct mass haul diagrams.
- Draft tender notice &demonstrate the significance of the tender as well as contract process.
- Determine the present fair value of any constructed building at stated time.

SUBJECT: THEORY OF REINFORCED CONCRETE STRUCTURES

Course Outcomes:

- Understand the pros and cons of the WSM and LSM.
- Understand the various clauses specified in IS: 456-2000 for designing structural members with the safety and economy.
- Carry out analysis and design of various elements of the reinforced concrete
- Structures such as beam, slab, column, footings using the concept of Limit state method.
- Understand and the use of readymade design curves from Special publications of Bureau of Indian standards.

SUBJECT: WATER RESOURCES ENGINEERING II

Course Outcomes:

- Design the section of gravity dams, earth and rock fill dams, arch dams and buttress dams.
- Design spillways and energy dissipaters.
- Apply silt theories to design irrigation canals.
- Explain various types of canals and its maintenance.
- Explain different cross drainage works of a canal system
- Understand and analyse faults and protection of HVDC system.
- Understand harmonics, their causes, effects and use of different filters.

SUBJECT: SOLID WASTE MANAGEMENT

Course Outcomes:

- Explain generation, storage, collection, transfer and transport, processing, recovery and Disposal in the management of solid waste.
- Understand the characteristics of different types of solid waste and the factors affecting Variation.
- Identify the methods of collection, storage and transportation of solid waste.
- Suggest suitable technical solutions for processing of wastes.
- Ability to plan waste minimization and disposal of municipal solid waste.
- Ensure the safe handling and treatment of Hazardous, Electronic and Biomedical waste.

BE, SEMESTER-VIII

SUBJECT: DESIGN AND DRAWING OF REINFORCED CONCRETE

Course Outcomes:

- Design independently RCC structure by applying IS code provisions.
- Design staircase, water tank and retaining wall.
- Explain principles of PSC and calculate losses.
- Draw and explain the structural detailing.
- Explain response of structure during an earthquake and calculate design forces.

SUBJECT: CONSTRUCTION MANAGEMENT

Course Outcomes:

- Understand & apply the knowledge of management functions executing & controlling the construction projects.
- Prepare feasible project schedule by using various scheduling techniques.
- Gain knowledge of managing various resources & recommend best method of allocating the resources to the project.
- Develop optimum relationship between time & cost for construction projects.
- Implement quality & safety measures on construction sites during execution of civil engineering projects.
- Understand the importance of labour legislation.

SUBJECT: INDUSTRIAL WASTE TREATMENT

Course Outcomes:

- Understand the characteristics of industrial wastewater.
- Identify sampling method and analyze industrial waste.
- Design facilities for the processing and reclamation of industrial waste water.
- Explain on-site treatment methods and solve Analyze and design wastewater treatment systems. (floatation, vacuum filtration, centrifugation, filter press and membrane filters)
- Detailed on-site manufacturing processes and treatments of industrial waste water.
- Analyze proposed development project plans for possible environmental effects and to improve treated effluent quality to confirm standard prescribed by regulatory agencies.

SUBJECT: ADVANCED DESIGN OF STEEL STRUCTURES

Course Outcomes:

- To perform the analysis and design of special steel structures
- The will be able to analysis and design the gantry girder by limit state method.
- They will be able to analysis and design steel chimney, lattice tower, tubular truss and Water tank
- Students should able to independently design steel structures using relevant IS codes.

SUBJECT: PAVEMENT DESIGN AND CONSTRUCTION

Course Outcomes:

- Understand the structural actions involved in the pavement due to different types of load acting thereon and the various methods of analysis of pavements.
- Understand the applications of the analysis in the design of pavements using different methods of pavement design.
- Know the different types of distresses occurring in the existing pavements and carry out the Structural and functional evaluation of the pavements.
- Apply the knowledge of evaluation in pre-empting the failure and to arrive upon the Methodology of the rehabilitation of pavements
- Understand the various aspects of the construction of concrete roads and low volume roads.

- Understand the pavement management system and quality control and assurance criteria and Subsequently, its application in the highway construction.

SUBJECT: BRIDGE ENGINEERING AND DESIGN

Course Outcomes:

- Select the suitable type of bridge according to the site condition.
- Understand IRC loads, distribution of these loads on deck slab and among longitudinal beams/girders of a bridge.
- Design of culvert, balanced cantilever reinforced concrete Bridge, prestressed concrete deck Slab Bridge, I-girdered and box girdered bridge, lattice girder Railway Bridge.
- Understand different types of foundations, piers and abutments, their methods of construction.
- Understand various types of bearings and their suitability, erection of bridge superstructure.