

Anurag Engineering College

(Autonomous)

Ananthagiri (V&M), Kodad, Suryapet (Dt). Pin 508 206



B.TECH.

CIVIL ENGINEERING

R18 REGULATION

COURSE OUTCOMES

I YEAR I SEMESTER**(MA101BS) MATHEMATICS-I**

- CO 1: Write the matrix representation of system of linear equations and identify the consistency of the system of equations.
- CO 2: Find the Eigenvalues and Eigenvectors of the matrix and discuss the nature of the quadratic form.
- CO 3: Analyse the convergence of sequences and series.
- CO 4: Discuss the applications of mean value theorems to the mathematical problems, Evaluation of improper integrals using Beta and Gamma functions.
- CO 5: Find the extreme values of functions of two variables with / without constraints.

(CH102BS) ENGINEERING CHEMISTRY

- CO 1: Apply the knowledge of atomic, molecular and electronic changes related to conductivity.
- CO 2: Analyze the troubles caused by impure water and method of purification of water.
- CO 3: Apply the knowledge of electrode potentials for the protection of metals from corrosion.
- CO 4: Explain the concept of configurational and conformational analysis of molecules and reaction mechanism.
- CO 5: Apply the knowledge of polymers in everyday's life.

(EN103HS) ENGLISH

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Understand the application of language skills in promoting the responsibilities towards society.
- CO 2: Use appropriate and Standard Language with basic grammatical concepts both for Technical and Professional purpose.
- CO 3: Use General and Technical Vocabulary in different academic situations.
- CO 4: Apply the Subject and Theme in establishing and spreading Human Values in society.
- CO 5: Compose different kinds of Writing: Formal Letters, Précis Writing, Essay Writing and Technical Report Writing.

(CS104ES) PROGRAMMING FOR PROBLEM SOLVING - I

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Design algorithms and flowcharts for real world applications
- CO 2: Know the usage of various operators in Program development
- CO 3: Design programs involving decision and iteration structures.
- CO 4: Apply the concepts code reusability using Functions.
- CO 5: Analyse the concepts of Arrays and Strings for real world problems.

(CH105ES)ENGINEERING CHEMISTRY LAB

On successful completion of this course, it is expected that the students will be able to

- CO 1: Determination of parameters like hardness and alkalinity of water.
- CO 2: Estimation of rate constant of a reaction from concentration – time relationships.
- CO 3: Determination of physical properties like surface tension and viscosity.
- CO 4: Calculation of strength of compound using instrumentation techniques.

(EN106HS) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB-I

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Understand the importance of speech sounds and Listening Comprehension.
- CO 2: Understand syllables and Consonant Clusters.
- CO 3: Speak with appropriate Word Accent and Intonation.
- CO 4: Learn to communicate effectively at work place with a special focus on social and professional etiquette.
- CO 5: Learn Task Based Language Learning (TBLL) through various language activities effectively.

(CS107ES)PROGRAMMING FOR PROBLEM SOLVING LAB- I

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Formulate the algorithms and flowcharts for simple problems
- CO 2: Apply fundamental programming concepts, to solve simple problems
- CO 3: Enhance debugging skills
- CO 4: Exercise conditional and iterative statements to write C programs
- CO 5: Modularize the code with functions so that they can be reused
- CO 6: Represent and manipulate data with arrays and strings

(ME108ES)ENGINEERING WORKSHOP

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Practice on manufacturing of components using workshop trades including Carpentry, Fitting, Tin-Smithy, Foundry, Welding Practice, House wiring and Black Smithy.
- CO 2: Apply basic electrical engineering knowledge for house wiring practice.
- CO 3: Identify and apply suitable tools for different trades of Engineering processes including Material removing, measuring And Chiseling.
- CO 4: Study and practice on Plumbing, Machine tools, Power tools, Wood working, Plastic Molding and their operations

(MA201BS) MATHEMATICS – II

On successful completion of this course, it is expected that the students will be able to,

CO 1: Classify the various types of differential equations of first order and first degree and apply the concepts of differential equations to real world problems.

- CO 2: Solve higher order differential equations and apply the concepts of differential equations to real world problems.
- CO 3: Evaluate the multiple integrals.
- CO 4: Identify the vector differential operators physically in engineering problems.
- CO 5: Evaluate the line, surface and volume integrals and converting them from one to another by using vector integral theorems.

(PH202BS) ENGINEERING PHYSICS

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Lasers and Fiber Optics helps to the students in various communication fields and engineering applications.
- CO 2: The student would be able to learn the fundamental concepts on Waves and Oscillations briefly.
- CO 3: The knowledge of fundamentals of crystallography, dielectrics and magnetic materials and their properties and applications in various fields.

(ME203ES) ENGINEERING MECHANICS

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Solve the resultant of forces which are acting on the systems and also the systems and able to apply the equilibrium conditions on a body.
- CO 2: Solve the problems based on friction.
- CO 3: Calculate the centroid and centre of gravity of composite sections.
- CO 4: Solve the area and mass moment of inertia of simple and composite sections.
- CO 5: Calculate the distance travelled and time required for the practice in case of connected systems.

I YEAR II SEMESTER

(CS204ES) PROGRAMMING FOR PROBLEM SOLVING - II

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Use dynamic memory allocation functions with pointers
- CO 2: Apply various file handling techniques for better data management
- CO 3: Distinguish between stacks and queues
- CO 4: Analyze various dynamic data structures

(ME205ES)ENGINEERING GRAPHICS

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Understand engineering drawing and its place in society.
- CO 2: Visualize the different aspects of Points, Lines and Planes.
- CO 3: Acquire knowledge on projections of solids.
- CO 4: Draw sections of solids and plan the drawing for development of surfaces.

- CO 5: Understand the isometric views and projections. Exposure to computer-aided geometric design and creating working drawings

(PH206BS) ENGINEERING PHYSICS LAB

On successful completion of this course, it is expected that the students will be able to,

- CO 1:** Rigidity Modulus of a Material – Torsional Pendulum
CO 2: Study of Resonance in LCR – Series circuit
CO 3: Determination of Time Constant of RC Circuit
CO 4: Determination of frequency of vibrating tuning fork - Melde's Experiment
CO 5: Dispersive Power of the Material of a Prism – Spectrometer

(CS207ES) PROGRAMMING FOR PROBLEM SOLVING LAB – II

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Develop applications on user defined data types
CO 2: Apply dynamic memory allocation through pointers
CO 3: Use different data structures for create/update basic data files
CO 4: Implement linear data structures through stacks and queues
CO 5: Implement various searching and sorting techniques, Linked lists.

(EN208HS) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB - II

On successful completion of this course, it is expected that the students will be able to

- CO 1: Understand the variants in Pronunciation.
CO 2: Differentiate Spoken and Written English in formal and informal situations
CO 3: Understand the emphasis on Pronunciation of English Language in the global world.
CO 4: Apply strategies for Effective Communication in different situations.
CO 5: Participate in conversation, Public Speaking and Group Discussion.

II YEAR I SEMESTER

(MA301BS) PROBABILITY AND STATISTICS

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Understand a random variable that describes randomness or uncertainty in certain realistic situation. It can be of either discrete or continuous type.
CO 2: Understand the definition of the sampling distribution of \bar{x} , and identify the mean, variance, and shape of the sampling distribution given the population information Compute probabilities for the normal distribution.
CO 3: Utilize curve fitting techniques for data representations and computation in engineering analysis.
CO 4: Accept or reject the population based on the sample.
CO 5: Test the significance difference between the sample means when more than two samples.

(CE302PC) BUILDING MATERIALS, CONSTRUCTION AND PLANNING

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Have the knowledge of construction methodology, materials and its planning
- CO 2: Know the functional design of various elements such as arches, lintels, floors, stairs, doors & windows
- CO 3: Have complete knowledge of farm work and plastering.
- CO 4: Get the innovative methods of construction by using the latest technology.
- CO 5: Getting the knowledge about building bye laws

(CE303PC) STRENGTH OF MATERIALS-I

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Describe the concepts and principles, understand the theory of elasticity including strain/displacement and Hooke's law relationships; and perform calculations, related to the strength of structured and mechanical components.
- CO 2: 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.
- CO 3: To evaluate the flexural and simple stresses developed in different types of beams different types of load condition
- CO 4: Analyze Slope and deflection structural members subjected to different load condition with different cross sections.
- CO 5: Analyze various situations involving structural members subjected to plane stresses by application of Mohr's circle of stress and Frame an idea to design a system, component.

(CE304PC) FLUID MECHANICS

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Determine the properties of fluid and pressure and their measurement
- CO 2: Compute forces on immersed plane and curved plates
- CO 3: Apply continuity equation and energy equation in solving problems on flow conduits
- CO 4: Analyze flow between laminar and turbulent flows
- CO 5: Compute frictional losses in pipes

(CE305PC) ENGINEERING GEOLOGY

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Understand the process of weathering and identify the minerals by their physical properties
- CO 2: Identify the type of rock by their physical properties
- CO 3: Understand the geological structures and their behavior.
- CO 4: Identify the subsurface formations through different geo-physical investigations
- CO 5: Apply the geological principles in identifying the suitable sites for engineering constructions to avoid the natural hazards or to withstand the

disturbances that are created by the nature.

(CE306PC) SURVEYING & GEOMATICS

On successful completion of this course, it is expected that the students will be able to

- CO 1: Gain the knowledge in measurement of distance and directions.
- CO 2: Know the measurement of areas and volumes of contours.
- CO 3: Have the knowledge of theodolite surveying & traversing.
- CO 4: Have the knowledge on curves tachometric and modern surveying.
- CO 5: Gain the knowledge of photogrammetry survey.

(CE307PC) SURVEYING LAB

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Conduct survey and collect field data for measuring areas and volumes.
- CO 2: Conduct survey and collect field data for measuring bearings.
- CO 3: Conduct survey and collect field data for measuring levels.
- CO 4: Conduct survey and collect field data for preparing contours.
- CO 5: Gain the knowledge on Total Station

(CE308PC) ENGINEERING GEOLOGY LAB

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Identify the important minerals based upon their physical and optical properties.
- CO 2: Identify the important rocks based upon their megascopic and microscopic properties.
- CO 3: Identify the rocks and minerals by the study of their physical properties.
- CO 4: Interpret and draw the sections for geological maps showing tilted beds, faults, uniformities etc.
- CO 5: Students can unravel the surface and subsurface geological structures for taking appropriate decision to either construct or to strengthen the existing geological structures for raising civil structures.

(HS309MC) GENDER SENSITIZATION (MANDATORY COURSE)

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Students will have developed a better understanding of important issues related to gender in contemporary India.
- CO 2: Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials from research, facts, everyday life, literature and film.
- CO 3: Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.

- CO 4: Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- CO 5: Men and women students and professions will be better equipped to work and live together as equals.

II YEAR II SEMESTER

(EE401ES) BASIC ELECTRICAL & ELECTRONICS ENGINEERING

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Introduction of Electrical Elements, Electrical circuits and applications of KVL, KCL, and Ohm's Law
- CO 2: DC machines and their applications
- CO 3: AC machines and their applications.
- CO 4: Electronic devices like Diode, Transistors and their applications.
- CO 5: Working principle of CRO and its internal parts.

(CE402PC) STRENGTH OF MATERIALS-II

On successful completion of this course, it is expected that the students will be able to,

- CO 1: the concepts of Torsion in Circular Shafts and Types of springs, deflection of springs.
- CO 2: Understand and evaluate various the stresses Developed in Columns and Struts
- CO 3: Analyze strength and stability of structural members subjected to Direct, and bending stresses.
- CO 4: Student will able to understand how to design thin cylinders and thick cylinders
- CO 5: Understand and evaluate the unsymmetrical bending and shear center of channel, I, T and L sections

(CE403PC) HYDRAULICS AND HYDRAULIC MACHINES

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Apply dimensional analysis in different models and prototypes
- CO 2: Calculate forces and work done by a jet on fixed or moving and curved plates and also apply the working principles of turbines including designs
- CO 3: Determine the characteristics of a centrifugal pump and hydro power plant.
- CO 4: Design open channels for most economical sections like rectangular, trapezoidal and circular sections.
- CO 5: Analyze fluid flow on non- uniform open channel hydraulics

(CE404PC) STRUCTURAL ANALYSIS-I

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Understand the statically determinate and indeterminate structures and

- the nature of stresses developed in perfect frames.
- CO 2: To apply energy methods for structural members and analyze three hinged arches for various types of simple loads
- CO 3: Analyze the statically indeterminate members such as propped cantilever and fixed beams and draw shear force and bending moment diagrams.
- CO 4: Analyze the statically indeterminate members such as continuous beams and for various types of loading and also used to derive the equations to solve engineering problems
- CO 5: Analyze the Influence on a beam for different static & moving loading positions.

(CE405PC) CONCRETE TECHNOLOGY

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Have complete knowledge of types and properties of materials require for making concrete
- CO 2: Know the properties of the green and hardened concrete
- CO 3: Know the methods of finding the properties of materials and concrete
- CO 4: Know the IS codal specifications of concrete and its materials.
- CO 5: Have the knowledge of special concretes.

(CE407PC) STRENGTH OF MATERIALS LAB

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Understand the behavior of twisting moment of materials and bending stress of wood/steel cantilever and simply supported beams
- CO 2: Understand the properties of Hardness, Tensile and shear stress of materials.
- CO 3: Understand about estimate the properties of helical spring and strain energy of materials.
- CO 4: Know the estimate the compressive strength of wood and concrete materials
- CO 5: Get the knowledge on Verification of Maxwell's reciprocal theorem, usage of electrical resistance gauges and also deflection of cantilever beam.

(CE408PC) FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Measure discharge in pipes
- CO 2: Determine the energy loss in conduits
- CO 3: Determine the characteristics curves of jets
- CO 4: Determine the characteristics curves of turbines
- CO 5: Determine the characteristics curves of pumps

(HS409MC) HUMAN VALUES AND PROFESSIONAL ETHICS (MANDATORY COURSE)

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Students will learn basic guide lines, content and process for value

- Education
- CO 2: Students will learn human being as co-existence of the sentient I and the material body
- CO 3: Students will understand harmony in the family and society will lead affection towards in the family and as well as in the society.
- CO 4: Students will acquire the knowledge about existing nature and their role in protecting of nature.
- CO 5: Students will learn competence in professional ethics.

III YEAR I SEMESTER

(AE501HS) MANAGERIAL ECONOMICS FINANCIAL ANALYSIS

On successful completion of this course, it is expected that the students will be able to,

- CO 1: The market dynamics namely demand, demand forecasting, elasticity of demand.
- CO 2: Game an insect in to how production function is carried out to achieve least cost combination of inputs and cost analysis.
- CO 3: know the types of markets and pricing methods and strategies.
- CO 4: Analyse how capital budgeting decisions are carried out.
- CO 5: The importance of accounting and known how to analyse and interpret the financial statements through ratio analysis.

(CE502PC) STRUCTURAL ANALYSIS-II

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Analyzing the indeterminacy in structures like trusses and arches.
- CO 2: Analyzing the structures using moment distribution method.
- CO 3: Analyzing the structures using Kani's method and also able to draw SFD and BMD.
- CO 4: Analyzing the structures using Matrix methods and also able to draw SFD and BMD.
- CO 5: Analyzing the structures using approximate methods and also able to draw SFD and BMD.

(CE503PC) GEOTECHNICAL ENGINEERING

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Understand the soil formation and mass volume relationship
- CO 2: Know the effect of permeability and seepage on soils and concept of effective stress in soils.
- CO 3: Understand the concept of stress distribution and mechanism of compaction in soils.
- CO 4: To understand the clear concept of consolidation.
- CO 5: Know the importance of shear strength and understand various theories.

(CE504PC) TRANSPORTATION ENGINEERING

On successful completion of this course, it is expected that the students will be able

to,

- CO 1: Know the highway development, planning and highway alignment.
- CO 2: Know the highway geometry & other elements of highway & their application in the design of highway
- CO 3: Understand the parameters of traffic & preventive measures.
- CO 4: Know the traffic regulation & its management
- CO 5: Understand the intersection, highway maintenance & its construction procedure

(CE505PC) STRUCTURAL ENGINEERING-I (DRCS)

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Know the basic concepts of reinforced concrete designs
- CO 2: Understand the design of beams and IS codal provisions
- CO 3: Understand the design of slabs and staircase
- CO 4: Understand the design of short and long columns
- CO 5: Know the knowledge of design of footings

PROFESSIONAL ELECTIVE - I (CE511PE) REMOTE SENSING & GEOGRAPHICAL INFORMATION SYSTEM

On successful completion of this course, it is expected that the students will be able to,

- CO 1: To apply photogrammetry in different aspects in basic remote sensing elements.
- CO 2: Analyze the Energy interaction in the atmosphere in earth surface features.
- CO 3: Application of GIS data, data representation in various elements like manual digitizing and scanning.
- CO 4: Analyze spatial & attribute data for solving spatial problems.
- CO 5: Use the RS & GIS applications in various aspects.

(CE512PE) GREEN BUILDING MATERIALS AND TECHNOLOGIES

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Be able to identify the fundamentals of energy use and energy processes in building.
- CO 2: Be able to identify the energy requirement and its management.
- CO 3: Apply the knowledge about Sun-earth relationship vis-a-visits effect on climate.
- CO 4: Be able to deal with the end -use energy requirements.
- CO 5: Be familiar with the audit procedures of energy.

(CE513PE) ADVANCED MECHANICS OF MATERIALS

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Appraise importance of Repair, Rehabilitation and Maintenance
- CO 2: Develop familiarity with Serviceability evaluation tests
- CO 3: List out properties to be considered to choose from available repair materials
- CO 4: Develop familiarity with various repair methods and rehabilitation strategies
- CO 5: Monitor the health of structures

(CE506PC) HIGHWAY AND CONCRETE MATERIAL LAB

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Students gain knowledge on test procedures for characterization cement
- CO 2: Students are able test aggregates for its characterization
- CO 3: Students are able evaluate properties of fresh concrete
- CO 4: Students gain knowledge on characterization of concrete
- CO 5: Students are able to understand characterization of bituminous mixes

(CE507PC) GEOTECHNICAL ENGINEERING LAB

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Evaluate the properties of soil
- CO 2: Know the calculation of field density by different methods and permeability tests.
- CO 3: Know the calculation of OMC by different compaction methods and consolidation test.
- CO 4: Evaluate the bearing capacity of soil by using CBR test
- CO 5: Evaluate the laboratory shear strength tests.

(HS508MC) CONSTITUTION OF INDIA (MANDATORY COURSE)

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- CO 2: Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- CO 3: Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
- CO 4: Discuss the passage of the Hindu Code Bill of 1956.

III YEAR II SEMESTER

(CE601PC) FOUNDATION ENGINEERING

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Know the knowledge of soil exploration and slope stability.
- CO 2: Know the earth pressure theories by using different methods and design of retaining walls
- CO 3: Know the various methods of load bearing capacity of soils and settlement of soils
- CO 4: Design the shallow foundations
- CO 5: Design the pile and well foundations

(CE602PC) STRUCTURAL ENGINEERING-II (Design of Steel Structures)

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Understand limit state method (IS: 800-2007) of design and can also design bolted and welded connections.
- CO 2: Design compression and tension members using simple and built-up sections
- CO 3: Design columns and column bases using simple and built-up sections
- CO 4: Design of beams in eccentric connections—framed, seated and stiffened seated connections
- CO 5: Design welded plate girder, connections between web and flange, stiffeners, web splice & flange splice.

(CE603PC) ENVIRONMENTAL ENGINEERING

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Apply procedures to forecast population and compute future water demand
- CO 2: Develop on Environmental Management Systems for characteristics of water
- CO 3: Explain different methodologies for collection and conveyance systems
- CO 4: Examine layout and analyze water distribution systems
- CO 5: Analysis and Design the various treatment plant units

(CE604PC) WATER RESOURCES ENGINEERING

On successful completion of this course, it is expected that the students will be able to,

- CO 1: To get the knowledge of hydrology and hydrologic cycle and its applications.
- CO 2: To gain the knowledge of rainfall measurement methods and its analysis
- CO 3: To understand about groundwater occurrence and aquifer parameters.
- CO 4: To understand basic knowledge of the irrigation and Design discharge for water course.
- CO 5: To get the knowledge of design of irrigation canals and also Design Discharge Handle the Project work with Proper Planning Scheduling including construction methods.

PROFESSIONAL ELECTIVE-II

(CE621PE) PRE-STRESSED CONCRETE

On successful completion of this course, it is expected that the students will be able

to,

- CO 1: Identify classification, properties of pre stressed concrete.
- CO 2: Analyze methods of Prestressing
- CO 3: Design different sections for flexure and shear strength.
- CO 4: Gain knowledge on transfer of prestress in pretension members.
- CO 5: Understand the composite beams and deflections.

(CE622PE) HIGHWAY CONSTRUCTION AND MANAGEMENT

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Have the knowledge of construction methodology materials and planning
- CO 2: Have complete knowledge of types of pavement & their applications.
- CO 3: Get the innovative methods of construction by using the latest technology.
- CO 4: Able to understand the Hill landslides & causes and control measures.
- CO 5: To understand the pavement evaluation & its techniques.

(CE733PE) GROUND WATER HYDROLOGY

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Assess groundwater potential and head.
- CO 2: Estimate hydraulic conductivity and storage coefficient for time variant flow.
- CO 3: Investigate ground water availability for a given area.
- CO 4: Plan and design of artificial recharge.
- CO 5: Construct model and analyze ground water flow.

(CE605PC) STRUCTURAL ANALYSIS AND DESIGN LAB

On successful completion of this course, it is expected that at the students will be able to,

- CO 1: The Student will understand importance in designing
- CO 2: Student will be able to generate a mode & can apply the loads & properties of the material
- CO 3: Student will be able to analyze & design a portal bay frame.
- CO 4: Student will be able to analyze & design a G+3 residential building.
- CO 5: Student will be able to analyze & design a concrete structure.

OPEN ELECTIVE-I

(CE611OE) CONSTRUCTION MATERIALS

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Students are get knowledge of various Materials Like Stones, Bricks and Concrete Blocks
- CO 2: Students are Gain Basic Knowledge on Materials like Lime, Cement, Aggregates and Mortar.
- CO 3: Students are known About Concrete Ingredients, Manufacturing Process and Tests on It.
- CO 4: Students are Gain About Basic Knowledge on Timber And Other Materials
- CO 5: Students are get knowledge on Modern construction materials.

(CE 612OE) WASTE MANAGEMENT

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Understand the standards for feed water in various industries and different theories in reducing the concentration of wastewater.
- CO 2: Understand the effects of discharging wastewater into streams and the direct and indirect impacts on aquatic animals and humans.
- CO 3: Understand the working procedure in various industries , sources , characteristics and effects of waste, also the treatment methods depending upon the type of waste.
- CO 4: Know the combined treatment methods of liquid waste, effective methods of waste disposal and their limitations.
- CO 5: Understand the waste disposal methods and requirement of treatment plants.

(EE611OE) SOLAR PHOTO VOLTAIC SYSTEMS (EEE)

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Understand the basics of solar energy and its geometry.
- CO 2: Analyze the various topologies of solar photovoltaic cells.
- CO 3: Understand the protection and measurement of solar photovoltaic system.
- CO 4: Understand the design considerations of solar photovoltaic system
- CO 5: Analyze the various maximum power point tracking techniques.

(EE612OE) ELECTRICAL POWER GENERATION SYSTEMS (EEE)

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Understand the electrical power generation process from Thermal and Nuclear power stations.
- CO 2: Analyze the electrical power generation from Hydro and Gas power stations.
- CO 3: Analyze the electrical power generation by using solar energy.
- CO 4: Understand the electrical power generation from wind energy & biomass energy.
- CO 5: Know the working of fuel cells and ocean energy conversion.

(ME611OE) ADVANCED ENGINEERING MATERIALS (ME)

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Acquire an understanding of the main concepts related to the structure and properties of Advanced materials
- CO 2: Understand the basic concepts of ferrous and non ferrous metals and alloys.
- CO 3: Understand the ceramics and composite materials
- CO 4: To understand the application of super alloys and intermetallic
- CO 5: Understand the basic methods of manufacturing various types of composite materials.

(ME612OE)INTRODUCTION TO AUTOMOBILE ENGINEERING (ME)

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Analyze the basic lay-out of automobile, working and other details about I.C Engines used in automobiles.
- CO 2: To gain knowledge on working of ignition, Electrical systems.
- CO 3: Understand how the transmission system works and the working knowledge of various Components in transmission system.
- CO 4: Students will be able to explain the working principle of various parts of automobile such as axles, steering system and Suspension System.
- CO 5: Understand the various braking systems and pollution standards and its significance.

(EC611OE)PRINCIPLES OF COMMUNICATIONS (ECE)

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Work on various types of modulations.
- CO 2: Should be able to use these communication modules in implementation.
- CO 3: Will have a basic understanding of various telephone communication systems.
- CO 4: Will have a basic understanding of various satellite and optical communication systems
- CO 5: Will have a basic understanding of various wireless and cellular, mobile and telephone communication systems

(EC612OE) BASIC ELECTRONIC CIRCUITS SIMULATION & DESIGN (ECE)

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Describe circuits for PSpice simulation
- CO 2: Understand the types of DC circuit their output variables analysis
- CO 3: Understand the response of Transient analysis and obtain their output variables.
- CO 4: Understand the types of AC circuit their output variables analysis.
- CO 5: Students can able to analyze and develop simulation circuit for different applications.

(CS611OE) SOFTWARE ENGINEERING (CSE)

On successful completion of this course, it is expected that at the students will be able to,

- CO 1: Apply software engineering principles and techniques.
- CO 2: Analyze software system requirements.
- CO 3: Produce efficient, reliable, robust and cost-effective software solutions.
- CO 4: Apply testing strategies.
- CO 5: Ensure good quality software.

(CS612OE) DATABASE MANAGEMENT SYSTEMS (CSE)

On successful completion of this course, it is expected that at the students will be able to,

- CO 1: Design Entity- Relationship Model for enterprise level databases.
- CO 2: Develop the database and provide restricted access to different users of database and formulate the Complex SQL queries.
- CO 3: Analyze various Relational Formal Query Languages and various Normal forms to carry out Schema refinement
- CO 4: Use of suitable Indices and Hashing mechanisms for real time implementation.
- CO 5: Analyze various concurrency control protocols and working principles of recovery algorithms.

(CE605PC) STRUCTURAL ANALYSIS AND DESIGN LAB

On successful completion of this course, it is expected that at the students will be able to,

- CO 1: Student will understand importance in designing
- CO 2: Student will be able to generate a mode & can apply the loads & properties of the material
- CO 3: Student will be able to analyse & design a portal bay frame.
- CO 4: Student will be able to analyse & design a G+3 residential building.
- CO 5: Student will be able to analyse & design a concrete structure.

(CE606PC) ENVIRONMENTAL ENGINEERING LAB

On successful completion of this course, it is expected that at the students will be able to,

- CO 1: To determine P^H, turbidity and conductivity of given water sample.
- CO 2: To determine alkalinity, acidity and total dissolved solids for a given water sample. .
- CO 3: Estimate the range of chlorides, iron, dissolved oxygen and nitrates in the water sample given.
- CO 4: To determine the optimum dose of coagulant, chlorine demands and total phosphorus for a given water sample.
- CO 5: To determine the COD and BOD of a given sample.

**(HS607MC) INTELLECTUAL PROPERTY RIGHTS
(MANDATORY COURSE)**

After completion of the course the student will be able to

- CO 1: Understand the fundamentals of intellectual properties and its agencies.
- CO 2: Know the trade mark registration process and its rights.
- CO 3: Understand the fundamentals of copy rights and patent law.
- CO 4: Know the trade secret determination and protection.
- CO 5: Know the recent developments in protection of intellectual property rights.

IV YEAR I SEMESTER

(MS701HS) MANAGEMENT SCIENCE

On successful completion of this course, it is expected that at the students will be able to,

- CO 1: About management functions, theories and Organizational structures.
- CO 2: About Production methods, Techniques under quality control and inventory control.
- CO 3: About functions & importance of HRM, Marketing functions and product life cycle.
- CO 4: About techniques in Networking for time required to complete the project.
- CO 5: About Corporate strategy implementation methods and other few contemporary management practices.

(CE702PC) ESTIMATING AND COSTING

On successful completion of this course, it is expected that at the students will be able to,

- CO 1: Apply different types of estimates in different situations
- CO 2: Carryout estimation of quantities for different works
- CO 3: Carryout analysis of rates & bill preparation at different locations
- CO 4: Demonstrate the concepts of specification writing
- CO 5: Apply different types of contracts, tenders and tender forms including projects

PROFESSIONAL ELECTIVE-III**(CE731PE) IRRIGATION AND HYDRAULIC STRUCTURES**

On successful completion of this course, it is expected that at the students will be able to,

- CO 1: The Student will be able to design hydraulic structures Surplus weir
- CO 2: The Student will be able to design hydraulic structures Direct sluice
- CO 3: The Student will be able to design hydraulic structures Glacis type canal drop
- CO 4: The Student will be able to design hydraulic structures Cross regulator
- CO 5: The Student will be able to design hydraulic structures Spillway and energy dissipaters.

(CE732PE) PAVEMENT DESIGN

On successful completion of this course, it is expected that at the students will be able to,

- CO 1: The Student will be able to get basic knowledge on Types of Pavements and it's factors for design
- CO 2: The Student will be able to analyze Stresses in Flexible Pavement
- CO 3: The Student will be able to analyze Stresses in Rigid Pavement
- CO 4: The Student will be able to design Flexible pavements
- CO 5: The Student will be able to design Rigid Pavements.

(CE733PE) ELEMENTS OF EARTHQUAKE ENGINEERING

On successful completion of this course, it is expected that at the students will be able to,

- CO 1: Assess the cause of an earthquake , it's magnitude and its effects on structures

- CO 2: Apply the concepts of Damped and Un-damped Vibrations to single, two and multi-degree systems and deduce a response spectrum
- CO 3: Apply the concepts of Seismic Design Philosophy and Earthquake Resistant Design to Masonry , RC and Steel structures
- CO 4: Evaluate the Seismic Performance of Engineered and Non-Engineered Urban and Rural buildings
- CO 5: Apply the concepts of Seismic Resistant Construction , Base isolation techniques and other energy dissipating devices and also the concepts of Seismic Retro fitting, use and interpret the knowledge gained from the case studies of performance of buildings during past earthquakes

**PROFESSIONAL ELECTIVE-IV
(CE741PE) AIRPORT AND RAILWAY ENGINEERING**

On successful completion of this course, it is expected that at the students will be able to,

- CO 1: Understand the importance of airway system and characteristics of aircrafts.
- CO 2: Understand the importance of airway system and involve in planning of airport facilities.
- CO 3: The students will be able to understand the facilities at airports and designing of runway systems.
- CO 4: Identify different components of railway track and select right materials for construction.
- CO 5: Compute the various geometric features of railways for a given set of requirements.

(CE742PE) SOLID WASTE MANAGEMENT

On successful completion of this course, it is expected that at the students will be able to,

- CO 1: Know the various types of solid waste, their properties and treatment
- CO 2: Know the various types of solid waste, their properties and treatment
- CO 3: Understand the methods of solid and hazardous waste disposal
- CO 4: Understand the hazardous waste management practices
- CO 5: Aware the site remedial technology.

(CE743PE) CONSTRUCTION TECHNOLOGY AND PROJECT MANAGEMENT

On successful completion of this course, it is expected that at the students will be able to,

- CO 1: Handle the Project work with Proper Planning Scheduling including construction methods
- CO 2: Use the mechanized construction equipment at different situations or any huge projects
- CO 3: Have the knowledge of ISC -9000 Quality systems and environmental protection.
- CO 4: To classify the contract management, estimation and project planning techniques
- CO 5: Use the CPM – PERT Problems in project scheduling

OPEN ELECTIVE- II

(CE721OE) DISASTER MANAGEMENT

On successful completion of this course, it is expected that the students will be able to,

- CO 1: Application of different approaches, human ecology in geographical research
- CO 2: Have the knowledge on planetary hazards/disasters
- CO 3: Know the principles and measures to control various disasters/exogenous hazards
- CO 4: Plan for face types of exogenous hazards, impacts and mitigation techniques & management system
- CO 5: Apply emerging approaches in different types of disasters

(CE722OE) REMOTE SENSING & GIS

On successful completion of this course, it is expected that the students will be able to,

- CO 1: To apply photogrammetry in different aspects in basic remote sensing elements.
- CO 2: Analyze the Energy interaction in the atmosphere in earth surface features.
- CO 3: Application of GIS data, data representation in various elements like manual digitizing and scanning.
- CO 4: Analyze spatial & attribute data for solving spatial problems.
- CO 5: Use the RS & GIS applications in various aspects.

(EE721OE) MAINTENANCE OF ELECTRICAL SYSTEMS (EEE)

On successful completion of this course, it is expected that at the students will be able to,

- CO 1: Identify the Engineering materials, properties and applications.
- CO 2: Test the domestic appliances.
- CO 3: Know the use of UPS and SMPS and maintenance of power devices.
- CO 4: Understand the maintenance of batteries, ups/inverter, motors and starters.
- CO 5: Rescue a person met with Electric shock.

(EE722OE/ EE511PE) RENEWABLE ENERGY SOURCES (EEE)

On successful completion of this course, it is expected that at the students will be able to,

- CO 1: Learn the principles of solar radiation and collection of solar energy.
- CO 2: Understand the various solar energy storage methods and solar applications.
- CO 3: Analyze the Wind energy conversion and Biomass energy conversion.
- CO 4: Analyze the geothermal energy conversion and ocean energy conversion.
- CO 5: Analyze the various direct energy conversion devices.

(ME721OE) FUNDAMENTALS OF REFRIGERATION & AIR CONDITIONING (ME)

On successful completion of this course, it is expected that at the students will be able to,

- CO 1: Ability to understand various refrigeration systems.
- CO 2: Ability to understand the operation of various devices of VCR system.
- CO 3: Ability to demonstrate the working of refrigeration equipment.
- CO 4: Ability to understand various psychrometric processes. .
- CO 5: Ability to explain the air-conditioning equipment.

(ME722OE)INDUSTRIAL ROBOTICS (ME)

On successful completion of this course, it is expected that at the students will be able to,

- CO 1: At the end of the course, the student will be able to understand the basic components of Robots and differentiate types of robots and robot grippers.
- CO 2: Model forward and inverse kinematics of robot manipulators.
- CO 3: Analyze forces in links and joints of a robot.
- CO 4: Programme a robot to perform tasks in industrial applications.
- CO 5: Design intelligent robots using sensors.

(EC721OE) PRINCIPLES OF SIGNAL PROCESSING (ECE)

On successful completion of this course, it is expected that at the students will be able to,

- CO 1: Perform Fourier transform and Z transform analysis on signals and systems
- CO 2: Understanding the inter-relationship between DFT and various transforms
- CO 3: Understand the Discrete Fourier series and various transforms
- CO 4: Ability to design various IIR digital filter structures
- CO 5: Ability to design a digital FIR filter for a given specification.

(EC623PE/ EC722OE) NANO MATERIALS AND TECHNOLOGY (ECE)

On successful completion of this course, it is expected that at the students will be able to,

- CO 1: Understand the basic concepts of Nanotechnology.
- CO 2: Understand the basic concepts of Nano materials
- CO 3: Familiar with fabrication process of Nano Technology.
- CO 4: Known the scaling and role of electrons in solids and Nanostructures.
- CO 5: Known structures of Nano Devices.

(CS721OE) OBJECT ORIENTED ANALYSIS AND DESIGN (CSE)

On successful completion of this course, it is expected that at the students will be able to,

- CO 1: Demonstrate the concepts and principles of object oriented programming.
- CO 2: Understand the purposes, major components and key mechanisms of Class and Object Diagram.
- CO 3: Describe the basic resource management responsibilities of Interaction Diagram.
- CO 4: Knowledge on State-chart Diagram.
- CO 5: Applying the techniques for Component and Deployment Diagrams.

(CS722OE) CYBER FORENSICS (CSE)

On successful completion of this course, it is expected that at the students will be able to,

- CO 1: Understand the usage of computers in forensic, and how to use various forensic tools for a wide variety of investigations.
- CO 2: It gives an opportunity to students to continue their zeal in research in computer forensics.
- CO 3: Apply methods for preservation of digital evidence.
- CO 4: Learning in depth about Computer Networks and internet.
- CO 5: Learning in depth about various operating systems.

(EN703HS) ADVANCED ENGLISH COMMUNICATION SKILLS LAB

On successful completion of this course, it is expected that at the students will be able to,

- CO 1: Understand the importance of vocabulary and using in real life situations.
- CO 2: Apply reading strategies to enhance reading comprehension skills
- CO 3: Compose different kinds of Writing: Formal Letters, Précis Writing, Essay Writing and Technical Report Writing.
- CO 4: Develop presentation skills to apply in professional life.
- CO 5: Apply Techniques to clear group discussions and Interviews.

IV YEAR II SEMESTER**PROFESSIONAL ELECTIVE-V****(CE851PE) REPAIR AND REHABILITATION OF STRUCTURES**

On successful completion of this course, it is expected that at the students will be able to,

- CO 1: Understand the behavior of existing structures.
- CO 2: Understand the main causes for structural failure and will be able to give the guidelines to their repairs and retrofitting of masonry and concrete structures.
- CO 3: Understand the main causes for structural failure and will be able to give the guidelines to their repairs and retrofitting of steel structures.
- CO 4: Understand the repairing of complicated and special structures using the new technologies available.
- CO 5: Give the guidelines and retrofitting procedures required for seismic prone structures.

(CE852PE) FINITE ELEMENT METHODS

On successful completion of this course, it is expected that at the students will be able to,

- CO 1: Understand the Finite element method (FEM) and derive elasticity matrices for 2-D, 3- D and axisymmetric elasticity problems.
- CO 2: Understand the basic principles of minimum potential energy methods, Principle of virtual work and various coordinate system.

- CO 3: Understand the FEM formulation using bar, truss elements and analyze simple problems with kinematic indeterminacy not greater than three.
- CO 4: Understand the FEM formulation for beam element and rigid jointed plane frame element and analyze simple problems with kinematic indeterminacy not greater than three.
- CO 5: Give the guidelines about familiarized with displacement models, Iso-parametric elements, 2D CST elements and rectangular elements and know the formulation of global stiffness matrices and load matrices and Gauss Quadrature rule

(CE853PE) INTELLIGENT TRANSPORTATION SYSTEM

On successful completion of this course, it is expected that at the students will be able to,

- CO 1: Students able to identify differentiate dissimilar ITS user services.
- CO 2: Students able to select appropriate ITS technology depending upon site specific conditions.
- CO 3: Students able to understand design and implement ITS components.
- CO 4: Students gain knowledge on appropriate systems in various functional areas.
- CO 5: Students are able to understand the Advantages of IT'S & suggest the technologies for field conditions.

PROFESSIONAL ELECTIVE-VI

(CE861PE) GROUND IMPROVEMENT TECHNIQUES

On successful completion of this course, it is expected that at the students will be able to,

- CO 1: Well aware about the different kinds of problems on expansive soils.
- CO 2: The process of stabilization from the different soils layers
- CO 3: The densification methods in cohesive and cohesive less soil
- CO 4: All methods of dewatering in various soils and also known about grouting system
- CO 5: The functions and applications of geo-synthetics and geo-textiles

(CE862PE) DISASTER MANAGEMENT AND MITIGATION

On successful completion of this course, it is expected that at the students will be able to,

- CO 1: Understand the need of disaster management system in India.
- CO 2: Have the thorough knowledge of environmental hazards and disasters.
- CO 3: Get the complete concept of endogenous hazards and their mitigation measures.
- CO 4: Know the principles and measures to control exogenous hazards.
- CO 5: Have the in depth knowledge of emerging approaches in disaster management.

(CE863PE) ADVANCED REINFORCED CONCRETE STRUCTURES DESIGN & DETAILING

On successful completion of this course, it is expected that at the students will be able to,

- CO 1: Design and detail continuous beams & frames.
- CO 2: Design and detail different types of slabs & rectangular and trapezoidal combined footings.
- CO 3: Design and detail cantilever and counter for retaining walls.
- CO 4: Design and detail circular and rectangular water tanks
- CO 5: Design and detail the various components of Solid slab & T-Beam bridges.

OPEN ELECTIVE-III (CE831OE) PROJECT MANAGEMENT

After successfully completion of this course, the student will be able to

- CO 1: Handle the Project work with Proper Planning Scheduling including construction methods
- CO 2: Use the mechanized construction equipment at different situations or any huge projects
- CO 3: Have the knowledge of ISC -9000 Quality systems and environmental protection.
- CO 4: To classify the contract management, estimation and project planning techniques
- CO 5: Use the CPM – PERT Problems in project scheduling

(CE831OE) SAFETY ENGINEERING

After successfully completion of this course, the student will be able to

- CO 1: Know how to Handle and Protect the Machine and himself while working on it
- CO 2: Know the Knowledge of lifting and carrying the materials and also maintenance of mechanical material handling equipment
- CO 3: Understand the knowledge of safety rules and regulations of working at construction industry
- CO 4: Understand the knowledge about working at all stages in different heights at construction site
- CO 5: Know the knowledge of different types of noise and vibration, its causes, effects and controlling measures

(EE831OE) ELECTRICAL ENGINEERING MATERIALS (EEE)

After successfully completion of this course, the student will be able to

- CO 1: Understand various types of dielectric materials, their properties in various conditions.
- CO 2: Understand the properties and importance of insulating and dielectric medium.
- CO 3: Evaluate magnetic materials and their behavior.
- CO 4: Evaluate semiconductor materials and technologies
- CO 5: Know the materials used in electrical engineering and applications.

(EE832OE) FUZZY LOGIC AND ITS APPLICATIONS (EEE)

After successfully completion of this course, the student will be able to

- CO 1: Operation and properties of crisp and fuzzy logic.
- CO 2: Operation and properties of crisp relations and fuzzy relations.

- CO 3: Laws and inference of classical propositional, predicate and fuzzy propositional logic.
- CO 4: Membership value assignment.
- CO 5: Methods of defuzzification and fuzzy rule based system.

(ME831OE) POWER PLANT ENGINEERING (ME)

After successfully completion of this course, the student will be able to

- CO 1: Understand the principle of various sources of energy, resources and development of power.
- CO 2: To know the concept of internal combustion engine and gas turbine power plant.
- CO 3: To know the concept of hydroelectric power plant.
- CO 4: To know the concept of nuclear power stations and non-conventional power sources..
- CO 5: Understand the power plant economics and environmental considerations.

(ME832OE) NANOTECHNOLOGY (ME)

After successfully completion of this course, the student will be able to

- CO 1: Apply engineering and physics concepts to the Nano-scale and non-continuum domain.
- CO 2: Understand Carbon Nano Tubes structures and manufacturing process.
- CO 3: Understand characterization techniques through various measurements to study electrical, mechanical, thermal properties of nano materials.
- CO 4: Understand the principles and microelectronics fabrication.
- CO 5: Understand the concept of Convective Heat Transfer in Nano fluids.

(EC733PE/EC832OE) BIOMETRIC SYSTEMS (ECE)

: After successfully completion of this course, the student will be able to

- CO 1: Understand the differences between a biometric method and a biometric system
- CO 2: Organize and conduct biometric data collection processes.
- CO 3: Understand the concepts of IRIS recognition.
- CO 4: Understand the concepts of FACE recognition.
- CO 5: Understand how to use biometric databases in system evaluation.

(EC831OE) FUNDAMENTALS OF EMBEDDED SYSTEMS (ECE)

After successfully completion of this course, the student will be able to

- CO 1: Summarize the different development tool for embedded system, features of advanced buses for distributed data transfer in system design.
- CO 2: Develop the different processors on hardware and software for the development of embedded system design.
- CO 3: Contrast the basics of embedded system Firmware.
- CO 4: Implement the concepts of RTOS in real time programming
- CO 5: Understand the development of distributed embedded system design.

(CS831OE) SOFTWARE PROJECT MANAGEMENT (CSE)

After successfully completion of this course, the student will be able to

- CO 1: Apply the practice of project management in delivering of projects.

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- CO 2: Evaluate the project against strategic, technical and economic criteria.
 - CO 3: Identify effort estimation and activity plan of a project.
 - CO 4: Categorize and prioritize actions for risk management.
 - CO 5: Evaluate the characteristics of various team structures