ANNA UNIVERSITY, CHENNAI
AFFILIATED INSTITUTIONS
B.E. CIVIL ENGINEERING
REGULATIONS – 2017
CHOICE BASED CREDIT SYSTEM
III SEMESTER CURRICULUM & SYLLABI

SEMESTER III

<table>
<thead>
<tr>
<th>S.No</th>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>CATEGORY</th>
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1
OBJECTIVES:

- To introduce the basic concepts of PDE for solving standard partial differential equations.
- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.
- To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
- To acquaint the student with Fourier transform techniques used in wide variety of situations.
- To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.

UNIT I  PARTIAL DIFFERENTIAL EQUATIONS  12
Formation of partial differential equations – Singular integrals - Solutions of standard types of first order partial differential equations - Lagrange’s linear equation - Linear partial differential equations of second and higher order with constant coefficients of both homogeneous and non-homogeneous types.

UNIT II  FOURIER SERIES  12

UNIT III  APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS  12
Classification of PDE – Method of separation of variables - Fourier Series Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two dimensional equation of heat conduction.

UNIT IV  FOURIER TRANSFORMS  12

UNIT V  Z-TRANSFORMS AND DIFFERENCE EQUATIONS  12

TOTAL: 60 PERIODS

OUTCOMES:
Upon successful completion of the course, students should be able to:

- Understand how to solve the given standard partial differential equations.
- Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
- Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.
• Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.

• Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

TEXT BOOKS:

REFERENCES:

CE8301 STRENGTH OF MATERIALS I L T P C

3 0 0 3

OBJECTIVES:
• To learn the fundamental concepts of Stress, Strain and deformation of solids.
• To know the mechanism of load transfer in beams, the induced stress resultants and deformations.
• To understand the effect of torsion on shafts and springs.
• To analyze plane and space trusses

UNIT I STRESS, STRAIN AND DEFORMATION OF SOLIDS

UNIT II TRANSFER OF LOADS AND STRESSES IN BEAMS
Types of loads, supports, beams – concept of shearing force and bending moment - Relationship between intensity of load, Shear Force and Bending moment - Shear Force and Bending Moment Diagrams for Cantilever, simply supported and overhanging beams with concentrated load, uniformly distributed load, uniformly varying load and concentrated moment. Theory of Simple Bending – Stress Distribution due to bending moment and shearing force - Flitched Beams - Leaf Springs.
UNIT III DEFLECTION OF BEAMS

UNIT IV TORSION

UNIT V ANALYSIS OF TRUSSES
Determinate and indeterminate trusses - Analysis of pin jointed plane determinate trusses by method of joints, method of sections and tension coefficient – Analysis of Space trusses by tension coefficient method.

TOTAL :45 PERIODS

OUTCOMES:
Students will be able to
- Understand the concepts of stress and strain, principal stresses and principal planes.
- Determine Shear force and bending moment in beams and understand concept of theory of simple bending.
- Calculate the deflection of beams by different methods and selection of method for determining slope or deflection.
- Apply basic equation of torsion in design of circular shafts and helical springs,
- Analyze the pin jointed plane and space trusses

TEXTBOOKS:

REFERENCES :
OBJECTIVE:
- To understand the basic properties of the fluid, fluid kinematics, fluid dynamics and to analyze and appreciate the complexities involved in solving the fluid flow problems.

UNIT I FLUID PROPERTIES AND FLUID STATICS 9
Fluid – definition, distinction between solid and fluid - Units and dimensions - Properties of fluids - density, specific weight, specific volume, specific gravity, viscosity, compressibility, vapour pressure, capillarity and surface tension - Fluid statics: concept of fluid static pressure, absolute and gauge pressures - pressure measurements by manometers - forces on planes – centre of pressure – buoyancy and floatation.

UNIT II FLUID KINEMATICS AND DYNAMICS 9
Fluid Kinematics – Classification and types of flow - velocity field and acceleration - continuity equation (one and three dimensional differential forms) - stream line-streak line-path line- stream function - velocity potential function - flow net. Fluid dynamics - equations of motion - Euler's equation along a streamline - Bernoulli's equation – applications - venturi meter, orifice meter and Pitot tube - linear momentum equation and its application to pipe bend.

UNIT III DIMENSIONAL ANALYSIS AND MODEL STUDIES 9
Fundamental dimensions - dimensional homogeneity - Rayleigh’s method and Buckingham Pi theorem - dimensionless parameters - similitudes and model studies - distorted models.

UNIT IV FLOW THROUGH PIPES 9
Reynold’s experiment - laminar flow through circular pipe (Hagen poiseulle's) - hydraulic and energy gradient – flow through pipes - Darcy - Weisbach's equation - pipe roughness -friction factor- Moody's diagram - major and minor losses of flow in pipes - pipes in series and in parallel.

UNIT V BOUNDARY LAYER 9
Boundary layer – definition - boundary layer on a flat plate – laminar and turbulent boundary layer displacement, energy and momentum thickness – Momentum integral equation-Boundary layer separation and control – drag on flat plate.

OUTCOMES:
At the end of the course students will be able to
- Get a basic knowledge of fluids in static, kinematic and dynamic equilibrium.
- Understand and solve the problems related to equation of motion.
- Gain knowledge about dimensional and model analysis.
- Learn types of flow and losses of flow in pipes.
- Understand and solve the boundary layer problems.

TEXT BOOKS:

REFERENCES:
CE8351 SURVEYING

L T P C
3 0 0 3

OBJECTIVES:
- To introduce the rudiments of plane surveying and geodetic principles to Civil Engineers.
- To learn the various methods of plane and geodetic surveying to solve the real world Civil Engineering problems.
- To introduce the concepts of Control Surveying
- To introduce the basics of Astronomical Surveying

UNIT I FUNDAMENTALS OF CONVENTIONAL SURVEYING AND LEVELLING
Classifications and basic principles of surveying - Equipment and accessories for ranging and chaining - Methods of ranging - Compass - Types of Compass - Basic Principles - Bearing - Types - True Bearing - Magnetic Bearing - Levelling - Principles and theory of Levelling - Datum - Bench Marks - Temporary and Permanent Adjustments - Methods of Levelling - Booking - Reduction - Sources of errors in Levelling - Curvature and refraction.

UNIT II THEODOLITE AND TACHEOMETRIC SURVEYING
Horizontal and vertical angle measurements - Temporary and permanent adjustments - Heights and distances - Tacheometer - Stadia Constants - Analytic Lens - Tangential and Stadia Tacheometry surveying - Contour - Contouring - Characteristics of contours - Methods of contouring - Tacheometric contouring - Contour gradient - Uses of contour plan and map

UNIT III CONTROL SURVEYING AND ADJUSTMENT
Horizontal and vertical control - Methods - specifications - triangulation - baseline - satellite stations - reduction to centre - trigonometrical levelling - single and reciprocal observations - traversing - Gale's table - Errors Sources - precautions and corrections - classification of errors - true and most probable values - weighed observations - method of equal shifts - principle of least squares - normal equation - correlates - level nets - adjustment of simple triangulation networks.

UNIT IV ADVANCED TOPICS IN SURVEYING
Hydrographic Surveying - Tides - MSL - Sounding methods - Three point problem - Strength of fix - astronomical Surveying - Field observations and determination of Azimuth by altitude and hour angle methods - Astronomical terms and definitions - Motion of sun and stars - Celestial coordinate systems - different time systems - Nautical Almanac - Apparent altitude and corrections - Field observations and determination of time, longitude, latitude and azimuth by altitude and hour angle method

UNIT V MODERN SURVEYING
Total Station: Advantages - Fundamental quantities measured - Parts and accessories - working principle - On board calculations - Field procedure - Errors and Good practices in using Total Station GPS Surveying - Different segments - space, control and user segments - satellite configuration - signal structure - Orbit determination and representation - Anti Spoofing and Selective Availability - Task of control segment - Hand Held and Geodetic receivers - data processing - Traversing and triangulation.

TOTAL: 45 PERIODS
OUTCOMES:
At the end of the course the student will be able to understand
- The use of various surveying instruments and mapping
- Measuring Horizontal angle and vertical angle using different instruments
- Methods of Leveling and setting Levels with different instruments
- Concepts of astronomical surveying and methods to determine time, longitude, latitude and azimuth
- Concept and principle of modern surveying.

TEXTBOOKS:

REFERENCES:

CE8391 CONSTRUCTION MATERIALS L T P C
3 0 0 3

OBJECTIVE:
- To introduce students to various materials commonly used in civil engineering construction and their properties.

UNIT I STONES – BRICKS – CONCRETE BLOCKS

UNIT II LIME – CEMENT – AGGREGATES – MORTAR

UNIT III CONCRETE
UNIT IV  TIMBER AND OTHER MATERIALS  

UNIT V  MODERN MATERIALS  

OUTCOMES:
On completion of this course the students will be able to
- Compare the properties of most common and advanced building materials.
- understand the typical and potential applications of lime, cement and aggregates
- know the production of concrete and also the method of placing and making of concrete elements.
- understand the applications of timbers and other materials
- Understand the importance of modern material for construction.

TEXT BOOKS:

REFERENCES:

CE8392  ENGINEERING GEOLOGY  
OBJECTIVE:
At the end of this course the students will be able to understand the importance of geological knowledge such as earth, earthquake, volcanism and to apply this knowledge in projects such as dams, tunnels, bridges, roads, airport and harbor.

UNIT I  PHYSICAL GEOLOGY  
UNIT II MINEROLOGY 9

UNIT III PETROLOGY 9
Classification of rocks, distinction between Igneous, Sedimentary and Metamorphic rocks. Engineering properties of rocks. Description, occurrence, engineering properties, distribution and uses of Granite, Dolerite, Basalt, Sandstone, Limestone, Laterite, Shale, Quartzite, Marble, Slate, Gneiss and Schist.

UNIT IV STRUCTURAL GEOLOGY AND GEOPHYSICAL METHODS 9

UNIT V APPLICATION OF GEOLOGICAL INVESTIGATIONS 9
Remote sensing for civil engineering applications; Geological conditions necessary for design and construction of Dams, Reservoirs, Tunnels, and Road cuttings - Hydrogeological investigations and mining - Coastal protection structures. Investigation of Landslides, causes and mitigation.

TOTAL: 45 PERIODS

OUTCOMES:
The students completing this course
  • Will be able to understand the importance of geological knowledge such as earth, earthquake, volcanism and the action of various geological agencies.
  • Will get basics knowledge on properties of minerals.
  • Gain knowledge about types of rocks, their distribution and uses.
  • Will understand the methods of study on geological structure.
  • Will understand the application of geological investigation in projects such as dams, tunnels, bridges, roads, airport and harbor

TEXT BOOKS:

REFERENCES:
OBJECTIVE:
- To facilitate the understanding of the behavior of construction materials.

I. TEST ON FINE AGGREGATES 15
1. Grading of fine aggregates
2. Test for specific gravity and test for bulk density
3. Compacted and loose bulk density of fine aggregate

II. TEST ON COARSE AGGREGATE 15
1. Determination of impact value of coarse aggregate
2. Determination of elongation index
3. Determination of flakiness index
4. Determination of aggregate crushing value of coarse aggregate

III. TEST ON CONCRETE 15
1. Test for Slump
2. Test for Compaction factor
3. Test for Compressive strength - Cube & Cylinder
4. Test for Flexural strength

IV. TEST ON BRICKS AND BLOCKS 15
1. Test for compressive strength of bricks and blocks
2. Test for Water absorption of bricks and blocks
3. Determination of Efflorescence of bricks
4. Test on tiles

TOTAL: 60 PERIODS

OUTCOME:
- The students will have the required knowledge in the area of testing of construction materials and components of construction elements experimentally.

REFERENCES:

OBJECTIVE:
- At the end of the course the student will posses knowledge about Survey field techniques

LIST OF EXPERIMENTS:
Chain Survey
1. Study of chains and its accessories, Aligning, Ranging, Chaining and Marking Perpendicular offset
2. Setting out works – Foundation marking using tapes single Room and Double Room
Compass Survey
3. Compass Traversing – Measuring Bearings & arriving included angles

Levelling - Study of levels and levelling staff
4. Fly levelling using Dumpy level & Tilting level
5. Check levelling

Theodolite - Study of Theodolite
6. Measurements of horizontal angles by reiteration and repetition and vertical angles
7. Determination of elevation of an object using single plane method when base is accessible/inaccessible.

Tacheometry – Tangential system – Stadia system
8. Determination of Tacheometric Constants
9. Heights and distances by stadia Tacheometry
10. Heights and distances by Tangential Tacheometry

Total Station - Study of Total Station, Measuring Horizontal and vertical angles
11. Traverse using Total station and Area of Traverse
12. Determination of distance and difference in elevation between two inaccessible points using Total station

TOTAL: 60 PERIODS

OUTCOME:
• Students completing this course would have acquired practical knowledge on handling basic survey instruments including Theodolite, Tacheometry, Total Station and GPS and have adequate knowledge to carryout Triangulation and Astronomical surveying including general field marking for various engineering projects and Location of site etc.

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS

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<td>3.</td>
<td>Dumpy level / Filling level</td>
<td>Atleast 1 for every 5 students</td>
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OBJECTIVES:
The Course will enable learners to:
• Equip students with the English language skills required for the successful undertaking of academic studies with primary emphasis on academic speaking and listening skills.
• Provide guidance and practice in basic general and classroom conversation and to engage in specific academic speaking activities.
• improve general and academic listening skills
• Make effective presentations.

UNIT I
Listening as a key skill- its importance- speaking - give personal information - ask for personal information - express ability - enquire about ability - ask for clarification Improving pronunciation - pronunciation basics taking lecture notes - preparing to listen to a lecture - articulate a complete idea as opposed to producing fragmented utterances.

UNIT II
Listen to a process information- give information, as part of a simple explanation - conversation starters: small talk - stressing syllables and speaking clearly - intonation patterns - compare and contrast information and ideas from multiple sources- converse with reasonable accuracy over a wide range of everyday topics.

UNIT III
Lexical chunking for accuracy and fluency- factors influence fluency, deliver a five-minute informal talk - greet - respond to greetings - describe health and symptoms - invite and offer - accept - decline - take leave - listen for and follow the gist- listen for detail

UNIT IV
Being an active listener: giving verbal and non-verbal feedback - participating in a group discussion - summarizing academic readings and lectures conversational speech listening to and participating in conversations - persuade.

UNIT V
Formal and informal talk - listen to follow and respond to explanations, directions and instructions in academic and business contexts - strategies for presentations and interactive communication - group/pair presentations - negotiate disagreement in group work.

TOTAL : 30 PERIODS

OUTCOMES:
At the end of the course Learners will be able to:
• Listen and respond appropriately.
• Participate in group discussions
• Make effective presentations
• Participate confidently and appropriately in conversations both formal and informal

TEXT BOOKS:
REFERENCES: