## DEPARTMENT OF CIVIL ENGINEERING
### COURSE STRUCTURE

#### B.Tech- 5th semester

<table>
<thead>
<tr>
<th>Code</th>
<th>Subject</th>
<th>Theory</th>
<th>Practical</th>
<th>Credits</th>
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<tr>
<td>CE 3414</td>
<td>Building Planning and Drawing</td>
<td>2</td>
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<tr>
<td>CE 3415</td>
<td>Elements of Reinforced Concrete Design</td>
<td>3+1*</td>
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<td>CE 3416</td>
<td>Environmental Engineering</td>
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<td>Methods of Structural analysis</td>
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<td>CAD applications in Civil Engineering</td>
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<td>CE 3220</td>
<td>Engineering Geology Lab</td>
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<td>Air and Noise pollution</td>
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Building Planning and Drawing

B.Tech 5th Semester

Subject code: CE 3414

T P C
2 3 4

Course objective(s):
The course content enables students to:
1. Get an idea about building drawing standards in various phases of a project.
2. Know the detailing in building construction.
3. Understand about planning of various buildings like residential, educational, office buildings and hospital buildings.
4. Know about the project planning and management techniques.

Course outcomes:
At the end of the course the students will be able to
1. Understand various building bye-Laws laid by town planning authorities and local regulatory bodies for planning various buildings like residential, educational, office buildings and hospital buildings.
2. Apply techniques for effective project planning and management.
3. Develop the building drawing as per standards in various phases of a project.
4. Comprehend the detailing in building construction.

UNIT – I:

PLANNING OF CONSTRUCTION PROJECTS: Planning scheduling and monitoring of building construction projects, Bar chart, CPM and PERT Network planning. Computation of times and floats – their significance.

UNIT – II:
PUBLIC BUILDINGS: Planning of Educational institutions, hospitals, dispensaries, office buildings, banks, industrial buildings, hotels and motels, buildings for recreation.

UNIT – III
SIGN CONVENTIONS AND BONDS: Sign conventions for different materials used in civil engineering. Bonds: English bond & Flemish bond odd & even courses for one, one and half, two and two and half brick walls in thickness at the junction of a corner.

UNIT – IV:
PLANNING AND DESIGNING A BUILDING: Given line diagram with specification to draw Plan, Section and Elevation of residential and public buildings.
Text Books:
2. PERT and CPM – Project planning and control with by Dr.B.C.Punmia & Khandelwal –Laxmi publications.
3. ‘A’ Series & ‘B’ Series of JNTU Engineering College, Anantapur,

References:
1. Building by laws by state and Central Governments and Municipal corporations
ELEMENTS OF REINFORCED CONCRETE DESIGN

B.Tech 5th -Semester
Subject code: CE 3415

Course objectives:

This course enables the student
1. To learn design principles of Working stress and Limit state Designs as per IS: 456-2000
2. To know the design parameters of singly reinforced, doubly reinforced, flanged beam elements for flexure as well as their load carrying capacities.
3. To design beam element subjected to shear, torsion and bond.
4. To know the design parameters of short and long columns subjected axial load, axial load and moments using SP: 16 charts
5. To know the design parameters of slabs and footings.
6. To check for Limit state of serviceability

Course outcomes:

At the end of the course student will be able to
1. Design a singly reinforced RC beam by using Working Stress Design philosophy.
2. Design beams subjected to shear, torsion and bond.
3. Design RC columns and isolated footing subjected to axial load, uniaxial and biaxial moments as per IS: 456-2000
4. Design the one way and two way slabs in as per IS: 456-2000
5. Compute deflection and crack depths following serviceability criterion

UNIT – I: (8+2)

UNIT – II: (12+5)
Beams: Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam sections.
Shear, Torsion and Bond: Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length, I.S. code provisions.

UNIT – III: (13+5)
Footings: Different types of footings – Design of isolated, square, rectangular and circular footings.

UNIT – IV: (12+3)
Slabs: Design of Two-way slabs, one way slab
Deflection: Limit state design for serviceability for deflection, cracking and codal provision.

NOTE: All the designs to taught in Limit State Method. Following plates should be prepared by the students.
1. Reinforcement particulars of simply supported, cantilever-beams.
2. Reinforcement detailing of T and L-beams
3. Reinforcement particulars of columns and footings.
4. Detailing of One way, two way slabs

**FINAL EXAMINATION PATTERN:**
The end examination paper should consist of Part A and Part B. Part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions and design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

**Text books:**
2. Reinforced concrete design by N. Krishna Raju and R.N. Pranesh, New age International Publishers, New Delhi

**References :**
ENVIRONMENTAL ENGINEERING

B.Tech 5th -Semester
Subject code: CE 3416

Course objectives:
The course content enables students to:
1. Develop overall technical competence in the students for understanding the concepts of the subject and enabling them to address the industry problems
2. Update students knowledge in planning, design, construction, operation and maintenance aspects of water supply and sewerage systems.
3. Reinforce management skills with regard to sustainable water supply and sewerage facilities.
4. Provide theoretical background and practical expertise in the field of water supply and sewerage engineering.

Course outcomes:
At the end of the course the learners will be able to

1. List the factors affecting water supply and wastewater generation
2. Understand the various types of water and wastewater characteristics
3. Design water and wastewater systems
4. Analyze available disposal options and their practical implications

UNIT – I: (11+3)
WATER SOURCES AND QUALITY

UNIT – II: (12+5)
DESIGN OF WATER TREATMENT UNITS

UNIT – III (13+5)
SEWAGE QUALITY AND DESIGN OF SEWAGE TREATMENT UNITS
UNIT – IV:  

SLUDGE HANDLING AND DESIGN OF PONDS
Concept of ponds-Construction and design of anaerobic and oxidation ponds - Sludge digestion – factors effecting – design of Digestion tank – Sludge disposal by drying – Other options-septic tanks working principles and design – soak pits.

Text Books:
3. Elements of Environmental Engineering by K.N. Duggal, S. Chand Publishers

References:
2. Waste water treatment- concepts and design approach by G.L. Karia and R.A. Christian, Prentice Hall of India
3. Unit operations in Environmental Engineering by R. Elangovan and M.K. Saseetharan, New age India Publishing
Course objectives:
The course content enables students to:
1. Understand Hydrology and hydrologic cycle, Classification of Precipitation, estimation of missing rain fall data,
2. Learn about unit hydrograph, estimation of hydrograph of different storm durations by using unit hydrograph and Synthetic hydrograph.
3. Learn about the Geological formation of the aquifers radial flow to wells in confined and unconfined aquifers.
4. Understand the Necessity and Impotence of irrigation, types of Irrigation, methods of application of irrigation water, duty and delta, Soil-water-plant relationship.
5. Know about Classification of canals and design irrigation canals by Kennedys and Laceys methods and also discussed about flood routing.

Course outcomes:
At the end of the course students will be able to
1. Identify components of hydraulic structures
2. Estimate direct run off from total rain fall, ground water recharges potential, base flow and flood discharge in the catchment area.
3. Construct Hydrograph at a particular location on the stream.
4. Calculate the inflow quantity in to the confined and unconfined wells and seepage characteristics of the ground.
5. Calculate duty and delta, depth and frequency of irrigation to improve the irrigation efficiency and design of irrigation canals suitable for different type of soils.

UNIT – I:
Introduction: Engineering hydrology and its applications, Hydrologic cycle.
Precipitation: Types and forms of precipitation, rainfall measurement, types of rain gauges, rain gauge network, average rainfall over a basin, consistency of rainfall data, frequency of rainfall, intensity-duration-frequency curves, probable maximum precipitation
Abstractions:
Evaporation- factors affecting evaporation, measurement of evaporation, evaporation reduction,
Evapotranspiration- factors affecting evapotranspiration, measurement of evapotranspiration
Infiltration- factors affecting infiltration, measurement of infiltration, infiltration indices.

UNIT – II:
Runoff: Factors affecting runoff, components of runoff, computation of runoff-rational and SCS methods, separation of base flow,
Unit Hydrograph: Definition of Unit Hydrograph, assumptions, derivation of Unit Hydrograph, unit hydrographs of different durations, principle of superposition and S-hydrograph methods, limitations and applications of UH, Synthetic Unit Hydrograph,
Floods and Flood Routing: Stream gauging, direct and indirect methods, floods-causes and effects, flood frequency analysis-Gumbel’s method, log Pearson type III method, flood control methods
Flood routing- hydrologic routing, channel and reservoir routing-Muskingum and Pulse method of routing.
UNIT – III:

Ground water: Occurrence, types of aquifers, aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient, types of wells, Darcy’s law, Dupuit’s equation steady radial flow to wells in confined and unconfined aquifers, yield of a open well-recuperation test.

Irrigation
Necessity and Importance of Irrigation, advantages and ill effects of Irrigation, types of Irrigation, methods of application of Irrigation water, water logging and drainage, standards of quality for Irrigation water, principal crops and crop seasons, crop rotation.

UNIT – IV:

Soil-water-plant relationship. vertical distribution of soil moisture, soil moisture tension, consumptiveuse, estimation of consumptive use.

Duty and delta- factors affecting duty, depth and frequency of Irrigation, irrigation efficiencies.

Canals: Classification of canals, design of canals by Kennedy’s and Lacey’s theories, balancing depth of cutting, canal lining, design of lined canal, economics of canal lining.

Text Books:
3. Irrigation and water power engineering by B.C. Punmia&Lal, Laxmi publications pvt. Ltd., New Delhi

References:
METHODS OF STRUCTURAL ANALYSIS

B.Tech 5th -Semester
Subject code: CE 3418

T P C
2 3 4

Course objectives:
The course content enables students to:

1. Become proficient in applying the classical methods of analysis with speed and accuracy
2. Understand the concept used in the structural analysis software.
3. Use updated structural analysis software in solving indeterminate structures
4. Submit accurate analysis in an efficient and professional way
5. Preparing student to Identify the relevant method for the analysis

Course outcomes:
At the end of the course student will be able to

1. Analyze three /two hinged arches and obtain internal forces at any cross section.
2. Determine design forces in arches subjected to concentrated, distributed and varying loads.
3. Determine the forces in indeterminate frames subjected to lateral loads by using approximate methods of analysis.
4. Solve statically indeterminate beams and frames using classical methods.
5. Evaluate the suitability of classical methods for a given structure and loading.
6. Utilize modern structural analysis software

UNIT – I: (12+4)
THREE HINGED ARCHES:
TWO HINGED ARCHES: Determination of horizontal thrust bending moment, normal thrust and radial shear – Rib shortening and temperature stresses, (6)

UNIT – II: (10+3)
APPROXIMATE METHOD OF STRUCTURAL ANALYSIS: Application to building frames. (i) Portal method (ii) Cantilever method.(5)
SLOPE DEFLECTION METHOD: Derivation of slope deflection equation of supports application to continuous beams including settlement of supports.(5)

UNIT – III: (13+4)
MOMENT DISTRIBUTION METHOD – Stiffness and carry over factors – Distribution factors – Analysis of continuous beams with and without sinking of supports – storey portal frames – including Sway.(7)
KANI’S METHOD – including settlement of supports and single bay portal frames with side sway by Kani’s method. (6)

UNIT – IV: (10+4)
FLEXIBILITY METHOD: Introduction, application to continuous beams including support settlements (maximum of two unknowns) (5)
STIFFNESS METHOD: Introduction, application to continuous beams including support settlements. (maximum of two unknowns) (5)
TEXT BOOKS:
2. Analysis of Structures by Bhavikatti, Vikas publications

REFERENCES :
2. Structural Analysis by C.S. Reddy, Tata Macgrawhill, New Delhi
3. Theory of structures by Ramamuratam
CAD APPLICATIONS IN CIVIL ENGINEERING

B.Tech 5th -Semester
Subject code: CE 3219

Course objectives:
The course content enables students to:

1. Plot the layout of building for given details
2. Create multi-view drawings (orthographic projections).
3. Draw section views.
4. Create shapes and symbols for different uses.
5. Create and manage symbols libraries.

Course objectives:
At the end of the course student will be able to

1. Create, display, and plot working drawings.
2. Use layering techniques.
3. Construct technical drawings using a standard computer aided drafting program.
4. Identify, operate and adjust input and output devices.
5. Demonstrate file management techniques.

1. Using CAD software draw & print the following drawings.

1.1 Draw conventional signs as per I.S. standards, symbols used in civil engineering drawing.
1.2 Draw the important joinery components of the building like elevation of fully panelled double leaf door, elevation of partly glazed and partly panelled window.
1.3 Draw the important building components like section of a load bearing wall foundation to parapet.
1.4 Prepare the king post & Queen post truss and label the various parts.

2 Residential buildings.

2.1 Plan, Elevation, Section of single roomed building
2.2 Single storied load bearing type residential building.
    2.2.1 One bed Room House
    2.2.2 Two bed room House
2.3 Single storied framed structure type residential building.
    2.3.1 One bed Room House
    2.3.2 Two bed room House

3 Structural detailing drawings

3.1 Singly reinforced simply supported rectangular beam.
3.2 Lintel cum sunshade
3.3 Continuous Beam.
3.4 Simply supported two way slab.
3.5 Isolated Column with square footing
4 Layouts of electrical lines in buildings.
4.1 One bed Room House
4.2 Two bed room House

5 Drawings to be submitted for approval to corporation or municipality showing required details in one sheet such as (Residential/Office building)

5.1 Plan – Showing Dimensions of all rooms.
5.2 Section – showing Specifications and Typical Foundation Details.
5.3 Elevation.
5.4 Site Plan – Showing Boundaries of Site and Plinth Area, Car Parking, Passages and location of Septic Tank.
5.4 Key plan – Showing the location of Building.
5.6 Title Block – Showing signature of Owner & Licensed surveyor’s.
B.Tech 5th - Semester
Subject code: CE 3220

Course objectives:
The course content enables students to:
1. Identify Megascopic Physical properties of rock forming and ore forming minerals
2. Megascopic identification of rocks
3. Interpret and sketch the sections for geological maps showing tilted beds, faults, unconformities etc.
4. Understand simple Structural Geology problems.
5. Analyze problems on Electrical Resistivity and Seismic Refraction Prospecting.

Course outcomes:
At the end of course student will be able to
1. Identify the various rocks and minerals based on the physical properties
2. Interpret different geological maps
3. Solve the various strike and dip problems
4. Interpret electrical resistivity and seismic refraction data

LIST OF EXERCISES:

1. Physical properties of minerals: Megascopic identification of
   a) Rock forming minerals – Quartz group, Feldspar group, garnet group, mica group & talc, chlorite, olivine, kyanite, asbestos, tourmelene, calcite, gypsum, etc…
   b) Ore forming minerals – magnetite, hematite, pyrite, pyralusite, graphite, chromite, etc…
   a) Igneous rocks – Types of granite, pegmatite, gabbro, dolerite, syenite, Granite porphyry, Basalt, etc…
   b) Sedimentary rocks – sand stone, ferrugineous sand stone, lime stone, shale, laterite, conglomerate, etc…
   c) Metamorphic rocks – biotite – granite gneiss, slate, muscovite & bioticesschist, marble, khondalite etc…
3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.
5. Simple problems on Electrical Resistivity and Seismic Refraction Prospecting.

LAB EXAMINATION PATTERN:
1. Description and identification of FOUR minerals
2. Description and identification of FOUR (including igneous, sedimentary and metamorphic rocks)
3. ONE Interpretation of a Geological map along with a geological section.
4. TWO Simple strike and Dip problems.
5. Two problems on Electrical Resistivity (01) and Seismic Refraction methods (01)
ENVIRONMENTAL ENGINEERING LAB

B.Tech 5th -Semester
Subject code: CE 3221

Course objectives:
The course content enables students to:
1. Determine of pH and Electrical Conductivity
2. Estimate total Hardness
3. Determine of Alkalinity, Acidity of given water sample
4. Determine chlorides, Iron, total solids, dissolved solids in water
5. Determine D.O B.O.D/COD.

Course outcomes:
At the end of course student will be able to
1. know how to perform relevant tests in the laboratory to determine the major characteristics of water and wastewater
2. Get hands on experience in operating the various equipment/methods available for examining water and wastewater
3. understand the practical significance of the characteristics, the relevant codes of practice for examination and permissible limits for the characteristics of water and wastewater

LIST OF EXERCISES:

6. Determination of pH and Electrical Conductivity
7. Determination and estimation of total Hardness
8. Determination of Calcium and Magnesium hardness
9. Determination of Alkalinity
10. Determination of Acidity
11. Determination of chlorides in water and soil.
12. Determination and estimation of total solids, dissolved solids
13. Determination of Iron
14. Determination of dissolved oxygen with D.O Meter & Winklers Method
15. Physical parameters-Temperature, Turbidity
16. Determination of B.O.D/COD
17. Determination of chlorine demand
18. Determination of optimum coagulant dose
FUNDAMENTALS OF SOIL MECHANICS

B.Tech- 6th Semester
Subject code: CE 3422

Course objectives:
1. Creating awareness to student about soils and their engineering importance.
2. Helping students in aquatinting various procedures and tests for classifying soils and develop relationships among various properties.
3. Imparting knowledge for students about behavior of soils under various drainage Conditions.
4. Making students to perform computations for determination of strength parameters of soil with using various theories.
5. Developing knowledge about conduct of different lab tests for determining engineering properties by simulating field conditions.

Course outcomes:
At the end of the course student will be able to
1. Understand soil as a building material and load bearing member.
2. Understand different procedures for classifying soils.
3. Asses the influence of soil water relationship and analyze engineering behavior of soils under different load/drainage conditions
4. Analyze the influence of field conditions on strength and consolidation properties of soils.

UNIT-I. Introduction (10 + 4)
Introduction to Soil Mechanics and Soil Engineering; Complexity of soil nature; Soil formation and soil types. Soil Structure: Basic concepts of clay minerals; Soil structure and fabric.

Simple Soil Properties and classification
Basic definitions; Phase relations; Index properties; Grain size distribution; Soil aggregate properties. Indian standard soil classification system.

UNIT-II. Principle of Effective Stress and Related Phenomena (12+4)
Principle of effective stress; Capillarity; Seepage force and quicksand condition; Total, effective and neutral pressures.
Permeability: One-dimensional flow; Darcy’s law; Laboratory methods for permeability determination; Field pumping tests for permeability determination; Permeability as a function of soil type, permeant, void ratio, soil fabric, and effective stress.
Seepage through Soils: Two-dimensional flow; Flow nets and their characteristics; Uplift pressure, exit gradient, and piping; Criteria for filters.

UNIT-III Compaction and stress distribution (10+3)
Laboratory compaction tests; Factors affecting compaction; Structure and engineering behaviour of compacted cohesive soils; Field compaction; Compaction specifications and field control.

Introduction to stress distribution: 2 to 1 method, Boussinesq’s theory for point, circular loads and Newmarks’ chart.
UNIT-IV. Consolidation and Shear Strength (13 +4)

Compressibility and Consolidation Behaviour

Components of total settlement; Effects of soil type, stress history, and effective stress on compressibility; Normally consolidated and over-consolidated soils; Terzaghi’s theory of onedimensional consolidation; Time-rate of consolidation; Evaluation of compressibility and consolidation parameters from consolidometer data.

Shear strength: Mohr’s stress circle; Mohr-Coulomb failure criterion; Laboratory tests for shear strength determination; Effective and total stress shear strength parameters; Shear strength characteristics of clays and sands.

Text Books:

1. A text book of Geotechnical Engineering by C.V.Ramaiah
2. Soil Mechanics and Foundation Engineering by B.C.Punmia

Reference Books:

1. Basics of applied soil mechanics - Gopal Ranjan, ASR Rao
2. Geotechnical engineering by S.K.Gulhati and Manoj Datta
HYDRAULIC STRUCTURES

B.Tech- 6th Semester
Subject code: CE 3423

Course objectives:
The course content enables students to:
1. Relate the head works constructed at the head of the canal and types and different components and their purposes.
2. Understand different theories behind the design of impervious floor in permeable soils.
3. Identify canal regulation structures and cross drainage structures come in the alignment of the channels.
4. Analyze for the forces to be considered in the stability Gravity dams
5. Distinguish between earthen embankments and Causes of its failures and seepage theories

Course outcomes:
At the end of the course students will be able to
1. Design the different water retaining structures.
2. Analyze the parameters needed in the design of weirs/barrages in permeable soils.
3. Analyze and design the Gravity dams and Earth dams with available foundation strata.
4. Design the canal regulation structures and cross drainage structure
5. Understand the design principles of canal fall and Spillway and able to design various components.

UNIT-I
Diversion Head works: Types of Diversion head works-diversion and storage head works, weirs and barrages, layout of diversion head works, components. Causes and failure of hydraulic structures on permeable foundations, Bligh’s creep theory, Khosla’s theory, determination of uplift pressure, impervious floors using Bligh’s and Khosla’s theory, exit gradient, functions of U/s and d/s sheet piles.
Dams: Types of dams, merits and demerits, factors affecting selection of type of dam, factors governing selecting site for dam, types of reservoirs, selection of site for reservoir, zones of storage of a reservoir, reservoir yield, estimation of capacity of reservoir using mass curve.

UNIT-II
Earth dams: types of Earth dams, causes of failure of earth dam, criteria for safe design of earth dam, seepage through earth dam-graphical method, measures for control of seepage.
Gravity dams: Forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile and practical profile of a gravity dam, limiting height of a low gravity dam, stability analysis, drainage galleries.

UNIT-III
Spillways: types of spillways, design principles of Ogee spillways, types of spillway gates.
Canal falls: types of falls and their location, design principles of Sarda type fall, trapezoidal notch fall and straight glacis fall.

UNIT-III
Canal regulation works: Head regulator and cross regulator, design principles of Cross regulator and head regulators, canal outlets, types of canal modules, proportionality, sensitivity and flexibility.
Cross Drainage works: types, selection of site, design principles of aqueduct, siphon aqueduct and super passage.
TEXT BOOKS:
1. Irrigation engineering and hydraulic structures by S.K Garg, Khanna publishers.
2. Irrigation engineering by K.R. Arora

REFERENCES:
1. Irrigation and water resources engineering by G.L. Asawa, New Age International Publishers
2. Concrete dams by Varshney.
3. Theory and Design of Hydraulic structures by Varshney, Gupta & Gupta
TRANSPORTATION ENGINEERING

B.Tech- 6th Semester
Subject code: CE 3424

Course objectives:
The course content enables students to:
1. Design for individual elements of highway geometry
2. Identify and analyze the components of traffic management
3. Conduct experiments for ascertaining the quality of highway materials
4. Identify various stages in construction of pavements.

Course outcomes:
At the end of the course the Students will be able to

1. Understand the road network development and Highway planning in India.
2. Design various road Geometric elements based on the geographic conditions.
3. Understand the Traffic characteristics and application of Management techniques.
4. Analyze various highway materials and their suitability for construction.
5. Apply different design methods for road construction.

UNIT – I:
HIGHWAY DEVELOPMENT AND PLANNING:

HIGHWAY GEOMETRIC DESIGN:
Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements-Stopping sight Distance, Overtaking Sight Distance and Intermediate Sight Distance-Design of Horizontal Alignment-Design of Super elevation and Extra widening- Design of Transition Curves- Vertical curves.

UNIT – II:
TRAFFIC ENGINEERING AND MANAGEMENT:
Basic Parameters of Traffic-Volume, Speed and Density- Traffic Volume Studies-Speed studies-Parking Studies and Parking characteristics- Road Accidents-Causes and Preventive measures- Accident Data Recording- Road Traffic Signs – Types and Specifications – Road markings-Need for Road Markings-Types of Road Markings.

INTERSECTION DESIGN:
Types of Intersections – Conflicts at Intersections- Types of At-Grade Intersections- Channelization: Objectives –Traffic Islands-Design of Traffic Signals –Webster Method –IRC Method. Types of Grade Separated Intersections- Rotary Intersection –Advantages and Disadvantages of Rotary Intersection

UNIT – III
HIGHWAY MATERIALS:
UNIT – IV:  
HIGHWAY CONSTRUCTION:  

Text Books:  

References:  
AIR AND NOISE POLLUTION CONTROL (ELECTIVE-I)

B.Tech- 6th Semester
Subject code: CE 3425
Subject code: CE 3425

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Course objectives:
The course content enables students to:
1. To study the fundamentals of air pollution and its global implication
2. To study the various mechanisms involved in meteorological aspects of air pollution dispersion
3. To understand the models available for predicting the air pollution dispersion
4. To understand the principles of design of particulate control devices
5. To understand the principles of design of gaseous emission control devices
6. To study the concepts of noise pollution and its control aspects

Course outcomes:
At the end of the course the learners will be able to
1. Learn the concepts of air pollution and its associated problems on a global scale
2. Learn the influence of meteorological aspects on air pollution and its dispersion
3. Design the different components of particulate and gaseous control equipment
4. Understand problems of noise pollution
5. Learn the basics of noise pollution and its control measures

UNIT – I: (10+3)
Air Pollution – Definitions, Scope, Significance and Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, point and Non-Point, Line and Areal Sources of air pollution- stationary and mobile sources- Effects of Air pollutants on man, material and vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes – Carbon trading

UNIT – II: (12+4)
Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomena on Air Quality-wind rose diagrams-Lapse Rates, Pressure Systems, Winds and moisture plume behaviour and plume Rise Models; Gaussian Model for Plume Dispersion.

UNIT – III: (12+4)
Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control Equipment’s – Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators.

UNIT – III: (11+4)
General Methods of Control of NOx and SOx emissions, Air Quality Management – Measurement and monitoring of SPM, SO; NO and CO Emissions- Standards-Air quality Index- Noise Pollution – effects of noise and control methods
TEXT BOOKS:


References:

1) Sewage disposal and air pollution Engineering by S K Garg, Khanna Publishers
2) An introduction to Air pollution by R.K. Trivedy and P.K. Goel, B.S. Publications
3) Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd, Delhi
4) Air pollution and control by KVSG Muralikrishna
The course content enables students to:
1. To understand the fundamental ideas of the FEM
2. To know the behavior and usage of each type of elements covered in this course
3. To prepare a suitable FE model for structural mechanical analysis problems
4. To interpret and evaluate the quality of the results (know the physics of the problems)
5. To be acquainted with the limitations of the FEM being it to be a numerical tool.

Course outcomes:

At the end of the course the learners will be able to

1. Idealize given structure with mathematical modeling and boundary conditions.
2. Model the given structure with suitable elements.
3. Conceptualize the Finite Element Analysis (FEA) procedure.
4. Apply FEA procedure to 1-dimensional structures bars, trusses, plane stress and plane strain conditions using triangular and rectangular elements.
5. Evaluating the suitability of type of element and methods of discretization.
6. Setup and solve 1-D, 2-D, and 3-D structural problems using contemporary finite element software.
7. Interpret results obtained from FEA software solutions, not only in terms of conclusions but also awareness of limitations.

UNIT –I

Principles of Elasticity: Equilibrium equations – strain displacement relationships in matrix form – Constitutive relationships for plane stress, plane strain and Axi-symmetric bodies of revolution with axi-symmetric loading.

UNIT –II
One Dimensional FEM: Stiffness matrix for bar element - shape functions for one dimensional elements – one dimensional problems.

UNIT –III
Two Dimensional FEM: Different types of elements for plane stress and plane strain analysis – Displacement models –generalized coordinates – shape functions – convergent and compatibility requirements – Geometric invariance – Natural coordinate system – area and volume coordinates

UNIT –IV
Generation of element stiffness and nodal load matrices for 3-node triangular element and four node rectangular elements.

Isoparametric formulation:– Concepts of, isoparametric elements for 2D analysis -formulation of CST element, 4–noded and 8-noded iso-parametric quadrilateral elements –Lagrangian and Serendipity elements.
TEXT BOOK:
2. Finite element analysis by S.S. Bhavakatti-New age international publishers
3. Finite element analysis by David V Hutton, Tata Mcgraw Hill, New Delhi

REFERENCES:
PRINCIPLES OF PRESTRESSED CONCRETE

B.Tech- 6th Semester
Subject code: CE 3427
Course objectives:
The course content enables students to:
1. Distinguish between RCC and PSC members
2. Understand principle in various methods of pre stressing systems
3. Evaluate the losses in pre and post tensioned members
4. Analyze and design members subjected to flexure and shear.

Course outcomes:
At the end of the course the learners will be able to
1. Understand the general mechanical behavior of prestressed concrete.
2. Perform analysis and design of prestressed concrete members and connections
3. Identify and interpret the appropriate relevant industry design codes.
4. Become familiar with professional and contemporary issues in the design and fabrication of prestressed concrete members.
5. Perform an industry relevant design project in a team setting.

UNIT – I
INTRODUCTION: Historic development – General principles of prestressing pretensioning and post tensioning – Advantages and limitations of prestressed concrete – Materials – High strength concrete and high tensile steel their characteristics.
I.S.Code provisions, Methods and Systems of Prestressing; Pre-tensioning and post tensioning methods – Analysis of post tensioning - Different systems of prestressing like Hoyer System, Magnel System Freyssinet system and Gifford – Udall System.

UNIT – II
LOSSES OF PRESTRESS: Loss of prestress in pre-tensioned and post-tensioned members due to various causes like elastic shortage of concrete, shrinkage of concrete, creep of concrete, Relaxation of steel, slip in anchorage bending of member and frictional losses.

UNIT – III
ANALYSIS OF SECTIONS FOR FLEXURE: Elastic analysis of concrete beams prestressed with straight, concentric, eccentric, bent and parabolic tendons.

UNIT – IV
DESIGN OF SECTIONS FOR FLEXURE AND SHEAR: Allowable stress, Design criteria as per I.S.Code – Elastic design of simple rectangular and I-section for flexure, shear, and principal stresses – design for shear in beams – Kern – lines, cable profile.

Text Books:
2. Prestressed Concrete by N.Rajasekharan; - Narosa publications.

References:
1. Prestressed Concrete by Ramamrutham; Dhanpatrai Publications.
DISASTER MANAGEMENT

B.Tech- 6th Semester
Subject code: CE 3428

Course Objectives:

The course content enables students to:
1. Demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response
2. Understand and appreciate the specific contributions of the Red Cross/Red Crescent movement to the practice and conceptual understanding of disaster management and humanitarian response and their significance in the current context
3. Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives
4. Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations
5. Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in, and
6. Respond to disaster risk reduction initiatives and disasters in an effective, humane and sustainable manner.

Course outcomes:

At the end of the course the learners will be able to

1. Integrate knowledge and to analyze, evaluate and manage the different public health aspects of disaster events at a local and global levels, even when limited information is available.
2. Describe, analyze and evaluate the environmental, social, cultural, economic, legal and organizational aspects influencing vulnerabilities and capacities to face disasters.
3. Work theoretically and practically in the processes of disaster management (disaster risk reduction, response, and recovery) and relate their interconnections, particularly in the field of the Public Health aspects of the disasters.
4. Manage the Public Health aspects of the disasters.
5. Obtain, analyze, and communicate information on risks, relief needs and lessons learned from earlier disasters in order to formulate strategies for mitigation in future scenarios with the ability to clearly present and discuss their conclusions and the knowledge and arguments behind them.
6. Design and perform research on the different aspects of the emergencies and disaster events while demonstrating insight into the potential and limitations of science, its role in society and people’s responsibility for how it is used.
7. Analyze and evaluate research work on the field of emergencies and disaster while demonstrating insight into the potential and limitations of science, its role in society and people’s responsibility for how it is used.
UNIT-I
NATURAL HAZARDS AND DISASTER AND THEIR MANAGEMENT: Case study methods of the following: floods, droughts, - Earthquakes – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast – landslides

UNIT-II:
RISK AND VULNERABILITY: BUILDING codes and land use planning-social vulnerability – environmental vulnerability – Macroeconomic management and sustainable development, Climate change risk rendition-financial management of disaster – related losses.

UNIT – III
EDUCATION AND COMMUNITY PREPAREDNESS: Education in disaster risk reduction – Essentials of school disaster education – community capacity and disaster resilience – Community based disaster recovery - Community based disaster management and social capital – Designing resilience – building community capacity for action

UNIT-IV
MULTI – SECTIONAL ISSUES: Impact of disaster on poverty and deprivation - Climate change adaptation and human health – Exposure, health hazards and environmental capacity in disaster management - the red cross and red crescent movement - Corporate sector and disaster risk reduction A community focused approach
FIELD VISIT: visit to a loc cal area / site where natural or manmade hazard has occurred and prepare a report with the following details i) location of site, ii) nature of the hazard (natural or manmade), iii) details of loss of life and property iv) response from the government / NGO etc. v) whether the response is adequate or not vi) the role of technology in risk reduction vii) suggestion for improvement of disaster response / preventive measures viii) Conclusions

TEXT BOOKS:
2.Disaster management - future challenges and opportunities (2007) editor by Jagbir singh. Published by I K international publishing house pvt. Ltd.

REFERENCE BOOK:
Course Objectives:
The course content enables students to:
1. Conduct tests and Evaluate the quality of aggregates used in the road construction
2. Conduct tests and Evaluate the quality of bitumen used in the road construction
3. Analyze and comprehend the data pertaining to traffic volume studies.

Course outcomes:
At the end of course student will be able to
1. Know the behavior of Road Aggregates
2. Know the behavior of Bituminous materials
3. Know the Traffic volume counts

LIST OF EXERCISES:

I. ROAD AGGREGATES:
1. Aggregate Crushing value
2. Aggregate Impact Test.
4. Attrition Test
5. Abrasion Test.
6. Shape tests

II. BITUMINOUS MATERIALS:
1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.

III. TRAFFIC VOLUME STUDIES:
1. Traffic volume study at mid blocks and intersection.
2. Spot Speed Studies.
SOIL MECHANICS LAB

B.Tech- 6th Semester

Subject code: CE 3230

Course Title: Soil mechanics lab

Course Objectives:

1. To make the student learn, apply his ability of knowledge with hands of practice to determine index and engineering properties of soils.
2. To have an exposure for determining various properties of soils in field and through simulating in lab.

Course outcomes:

1. Identify tools, equipment required and familiarity with experimental procedures for determining index and engineering properties of soils
2. Perform field tests for soil investigations.
3. Apply field conditions for computing and analyzing the experimental data.
4. Infer the results and compare.

LIST OF EXERCISES:

1. Determination of Consistency Limits (Liquid, plastic and Shrinkage limit) for soil.
2. Determination of Field density with Core cutter method & Sand replacement method.
3. Determination of particle size distribution through mechanical and hydrometer analysis.
5. Determination of coefficient Permeability of soil with constant head and variable head Tests.
6. Determination of strength parameters of given soil with Unconfined Compression strength (UCS) test.
7. Determination of Consolidation characteristics of given cohesive soil by performing consolidation test.
8. Determination of Free swell index for soil.
9. Determination of Strength parameters of given soil under different drainage conditions with Triaxial Test.
10. Determination of strength parameter of given cohesion-less soil by performing Direct shear test.
11. Determination of C.B.R Value of given soil with Laboratory CBR Test.

(Any eight shall be conducted.)