Mission and Vision of the Institution:

Mission of the Institute:

- To be recognized as a premier institution offering Engineering Education programs, training human resources oriented to problem solving and system development.
- To carry out research in Engineering and Technology relevant to all segments of society.
- To assume leadership in sustainable technological growth of the Indian society.
- To be a natural destination for excellence and diversity in thought and practice.

Vision of the Institute:

The Vision of Sri Venkateswara University College of Engineering is to be the leader in the creation and development of globally competitive human capital in Engineering Education for Technological, Economical and Social Enrichment of the Society, through its open and flexible Academic Programs**.**

Mission and Vision of the Department

Vision:

Vision of the Civil Engineering Department is to produce globally competitive and committed Civil Engineers with ethical values to cater to the needs of the society and strive for sustainable development through research and innovation.

Mission:

- To impart quality education with the support of state-of-art Infrastructure and Faculty.
- To inculcate inquisitiveness, infuse training and research for the societal development.
- To address growing needs of sustainable infrastructure development.
- To provide technical advice and support to the industry.
- To provide awareness of global economic problems and contribute to Nation building.
- To provide entrepreneurial skills for the upliftment of the country.

Programme Educational Objectives (15)

a. To provide students with the fundamental, technical knowledge and skills in mathematics, sciences and engineering to recognize, analyze and solve complex problems in the areas of Structural, Geotechnical, Hydraulics and Water Resources, Transportation and Environmental engineering.

b. To provide students with individual working skills and practical experience and to fulfill their professional duties and communicate effectively in teamwork, ethical thinking, technical leadership, and lifelong learning.

c. To make the students responsible professionals to work in various positions in industry or government and/or succeed in graduate or other professional organizations.

d. To train the students to become engineers, managers, scientists, researchers and innovators and make substantial contributions to the society.

e. To guide the students to use modern tools to solve complex engineering problems

f. To make the students to strive for the improvement of the quality of life and improve the standard of living by providing environmental sustainability.

Program outcomes:

POs describe what students are expected to know or be able to do by the time of graduation from the program.

Program Outcomes of B.Tech in Civil Engineering are:

1. To apply knowledge of mathematics, Science, Engineering fundamentals, and engineering specialization for the solution of complex engineering problems.
2. To identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. To design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate

consideration for public health and safety, and cultural, societal, and environmental considerations.

4. To use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.

5. To create, select, and apply appropriate techniques, resources, and modernengineering and IT tools, including prediction and modeling to complex engineering activities, with an understanding of the limitations.

6. To apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. To understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. To apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. To function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. To communicate effectively on complex engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. To demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. To recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

APPENDIX-I

MAT 03 ENGINEERING MATHEMATICS – III

L+T / week : 3+1 Hrs **Sessional Marks: 20+20**

University Exam : 3 Hrs **End Exam Marks : 60**

Course Educational Objective (CEOs)

1. To understand the solution of special functions and solution of partial differential equations.
2. To understand the complex variables and analysis

UNIT – I

SPECIAL FUNCTIONS

Beta and Gamma functions – Series solution of differential equations – Bessel function – Recurrence formulae – generation function on $J_n(x)$ – Legendre function – Legendre Polynomials – Recurrence relations for $P_n(x)$ – Generation function for $P_n(x)$ Orthogonality – Rodrigues formula.

UNIT – II

COMPLEX ANALYSIS- I

Analytical functions, Cauchy – Reimann equation – complex integration – Cauchy's theorem – Integral formula – evaluation of integrals

UNIT – III

COMPLEX ANALYSIS- II

Singularities – poles – residues – residue theorem – evaluation of real integrals – conformal mapping – Bilinear transformations – Transformation of e^z, Z^2, sin z and cos z.

UNIT – IV

PARTIAL DIFFERENTIAL EQUATIONS – I

Formation of differential equations - Classification – first order linear partial differential equations – Lagrange linear equation – Method of multipliers – first order, non linear partial differential equations – Charpits method.

UNIT – V

PARTIAL DIFFERENTIAL EQUATIONS – II

Method of separation of variables – one dimensional wave equation – Heat equation – Laplace equation.

Text Books :

1. Higher Engineering Mathematics – B.S.Grewal
2. Engineering Mathematics, vol I & II – M.K.Venkataraman
3 Engineering Mathematics – M.K.Venkata Raman
4. Elementary Engineering Mathematics – B.S.Grewal
5. Advanced Engineering Mathematics – Erwin Kreyszig

Course Outcomes (COs)

After completion of the course the student will have :

- Able to utilize different special function like Beta, Gamma & Bessel equations
- Ability to generate differential equations to solve various civil engineering problems.
- Able to solve complex functions using cauchy's, residue theorems and transformations.

CET 02 BUILDING MATERIALS

L+T / week : 3+1 Hrs **Sessional Marks: 20+20**

University Exam : 3 Hrs **End Exam Marks : 60**

Course Educational Objective (CEOs)

1. To understand the suitability of masonry units for construction.
2. To learn the characteristics of different types of mortar tests
3. To know about aggregates.

UNIT-I

STONES-BRICKS-CONCRETE BLOCKS

Stone as building material-criteria for selection-Tests on stones-Deterioration and preservation of stone work-Bricks-Classification-Manufacture of clay bricks-Tests on bricks-Compressive strength-Water absorption-Efflorescence-Bricks for special use-Refractory bricks-Cement and Concrete hollow blocks-Light weight concrete blocks.

UNIT-II

LIME –CEMENT-AGGREGATES-MORTAR

Lime- Preparation of lime mortar-cement ingredients-Manufacturing process-Types and grades-properties of cement and cement mortar-Hydration-Compressive strength-Tensile strength-Soundness and consistency-Setting time-Aggregates-Natural stone aggregates-Industrial byproducts-Crushing strength-Impact strength-Flakiness-Abrasion Resistance-Grading-Sand-Bulking.

UNIT-III

CONCRETE

Concrete-Ingredients-Manufacture-Batching plants-RMC-Properties of fresh concrete-Slump-Flow and compaction-Principles of Hardened concrete-Compressive, Tensile and shear strength-Modulus of Rupture-Tests-Mix specification-Mix proportioning-IS method-High strength concrete and HPC- No fines concrete.

UNIT-IV

TIMBER AND OTHER MATERIALS

Timber- Market forms-Industrial timber-Plywood-Veneer- Thermocole-Panels of laminates-Steel -Aluminium and other metallic materials-composition-Uses-Market forms-Mechanical treatment-Paints-Varnishes-Distempers- Bitumens.

UNIT-V

MODERN MATERIALS

Glass-Ceramics- Sealants for joints-Fibre glass reinforced plastic-Clay products-Refractories-Composite materials-Types-Application of Laminar composites-Fibre Textiles- Geomembranes and Geotextiles for earth reinforcement.

TEXTS BOOKS

1. R.K. Rajput, Engineering Materials, S.Chand and company Ltd., 2000.

2. M.S.Shetty, Concrete Technology (Theory and Practice), S.Chand and company Ltd., 2003

Course Outcomes (COs)

After completion of the course the student will have :

- To find the suitability various building materials at a particular location in the building construction .
- To know the preparation of concrete and tests to be performed
- Ability to utilize various modern building materials like timber products, protective coatings, and fibre textiles

CET 03 CONSTRUCTION TECHNOLOGY

L+T / week : 3+1 Hrs **Sessional Marks: 20+20**

University Exam : 3 Hrs **End Exam Marks : 60**

Course Educational Objective (CEOs)

1. To learn about high grade cements,
2. To learn about Non-distractive testing methods.
3. To understand different types construction practices
4. To Learn Causes of damage and deterioration of concrete structures and their repairs
5. To learn the application of civil engineering Construction equipment

UNIT-I

CONCRETE TECHNOLOGY

High grade cements-Advances in manufacture of cement-Testing of Fresh and Hardened Concrete-Non destructive testing-Concrete chemicals and applications-Concepts of Mix design-Statistical quality control of concrete Mix design as per BIS and ACI methods-Process of manufacture of concrete-Batching-Mixing-Transporting-Placing-Compaction of concrete-Curing-Finishing.

UNIT-II

CONSTRUCTION PRACTICES

Types of foundations-Stone Masonry-Brick Masonry- Composite Masonry-Cavity walls-Flooring-Formwork-Centering and shuttering sheet piles-Slip and Moving forms-Roofs and roof covering- Joints in Concrete-Plastering and Pointing-Shoring-Scaffolding-Under pinning-Submerged structures.

UNIT-III

SERVICE REQUIREMENTS

Painting, Distempering and White washing-Fire protection- Thermal insulation-Ventilation and Air conditioning- Acoustics and Sound insulation-Damp proofing-Termite proofing.

UNIT-IV

REPAIR AND REHABILITATION WORKS

Causes of damage and deterioration in masonry and concrete structures- symptoms and diagnosis-common types of repairs.

UNIT-V

CONSTRUCTION EQUIPMENT

Selection of equipment for earth work, concreting, material handling and erection of structures-Dewatering and pumping equipments.

TEXT BOOKS

1. Gambir, M.L, Concrete Technology, Tata Mc graw hill Publishing Company,1995.
2. Shetty, M.S., Concrete Technology, Theory and Practice, S.Chand and Company, 2003.

REFERENCE BOOKS

1. Arora, S.P. and Bindra, S.P., Building Construction, Dhanpat Rai and Sons,1997.
2. Punmia ,B.C., Building Construction, Lakshmi Publications (P) Ltd.,1993.
3. Peurifoy, R.L., Formwork for Concrete Structures, Mc graw hill book Co.,1999.

Course Outcomes (COs)

After completion of the course the student will have :

- Able to know the different types of concretes their application, mix design and tests.
- To develop acquaintance over service requirements like protectives, damp and termite proofing.
- Able to repair and rehabilitation of distressed structures and use of construction equipment in the field.

CET 04 ENGINEERING GEOLOGY

L+T / week : 3+1 Hrs **Sessional Marks: 20+20**

University Exam : 3 Hrs **End Exam Marks : 60**

Course Educational Objective (CEOs)

1. To learn various geological parameters.
2. Identification of minerals
3. Identification of rocks.
4. Identification of water sources
5. Identification of geologic structures

UNIT - I

Introduction to geology and its various branches -Role of Earth Sciences in Civil Engineering Operations.

Processes acting at the surface of the earth - Volcanism, Geological action of wind , glaciers, rivers and oceans - Rock weathering.

UNIT – II

Study of various properties for the identification of minerals - Study of minerals like Quartz and its varieties. Felspars, Garnet, Mica, Olivine, Hornblende, Augite, Calcite, Talc, Kyanite, Bauxite and Clay minerals.

UNIT – III

Origin and formation of rocks - Classification of rocks - Igneous, Sedimentary and Metamorphic rocks - Their textures and structures -Study of rocks like Granite, Gabbro, Dolerite, Basalt, Breccia, Conglomorate, Sand stone, Shale, Limestone, Laterite, Quartzite, Schist, Gneiss, Marble, Slate.

UNIT – IV

Elements of structural geology like strike, dip, outcrop. Study of folds, joints, faults and their importance in civil engineering works.

UNIT – V

Geology of dams, reservoirs, tunnels land slides and rockfalls. Earthquakes. Groundwater exploration. Rock as a construction materials.

TEXT BOOKS :

1. A text book of geology By Mukharjee.P.K.
2. Principles of Engineering geology and Geotechnics By Krynine & Judd
3. Geology for Engineers By Blyth & de freitaus
4. Fundamental of Engineering Geology By F.H.Bell.
5. A Text Book of Engineering Geology - N.Chennakesavulu.

Course Outcomes (COs)

After completion of the course the student will have :

- To apply the geological knowledge to Civil Engineering Constructions, at different stages. The kind of study expose the geological draw backs, if any.
- To help the site engineers to take suitable precautionary measures to overcome the drawbacks but also to take advantage of the site geology findings wherever possible. To take precautionary measures in civil engineering constructions based on geological parameters.

CET 05 FLUID MECHANICS – I

L+T / week : 3+1 Hrs **Sessional Marks: 20+20**

University Exam : 3 Hrs **End Exam Marks : 60**

Course Educational Objective (CEOs)

1. To learn fluid properties
2. To understand fluid flow concepts
3. To derive fundamental equations of fluid flow
4. To know about pressure and velocity
5. To know discharge measuring devices

UNIT – I

FLUID PROPERTIES : Definition of a fluid – Continuum – Density, Specific weight, Specific volume, Specific gravity – Viscosity – Bulk modulus of elasticity – Vapour pressure – Surface tension and capillarity.

UNIT – II

FLUID STATICS : Pressure at a point – Absolute and gauge pressure – Pascal's and Hydrostatic laws – Pressure measurement – Manometers and Mechanical gauges – Hydrostatic thrust on plane and curved surfaces – Buoyancy and flotation .

UNIT – III

FLUID FLOW CONCEPTS: Flow characteristics – Velocity – Acceleration – Types of flow – Streamlines, path lines, streak lines – Stream function, velocity potential, flownet – Circulation and Vorticity.

UNIT – IV

FUNDAMENTAL EQUATIONS : Continuity equation – Euler's equation of motion along a streamline – Bernoulli's equation – Free vortex flow – Free liquid jets – Linear momentum equation – Forces on a bend – Fixed and moving vanes – Moment of momentum equation – Torque on sprinklers.

UNIT – V

DIMENSIONAL ANALYSIS AND SIMULITUDE: Dimensional homogeneity – Dimensions and units - Buckingham's π theorem – Dimensionless parameters – similitude-Model studies.

FLOW MEASUREMENT: Velocity measurement – Pitot tube – Pitot static tube – Discharge measurement – Orifices and Mouth pieces – Venturimeter, Nozzlemeter, Orificemeter, Notches and Weirs.

TEXT BOOKS :

1. Fluid Mechanics by V.I. Streeter and E.Benzamine Wylie.
2. Engineering Fluid Mechanics by K.L. Kumar.
3. Hydraulics and Fluid Mechanics by P.N. Modi and S.M. Seth.
4. Fluid Mechanics and Turbo machines by Madan Mohan Das – PHI Learning Pvt. Ltd., New Delhi.

Course Outcomes (COs)

After completion of the course the student will have :

1. To solve fluid flow problems using fundamental principles
2. To measure pressure, velocity and discharge
3. To perform model analysis

CET 06 ENGINEERING MECHANICS

L+T / week : 3+1 Hrs **Sessional Marks: 20+20**

University Exam : 3 Hrs **End Exam Marks : 60**

Course Educational Objective (CEOs)

1. To understand basics of forces
2. To understand forces on rigid bodies both on the 2D /3D.
3. To learn internal stress system due to action of external forces.
4. To study various aspects of CG
5. To study and apply concepts of M.I

UNIT – I

STATICS : Basic concepts – System of force, Concurrent and non-concurrent coplanar and non-coplanar forces – Resultant – Moment of force and its application – Couples and resultant of force systems – Equilibrium of systems of forces – Free body diagrams, Equations of equilibrium of coplanar systems and spatial systems.

UNIT – II

CENTRE OF GRAVITY AND MOMENTS OF INERTIA: Theory of Pappus – Centroids of composite figures – Areas of gravity of bodies – Moment of inertia – Parallel and perpendicular axis theorems – Moments of inertia of composite areas (rolled and built up sections) – Radius of gyration of areas.

UNIT – III

SIMPLE STRESES AND STRAINS : Elasticity and plasticity – Types of stresses and strains – Hooke's law – Stress-strain diagram for mild steel – Working stress – Factor of safety.

UNIT – IV

Lateral strain – Poisson's ratio and volumetric strain – Elastic moduli and relationship between elastic constants – Bars of varying section – Composite bars – Temperature stresses.

UNIT – V

STRAIN ENERGY : Gradual, sudden and impact loading – Endurance limit principles of virtual work and its applications.

TEXT BOOKS :

1. Ghose D.N. – Applied Mechanics and Strength of Materials.
2. Timoshenko & Young – Engineering Mechanics.
3. Junarkar SB – Mechanics of Structures – Vol. I.
4. Junarkar SB – Elements of Applied Mechanics.

Course Outcomes (COs)

After completion of the course the student will have :

- To aquaire the basic knowledge of the analysis of general structures when external lodes are applied.

CET 07 SURVEYING – I

L+T / week : 3+1 Hrs **Sessional Marks: 20+20**

University Exam : 3 Hrs **End Exam Marks : 60**

Course Educational Objective (CEOs)

1. To study basics of surveying and chain surveying,
2. To study basics of surveying compass surveying,

3. To study basics of leveling,
4. To study basics of theodolite surveying
5. To apply the concepts of surveying and leveling to field problems

UNIT – I

FUNDAMENTALS :

Definition of Surveying. Classification of Surveys. Basic Principles of Surveying - Chains and Tapes and types. Ranging of lines - Direct and Indirect. Measurement of distances over sloping grounds. Chain and Tape corrections - Numerical problems. Chain Surveying – Field work - Accessories required. Selection of stations and lines. Offsets and types. Setting out right angles - working principle and use of cross staff, optical square. Booking of chain survey work – field book entries, conventional symbols. Obstacles in chain survey – Numerical problems.

UNIT – II

COMPASS SURVEYING :

Meridians and Bearings. Principle, working and use of Prismatic compass and Surveyor's compass, WCB and Reduced bearing. Dip and declination. Computation of bearings of closed traverse given the bearing of one of the lines, Computation of included angles given the bearings of lines of a closed traverse. Local attraction- determination and corrections. Compass traversing – Field work – Plotting of the survey.

PLANE TABLE SURVEYING :

Plane table and accessories, Advantages and limitations of plane table survey, Orientation and methods of orientation, Methods of plotting – Radiation, Intersection, Traversing, Resection method – Two point and three point problems - Solution to two-point problem - Solution to three point problem - Mechanical (or) Tracing paper method.

UNIT – III

LEVELLING :

Principles and basic definitions, Fundamental axes and part of dumpy level, types of adjustments and objectives, Temporary adjustments of a dumpy level, Type of leveling – Simple leveling, Reciprocal leveling, profile leveling, cross sectioning – Fly leveling, Booking of levels – Rise and fall method and height of instrument method – Comparison Arithmetic checks, Errors

and precautions. Contours and their characteristics, Methods of contouring – Direct and Indirect methods – Uses of contours.

UNIT – IV

THEODOLITE SURVEYING

Vernier theodolite – Basic definitions, Fundamental lines, Temporary adjustments; Measurement of horizontal angles – Repetition and Reiteration Methods – Measurement of vertical angle - Theodolite Traverse survey - Checks in traverses. Errors in theodolite survey. Traverse computations - Coordinate systems - Their use.

UNIT – V

AREAS AND VOLUMES

Computation of areas from field notes and plotted figures. Areas of figures at boundaries by Mid-ordinate rule, Trapezoidal rule, Simpson's rule.

Computation of straight volumes of level, two-level and side-hill two-level sections using Trapezoidal & Prismoidal rules. Computation of volumes of Borrow pits by Spot Levels and Reservoirs by Contours.

TEXT BOOKS :

1. Surveying and Levelling Parts 1 & 2 by T.P.Kanetkar and S.V.Kulkarni.
2. Surveying and levelling vol I,II & III by B.C.Punmia.
3. Plane Surveying by A.M. Chandra.
4. Elements of Geomatics by P.R. Wolf.
5. Higher Surveying by A.M. Chandra.

Course Outcomes (COs)

After completion of the course the student will have :

- Measure and layout elevations and relative position of points, understand plans and filed notes.
- Perform computations using information gathered from differential levelling, traversing, area calculations, and volume/ earthwork.

CEP 01 ENGINEERING GEOLOGY LABORATORY

L+T / week : 3+1 Hrs Sessional Marks: 20+20

University Exam : 3 Hrs **End Exam Marks : 60**

Course Educational Objective (CEOs)

1. To enable the student to learn various geological models.
2. To find the properties of minerals,
3. Identification of rocks
4. Field applications
5. To study geological maps

1. Description of the geological models.
2. Study of the Physical properties of Minerals.
3. Study and Identification of the Rocks.
4. Structural Geology Problems
   a) Thickness Problems.
   b) Strike and Dip Problems
   c) Bore Hole or Three point problems.
5. Study of the Geological Maps.

Course Outcomes (COs)

After completion of the course the student will have :

1. The study and identification of minerals, rocks and structures with their utilization in civil engineering works.

CEP 02 SURVEYING – I LABORATORY

L+T / week : 3+1 Hrs **Sessional Marks: 20+20**

University Exam : 3 Hrs **End Exam Marks : 60**

Course Educational Objective (CEOs)

- To apply the possess knowledge about survey field techniques
- To apply the possess knowledge about chain survey
- To learn about areas of polygons
- To learn about determination of distances

- To learn about error adjustments

EXERCISE – 1

To measure distance between two points using direct ranging.

EXERCISE – 2

Chain traversing.

EXERCISE – 3

Area of a polygon by cross staff survey

EXERCISE – 4

Study of Prismatic Compass and determination of distance between two inaccessible points by the compass.

EXERCISE – 5

Compass traversing and adjustment of closing error by Bowditch method (Graphical method).

EXERCISE – 6

To locate points by radiation method of plane tabling.

EXERCISE – 7

To determine the distance between inaccessible points by intersection method of plane tabling.

EXERCISE – 8

To determine elevation between two points by Height of Instrument method.

EXERCISE – 9

To determine difference in elevation between two points by Rise and Fall method.

EXERCISE – 10

To conduct profile levelling for water supply / sewage line and to draw the longitudinal section to determine the depth of cut and depth of filling for a given formation level.

Course Outcomes (COs)

After completion of the course the student will have :

1. Ability to use the techniques, skill and surveying equipment for engineering practice.

Applying mathematics concepts in the field of surveying.

CET 08 MECHANICS OF SOLIDS

L+T / week	**:**	**3+1 Hrs**	**Sessional Marks: 20+20**
University Exam	**:**	**3 Hrs**	**End Exam Marks : 60**

Course Educational Objective (CEOs)

To acquire the knowledge about behavior of members subjected to various types of forces on the members.

UNIT I

SHEAR FORCE AND BENDING MOMENT :

Definition of beam - Types of beams - Concept of shear force and bending moment - S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l, uniformly varying loads and combination of these loads - Point of contraflexure - Relation between S.F, B.M and rate of loading at a section of a beam.

UNIT II

FLEXURAL STRESSES AND SHEAR STRESSES :

Theory of simple bending - Distribution of flexural stresses and shear stresses - Resilience due to flexure and shear.

UNIT III

DIRECT AND BENDING STRESSES :

Stresses under the combined action of direct loading and B.M - Core of a section - Circular, rectangular and triangular (solid and hollow) - Determination of stresses in the case of chimneys, retaining walls and dams.

COLUMNS :

Stability of columns - Euler's theory - Various end conditions - Rankine's theory - Eccentrically loaded columns (without initial curvature).

UNIT IV

TORSION OF CIRCULAR SHAFTS :

Theory of pure torsion in solid and hollow circular shafts - Transmission of power - Combined bending, torsion and end thrust.

SPRINGS :

Types of springs - Close and open coiled helical springs under axial loads and axial couple - Springs in series and parallel - Carriage or leaf springs.

UNIT V

PRINCIPAL STRESSES :

Principal stresses and principal strains - Mohr's circle of stresses – Theories of failure.

CYLINDERS :

Thin cylinders subjected to internal fluid pressure - Wire wound thin cylinders - Thick cylinders under internal and external pressure - Compound cylinders.

TEXT BOOKS :

1) Mechanics of Structures Vol.I & Vol.II by S.B.Junnarkar.
2) Analysis of Structures by Vazirani & Ratwani.
3) Strength of Materials Vol.I & Vol.II by Timoshenko.
4) Strength of Materials by Andrew Pytal and Ferdinand L.Singer (Longman).

REFERENCES :

1) Engineering Mechanics by Egor. P. Popov.

Course Outcomes (COs)

After completion of the course the student will have :

1) Ability to analyze the stress state of members in tension, Shear torsion and bending.
2). Ability to construct the SFD, BMD, TMD Diagrams and to drain their stress diagrams.

CED 01 BUILDING PLANNING DESIGN AND DRAWING

L+D / week : 1 + 2 (Drg) Hrs **Sessional Marks : 20+20**

University Exam : 3 Hrs **End Exam Marks : 60**

Course Educational Objective (CEOs)

1. To study the factors influencing in selection of site for residential buildings.
2. To learn the different aspects of residential buildings.
3. To know the planning and design aspects of different types of buildings like residential, hospitals, school buildings etc.
4. To study the NBC Code practice need for better planning

Site selection - Functional requirements of a residential building - Principles of

planning - Factors - Aspect, Prospect, Privacy, Grouping, Roominess, Water Supply and Sanitation, Flexibility, Circulation and other factors - Site plan - Planning and design of public buildings such as Residential, offices, schools, hospitals and theatres and industrial buildings, preliminaries of Vastu.

Conventional signs used in Civil Engineering Drawing, Bonds in brick masonry, stone masonry, panelled and flush doors, glazed and iron barred windows, king post truss, queen post truss.

Drawings (plans, sections and elevations) of simple residential buildings with flat roof not exceeding two storeys.

TEXT BOOKS

1. Building Planning and Drawing by Dr. N.Kumara Swamy and A.Kameswara Rao, Charotar Publishers, Anand.
2. Building Drawing by Shah, Kale & Patki.
3. Instructional Sketches for Civil Engineering Drawing - A Series & B Series.
4. Building Planning Design and Scheduling by Gurucharan Singh & Jagadish Singh.

Course Outcomes (COs)

After completion of the course the student will have :

- The scope of this course is to introduce the concepts of building planning and drawing with emphasis on architectural planning.
- This subject is designed as an introduction for students who wish to develop their competence and skills in the preparation of architectural and building drawings.

CET 09 FLUID MECHANICS – II

L+T / week : 3+1 Hrs **Sessional Marks : 20+20**

University Exam : 3 Hrs End Exam Marks : 60

Course Educational Objective (CEOs)

1.To learn laminar and turbulent characteristics of pipe flows

2.To understand boundary layer concept, its separation and control

3.To determine drag and lift forces on submerged bodies

4.To study the characteristics of pumps and turbines

UNIT – I

LAMINAR FLOW : Relation Between Shear and Pressure Gradients in Laminar Flow –Velocity and Shear distribution in Circular Pipes – Hagen – Poiseuille Law – Laminar Flow Between Parallel Plates.

TURBULENT FLOW : Hydrodynamically Smooth and Rough Boundaries – Velocity Distribution For Turbulent Flow in Pipes –Resistance to Flow of Fluid in Smooth and Rough Pipes.

UNIT – II

FLOW THROUGH PIPES : Laws of Fluid Friction – Darcy – Weisbach Equation and Other Formulae for Head Loss due to Friction in Pipes – Minor Losses in Pipes – Pipes in Series and Parallel –Branched Pipes – Siphon – Transmission of Power Through Pipes –Pipe Networks – Hardy Cross Method.

UNIT – III

BOUNDARY LAYER THEORY : Thickness of Boundary Layer – Boundary Layer Along a Long Thin flat Plate and its Characteristics –Drag on a flat plate –Laminar Boundary Layer – Turbulent Boundary Layer – Laminar Sublayer – Boundary Layer on Rough Surfaces – Separation of Boundary Layer – Methods of Controlling the Boundary Layer.

FLUID FLOW AROUND SUBMERGED OBJECTS – DRAG AND LIFT

Types of Drag –Drag on a Sphere – Drag on a Cylinder –Drag on an Airfoil – Development of Lift on Immersed Bodies – Magnus effect.

UNIT – IV

HYDRAULIC TURBINES : Heads, Efficiencies and work done – Pelton Wheel, Francis Turbine and Kaplan Turbine – Draft Tube theory - Governing – Runaway speed – Surge Tanks – Unit Quantities – Specific Speed – Performance Characteristic Curves – Model Testing – Cavitation – Selection.

UNIT – V

CENTRIFUGAL PUMPS : Advantages - Component Parts – Working – Types – Work done – Heads – Losses and Efficiencies – Specific Speed – Model Testing – Multi Stage Pumps – Performance Characteristic Curves – Net positive Suction Head (NPSH) – Cavitation.

TEXT BOOKS :

1. Fluid Mechanics by V.I. Streeter and E.Benzamine Wylie.
2. Engineering Fluid Mechanics by K.L. Kumar.
3. Fluid Mechanics and Hydraulic Machines by Modi and Seth.

Course Outcomes (COs)

After completion of the course the student will have :

- To analyze and solve pipe flow problems
- To design submerged bodies based on drag and lift characteristics
- To select suitable pumps and turbines based on the requirements

CET 10 SOIL MECHANICS

L+T / week : 3+1 Hrs **Sessional Marks : 20+20**

University Exam : 3 Hrs **End Exam Marks : 60**

Course Educational Objective (CEOs)

The course should enable the students to :

1. Develop an understanding of the index properties of soils and the various methods of soil classification.
2. Be acquainted with different modes of soil-water, permeability ,effective stress concepts and seepage through porous media and flow nets.
3. Gain knowledge about the different tests carried to find out the shear strength of soil.4.

UNIT - I

PHYSICAL PROPERTIES OF SOILS : Soil as a 3-phase system -Fundamental relationships by volume and weight - Index properties of soils - Sieve analysis - Sedimentation analysis - Atterberg limits and density index.

UNIT - II

IDENTIFICATION AND CLASSIFICATION OF SOILS: Tests for field identification and classification of soils - Textural classification, Unified soil classification and Indian Standard classification systems.

SOIL WATER: Modes of occurrence of water in soils, Adsorbed water, Capillary water - stress

condition in soil - effective & neutral pressures.

UNIT - III

PERMEABILITY AND SEEPAGE : Permeability of soil - Laboratory and field determination - Seepage analysis - Elementary principles of flow nets - Phreatic line in an Earth dam - Seepage through earth dam - Critical hydraulic gradient - Piping.

UNIT - IV

CONSOLIDATION : Pressure - void ratio curve - Compression index - Coefficient of Compressibility - Modulus of volume change - Consolidation process - Consolidation settlement - Terzaghi's theory of one dimensional consolidation - coefficient of consolidation - Preconsolidation pressure - Normally consolidated and over consolidated soils.

UNIT - V

SHEAR STRENGTH OF SOILS : Shear strength of soils - Mohr'-Coulomb Failure Criteria - Measurement of shear strength - Direct shear, Unconfined compression and Triaxail compression tests - Shear strength parameters - Test conditions - Shear strength of cohesive and cohesionless soils - Drainage conditions - Pore pressure parameters.

TEXT BOOKS:

1. Geotechnical Engineering - C.Venkatramaiah.
2. Numerical Problems, Examples and Objective Questions in Geotechnical Engineering - Prof.A.V.Narasimha Rao and Prof.C.Venkatramaiah
3. Soil Mechanics and Foundation Engineering - K.R.Arora.
4. Soil Mechanics and Foundation Engineering - B.C.Punmia.
5. Basic and Applied Soil Mechanics - Gopal Ranjan & A.S.R.Rao.
6. Soil Mechanics & Foundation Engineering – P.Purushothama.Raj

Course Outcomes (COs)

After completion of the course the student will have :

The students will be able to:

- Classify the soils based on their properties
- Assess the permeability and seepage characteristics of soil.

- Find out the settlement of soil based on the stress distribution.
- Assess the shear strength of various types of soil.
- Analyse the stability of slopes using different methods.

EET 41 BASIC ELECTRICAL ENGINEERING

L+T / week : 2 Hrs **Sessional Marks : 20+20**

University Exam : 3 Hrs **End Exam Marks : 60**

Course Educational Objective (CEOs)

1. To understand the basic circuit element and classification.
2. To learn different types of circuits.
3. To know the functioning of DC machines and Transformers

UNIT – I

Basic Circuit Concepts : Basic Circuit elements R, L and C – Classification of circuit elements – Voltage and Current sources – Kirchhoff's laws, Star to Delta and Delta to Star transformations, network reduction techniques – Simple problems.

UNIT – II

DC Circuits : D.C. Circuit analysis by mesh current method and nodal voltage method – Superposition theorem, Thevenin's theorem and maximum power transfer theorem – Application to simple D.C. circuits.

UNIT – III

AC Circuits : Average value – RMS value – form factor – crest factor – j notation – Phasor diagrams, reactance, impedance and admittance, active power, reactive power and apparent power and power triangle – Expression for real power in an A.C. circuit – Analysis of simple series and parallel circuits.

UNIT – IV

DC Machines : Principle of operation of de generator, emf equation, types of generators, principle of operation of DC motor, Back E.M.F. and torque equations of D.C. motors, illustrative examples.

UNIT – V

Transformers : Single phase transformer, principle of operation, types, e.m.f equation, Problems on E.M.F. equation.

Text Books :

1. Network Analysis by A. Sudhakar and S.P. Shyammohan, Tata Mc. Graw Hill, 2009.
2. Electrical Networks by Ravish R Singh, Tata Mc. Graw Hill, 2007.
3. Basic Electrical Engineering by D.P. Kothari & IJ Nagrath : Tata Mc Graw Hill, 2002.

Course Outcomes (COs)

After completion of the course the student will have :

- Able to aquaire the basic knowledge of analysis of different circuits like AC & DC.
- Able to find the functioning of DC machines and Transformers.

MET 64 BASIC MECHANICAL ENGINEERING

Lectures/week : 2 Hrs **Sessional Marks : 20+20**

University Exam : 3 Hrs **End Exam Marks :60**

Course Educational Objective (CEOs)

1. To understand the parts of turbines and working principles.
2. To know the classification of power plants and functioning of different power plants.
3. To learn the classification, main components like 2-stroke and 4 – stroke engines.
4. To know the processes of refrigeration.

UNIT – I

Steam Turbines: Main parts of a steam turbine, types of turbines, working of a single stage impulse turbine (De-Level Turbine) Compounding of impulse steam turbines, Working of Parson's Reaction turbine, Differences between Impulse and Reaction Turbines.

UNIT – II

Power Plants: Classification of power plants, steam power plants, Nuclear Power plant, Gas Turbines, Diesel Power Plant, Hydro Power Plant, Environmental constraints of power Generation, Solar Energy, Wing Energy, Tidal power, Geothermal Power, ocean Thermal Energy Conversion (OTEC)

UNIT – III

Internal Combustion Engines: Classification, Main components, 2-stroke and 4-stroke Petrol Engines, 2-stroke and 4-stroke diesel engines, Fuel System in a petrol Engine, Battery or Coil Ignition System, Cooling System in I.C. Engines, Lubrication System, Fuel System for Diesel Engines, Petrol Injection, Differences between Diesel Injection and Petrol Injection.

UNIT – IV

Refrigeration and Air Conditioning: Refrigeration, Refrigerants and their desirable properties, methods of Refrigeration, Requirements of Comfort Air Conditioning, Window Air Conditioner, Thermo Electric Cooling.

UNIT – V

Transmission of Power: Belt and rope Drives, Types of Belts, Materials, Types of Flat Belt Drives, Velocity Ratio or Speed Ratio, Rope Drives, Gear Trains and Their Types.

TEXT BOOKS :

1. G. Shanmugham & S. Raveendran-Basic Mechanical Engineering , Tata MC Graw Hill,2007.
2. Wickert J – An Intruduction to Mechanical Engineering, Thomson Brooks Cole, 2004 Edition.

REFERENCE BOOKS

1. Aroraz & Domkundwaqr-Power Plant Engineering, dhanpat Rai & Co., 5th Revised Edition.
2. R.S. Khurmi & J.K. Gupta – Thermal Engineering, S. Chand, 2008.
3. C.P.arora- Refrigeration and Air Conditioning, Tata Mc Graw Hill,2008

Course Outcomes (COs)

After completion of the course the student will have :

- To aquaire the basic knowledge and working principles of Engines, Turbines, Air-conditioning and refrigeration.

CET 11 SURVEYING - II

L+T / week : 2+1 Hrs **Sessional Marks : 20+20**

University Exam : 3 Hrs **End Exam Marks : 60**

Course Educational Objective (CEOs)

1. To obtain knowledge about tacheometric surveying
2. To understand basic design of curves. To know principles of aerial and hydrographic surveying.
3. To handle modern surveying instruments.

UNIT – I TACHEOMETRY:

Principle of stadia method - Tacheometric constants and their determination - Determination of distances and elevations of points by stadia and tangential methods - Tacheometric survey - Field work. Errors in tacheometric survey.

UNIT – II CURVES:

Principles of simple and compound curves - Curve ranging - Offsets from long chord - Rankine's one theodolite method - Two theodolite method. Reverse curve between parallel straights - Super-elevation - Uses and characteristics of transition curve - Length of transition curve - Principles of combined curve. Types and elements of Vertical curves.

UNIT – III AERIAL SURVEYING:

Introduction - Types of Photographs - Vertical Aerial Photographs - Geometry - Scale - Ground coordinates from a vertical photograph - Relief displacement - Flying height of vertical photograph - Flight planning - Stereoscopic vision - Photo interpretation - Keys. Photomaps and mosaics - Advantages and disadvantages - Uses.

UNIT – IV HYDROGRAPHIC SURVEYING:

Definition – Method of Hydrographic surveys – Mean Sea Level. Shore-Line Surveys. Tides – Tide gauges. Sounding – Equipment for sounding. Locating the Soundings. Stream Gauging – Area-velocity method, Weir method, Chemical method.

UNIT – V MODERN SURVEYING INSTRUMENTS:

Electronic Distance Measurement (EDM) instrument - Principle and working of EDM.

Total Station -Introduction, Functions, Parts of Total station instrument; Handling and setting up a Total Station Instrument. Measuring horizontal angles, Deflection angles, Azimuths, Vertical or Zenith angles.

Global Positioning System (GPS) - Principle and working of GPS.

TEXT BOOKS :

1. Surveying and Levelling Parts 1 & 2 by T.P.Kanetkar and S.V.Kulkarni.
2. Surveying and levelling vol I,II & III by B.C.Punmia.
3. Plane Surveying by A.M. Chandra.
4. Elements of Geomatics by P.R. Wolf.
5. Higher Surveying by A.M. Chandra.

Course Outcomes (COs)

After completion of the course the student will have :

- Ability to design and set out curves
- Gain knowledge about aerial and hydrographic surveying.
- Ability to use modern surveying equipment

CET 12 TRANSPORTATION ENGINEERING – I

L+T / week : 3+1 Hrs **Sessional Marks : 20+20**

University Exam : 3 Hrs **End Exam Marks : 60**

Course Educational Objective (CEOs)

1. To understand the various modes of Transportation
2. To know the historical development of highways
3. To analyze and compare the various engineering surveys for highway location
4. To familiarize with various elements and geometric design of highways
5. To know the various properties of highway materials
6. To learn the various aspects of pavement design

UNIT - I

ROAD TRANSPORTATION: Importance of transportation, modes of transportation, characteristics of road transport, Historical development of highways in other countries and India, classification of roads, road patterns, Review of Transport system and Technology, coordinated development.

UNIT - II

HIGHWAY ALIGNMENT AND SURVEYS: Highway alignment, basic requirements, controlling factors, engineering surveys for highway location, drawings and report. PREPARATION OF

PLANS, MASTER PLANS AND PHASING - Project - points considered in a new highway project and realignment project.

UNIT - III

GEOMETRIC DESIGN : Important elements, Design controls and criteria, cross section elements - pavement surface characteristics, camber, width of pavement, kerbs, road margins, formation width, right of way, sight distance - factors affecting sight distance - Different situations (problems included). Horizontal alignment - Design speed, super elevation, including construction methods, radius of curve, widening of pavement including analysis, set back distance, curve resistance, gradient, types, grade compensation - Vertical curves.

UNIT - IV

HIGHWAY MATERIALS : Aggregates and bitumen - desirable properties, tests, Specifications, Aggregate bitumen mixes - Desirable properties, Design by Marshall method.

UNIT - V

PAVEMENT DESIGN: Types, components and their functions, design factors, flexible pavement design - IRC methods based on CBR only. Rigid pavement design - Calculation of stresses, design of joints, dowel bars, tie bars, thickness of pavement by IRC procedure.

TEXT BOOKS

1. Highway Engineering by Khanna, S.K. and Justo C.E.G.
2. Principles of Highway Engg. by Dr. L.R.Kadiyali.
3. A Course in Highway Engineering by S.P.Bindra.

Course Outcomes (COs)

After completion of the course the student will have :

- To apply the knowledge of highway materials in the design of the pavements.
- To design the various highway pavements.
- To estimate the geometrics for highway pavements.

CEP 03 FLUID MECHANICS LABOTRATORY

Practicals / week : 3 hrs. **Sessional Marks : 40**

Univ. Exams : 3 hrs. **End Exam. Marks : 60**

Course Educational Objective (CEOs)

1. To conduct experiments on flow measuring devices, pipe-loss coefficients and performance characteristics of pumps and turbines

I CYCLE FLOW MEASUREMENT

1. Calibration of Small Orifice
2. Calibration of Venturimeter
3. Calibration of Orifice meter
4. Calibration of Bend meter
5. Calibration of Triangular Notch

II CYCLE HEAD LOSSES IN PIPES

1. Determination of Friction factor of the pipe material
2. Determination of Head Loss coefficient due to Sudden contraction and Sudden Expansion
3. Determination of Head loss coefficient due to Gate valve in a pipe line
4. Determination of Head Loss coefficient due to Bend in a pipe line

III CYCLE HYDRAULIC MACHINES

1. Characteristic curves of 0.4 kW single stage centrifugal pump
2. Characteristic curves of 0.8 kW two stage centrifugal pump
3. Characteristic curves of variable speed centrifugal pump
4. Characteristic curves of Pelton wheel
5. Characteristic curves of Francis/Kaplan Turbine

Course Outcomes (COs)

After completion of the course the student will have :

- To calibrate the flow measuring devices
- To calculate loss coefficients for use in the pipe-flow analysis
- To prepare the characteristic curves of the pumps and turbines

CEP 04 SURVEYING – II LABORATORY

Practicals / week : 3 hrs. Sessional Marks : 40

Univ. Exams : 3 hrs. End Exam. Marks : 60

Course Educational Objective (CEOs)

1. To gain knowledge of modern field measurement tools and techniques

EXERCISE – 1 :

Measurement of horizontal angles by Repetition method.

EXERCISE – 2 :

Measurement of horizontal angles by Reiteration method.

EXERCISE – 3 :

Measurement of vertical angles – Determination of heights of objects.

EXERCISE – 4 :

To determine the distance and difference in elevation between two inaccessible points using theodolite.

EXERCISE – 5 :

To determine the tachometric constants and to determine the distance between two points using stadia tacheometry.

EXERCISE – 6 :

To determine the distance between two points using tangential tacheometry.

EXERCISE – 7 :

To set out simple curve using linear methods – Perpendicular offsets from long chord.

EXERCISE – 8 :

To set out simple curve using Rankine's deflection angles method.

EXERCISE – 9 :

Demonstration of Total Station Instrument. To determine height of remote object, horizontal distance and co-ordinates of points using Total Station Instrument.

EXERCISE – 10 :

Demonstration of GPS Receiver. Overview of GPS.

Course Outcomes (COs)

After completion of the course the student will have :

1. Develop an understanding of modern surveying equipment

CET 13 APPLIED HYDRAULICS

L+T / week : 3+1 Hrs **Sessional Marks : 20+20**

University Exam : 3 Hrs **End Exam Marks : 60**

Course Educational Objective (CEOs)

1. To understand the basic concepts of channel flows
2. To learn specific energy and specific force concepts
3. To analyze and compute uniform and gradually varied flows
4. To learn the design aspects of erodible and non-erodible channels

UNIT - I

INTRODUCTION TO CHANNEL FLOW :

Differences between pipe flow and channel flow -classification of flows - Geometric elements of channel section - velocity and pressure distributions - Velocity distribution coefficients - Parallel and curvilinear flows - Pressure correction coefficient.

UNIFORM FLOW :

Uniform flow - Chezy and Manning fomulae - Hydraulically efficient channel sections (Rectangular, triangular, trapezoidal and circular sections) - Uniform flow computations

UNIT - II

SPECIFIC ENERGY AND CRITICAL DEPTH :

Specific energy and critical depth - Critical flow computations - Applications – Transitions - channels with a hump-Transition with change in width – Mitra and Hinds methods of design of transitions.

UNIT - III

GRADUALLY VARIED FLOW :

Differential equation of gradually varied flow - classification of flow profiles - Features of flow profiles - Control sections - Analysis of flow profiles - Gradually varied flow computations - Direct step method – standard step method.

UNIT - IV

RAPIDLY VARIED FLOW:

Hydraulic jump - Momentum equation –Hydraulic jump in rectangular channels-classification

of jumps- Characteristics of jump in a horizontal rectangular channel - Rapidly varied unsteady flow - Surges in rectangular channels – positive and negative surges.

UNIT - V

DESIGN OF CANALS:

Design of non-erodible channels- methods of economic section and permissible velocity- design of erodible channels-Regime approach-Kennedy's silt theory and Lacey's regime theory

TEXT BOOKS:

1) Open Channel Hydraulics by Ven Te Chow, Mc Graw-Hill International Book Company, New Delhi.
2) Flow in Open Channels by Subramanya, K. - Tata Mc Graw Hill Publishing Co. Ltd., New Delhi.
3) Flow through Open Channels by K.G.Rangaraju - Tata Mc Graw Hill Publishing Co. Ltd., New Delhi.
4) Open channel flow by Madan Mohan Das – PHI Learning Pvt.Ltd., New Delhi.

Course Outcomes (COs)

After completion of the course the student will have :

- To design channel transitions and hydraulics jump stilling basins
- To study the effects of hydraulic structures on flow
- To design irrigation canals, storm water drains, sewers etc.

CET 14 DESIGN OF STEEL STRUCTURES

L+T / week : 3+1 Hrs **Sessional Marks : 20+20**

University Exam : 3 Hrs **End Exam Marks : 60**

Course Educational Objective (CEOs)

1. To understand the design of structural steel members subjected to compressive, tensile and bending loads, as per current codal provisions(IS800 – 2007)

UNIT - I

Introduction - Properties of sections - Types of loads - Permissible stresses in tension, compression, and shear as per IS code.

Riveted and bolted connections - Strength of rivet - Strength of lap and butt joints - Methods

of failure and efficiency of a riveted joint - Design of riveted joints - Design of bracket connections - (Beam-column and Beam-beam connections).

UNIT - II

Welded joints - Types of welded joints - Strength of fillet and butt welds - Design of welded joints - Design of bracket connections - (Beam and column and beam to beam connections), Design of Tension members - Lug angles - Tension splice

UNIT - III

Design of compression members - Single and built-up columns - Design of the lacing and battens - Design of eccentrically loaded columns - Column splicing.

UNIT - IV

Laterally supported beams - Design of simple beam - Design of Built-up beams - Curtailment of flange plates - Connection of flange plate with flange of beam.

UNIT - V

Design of column bases - Slab base - Gusseted base - Bases subjected to moment - Grillage foundation.

TEXT BOOKS

1. Design of Steel Structures – (Limit State Method as per IS 800-2007) by Bhavakatti S.S.
2. Design of Steel Structures - (Limit State Method as per IS 800-2007) by N. Subramanian.
3. Design of Steel Structures - (Limit State Method as per IS 800-2007) by S.K.Duggal.

Course Outcomes (COs)

After completion of the course the student will have :

- Ability to design, tension members, compression members and ability to analyze and design of simple bolted and welded connections.
- Ability to design steel framing system and connections of a building in a team setting.
- Familiarity with professional and ethical issues and the importance of lifelong learning in structural Engineering.

CET 15 DESIGN OF R.C.C. STRUCTURES

L+T / week : 3+1 Hrs **Sessional Marks : 20+20**

University Exam : 3 Hrs **End Exam Marks : 60**

Course Educational Objective (CEOs)

1. To understand the general mechanical behavior of reinforced concrete members.
2. Ability to analyze and design reinforced concrete flexural members and compression members.
3. To help the student develop an intuitive feeling about structural & material vise behavior and design of RC systems & elements.

UNIT – I

INTRODUCTION

Design Philosophies – working stress method, ultimate load method and limit state method.

DESIGN FOR FLEXURE – WORKING STRESS METHOD

Assumptions, permissible stresses in concrete and steel, balanced design, transformed area method, analysis and design for flexure of singly and doubly reinforced and flanged sections.

LIMIT STATE METHOD

UNIT – II

DESIGN PRINCIPLES : Basic Design Principles - Stress strain curves for concrete and steel - Characteristic strengths and loads - Partial safety factors - Stress block - Various limit states.

DESIGN FOR FLEXURE : Limit state of collapse in flexure - Ultimate flexural strength - Balanced, under-reinforced and over-reinforced sections - Design of singly and doubly reinforced rectangular beams - Design of flanged beams.

UNIT - III

DESIGN FOR SHEAR, TORSION AND BOND : Shear-Truss analogy - Design of beams for shear and torsion - Anchorage and development length.

LIMIT STATES OF SERVICEABILITY : Deflection (short and long term) - Cracking.

UNIT - IV

DESIGN OF SLABS, STAIR CASES AND BEAMS :

Design of one way and two way slabs - Design of stair cases - Design of continuous beams and slabs.

UNIT - V

DESIGN OF COMPRESSION MEMBERS : Columns - Reduction factors - Axially loaded -

Eccentrically loaded columns - Uniaxial moment - Biaxial moment (for practice only and not for University Examination).

DESIGN OF FOUNDATIONS : Types of footings - Design of wall footings and isolated, pad stepped and sloped footings - Square, rectangular subjected to axial load.

TEXT BOOKS :

1) Reinforced Concrete by Limit State Design by AK Jain.
2) Reinforced Concrete Design by SN Sinha.
3) LSD of Reinforced Concrete Structures by Ramachandra.
4) Reinforced Concrete Design by Unni Krishna Pillai and Devdas Menon.
5) Reinforced Concrete Design by P.C. Varghese.

Course Outcomes (COs)

After completion of the course the student will have :

- To be in a position to design the basic elements of reinforced concrete structures. Such as slab, beam, column and footing which form part of any structural system with reference to Indian standard code of practice for reinforced Concrete Structures and Design.

CET 16 FOUNDATION ENGINEERING - I

L+T / week : 3+1 Hrs **Sessional Marks : 20+20**

University Exam : 3 Hrs **End Exam Marks : 60**

Course Educational Objective (CEOs)

1. The course should enable the students to :
2. To understand the compaction behaviour of soils
3. Introduce the concept and methods of stress distribution in soils due to applied loads.
4. Understand the stress distribution and types of settlement in soil.
5. Introduce the principle of earth pressure and design of earth retaining structures.
6. Know about Retaining walls.
7. Get a basic understanding of the geotechnical site investigation.
8. Understand the types of foundation and the design concepts of shallow foundation.
9. Get exposed to footings and rafts.

10. Get the concepts of pile foundation.

UNIT - I

SOIL COMPACTION: Compaction of cohesive and cohesionless soils - Standard Proctor's test and Modified Proctor's test - Field compaction - Compaction control - C.B.R. test and its use.

UNIT - II

STRESS DISTRIBUTION IN SOILS : Boussinesq's equation - Vertical stress due to line load, strip load, and uniformly loaded circular area - Newmark's chart - Westergaard's approach - Pressure bulb concept - Approximate methods.

UNIT - III

STABILITY OF SLOPES : Stability analysis of infinite slopes - Stability analysis of finite slopes - Swedish circle method - Friction circle method - Taylor's stability number and use of charts - Improving stability of slopes.

UNIT – IV

EARTH PRESSURE THEORIES: Types of Earth Pressures – Earth Pressure at Rest-Active and passive earth pressures in cohesion less and cohesive soils (with and without surcharge) - Rankine's and coulomb's earth pressure theories - Graphical methods due to Rebhann and Culmann.

UNIT - V

EARTH RETAINING STRUCTURES : Types of Retaining Structures - Stability Considerations of Gravity and Cantilever Retaining Walls - Cantilever Sheet Pile Walls - Anchored Bulk Heads (free earth support method only).

TEXT/REFERENCE BOOKS:

1. Geotechnical Engineering - C.Venkatramaiah.
2. Numerical Problems, Examples and Objective Questions in Geotechnical Engineering - Prof.A.V.Narasimha Rao and Prof.C.Venkatramaiah.
3. Soil Mechanics and Foundation Engineering - K.R.Arora.
4. Soil Mechanics & Foundations - B.C.Punmia
5. Analysis and design of foundations and retaining structures - Shamsher Prakash, Gopal Ranjan & Swamisaran
6. Basic and Applied Soil Mechanics - Gopal Ranjan & A.S.R.Rao.

7. Soil Mechanics & Foundation Engineering – P.Purushothama.Raj
8. Foundation Engineering - Teng

Course Outcomes (COs)

After completion of the course the student will have :

The students will be able to:

- Describe différent soil exploration techniques.
- Gain knowledge on the factors affecting bearing capacity of shallow foundation, various tests to find the bearing capacity and the components of settlement of foundation.
- Know the contact pressure distribution below footings and rafts, types and proportioning of isolated and combined footings and mat foundation.
- Describe the types of piles, their functions, factors influencing the selection of pile, load carrying capacity of pile and pile group and the settlement of pile groups.
- Calculate the plastic equilibrium in soils, earth pressure on retaining walls and the pressure on the wall due to line loads.

CET 17 STRUCTURAL ANALYSIS – I

L+T / week : 3+1 Hrs **Sessional Marks : 20+20**

University Exam : 3 Hrs **End Exam Marks : 60**

Course Educational Objective (CEOs)

1. To be well conversant in analyzing the internal forces in structural members with classical method of analysis in transferring the loads acting on it.

UNIT I

DEFLECTIONS :

Relationship between curvature, slope and deflection - Differential equation for the elastic line of a beam - Slope and deflection of cantilevers and simply supported beams by integration method, moment area method and conjugate beam method.

STATICALLY DETERMINATE PIN - JOINTED PLANE FRAMES :

Computation of forces in simple and compound trusses using method of joints, method of

sections.

UNIT II

ENERGY METHODS :

Strain energy due to axial load, bending moment and shear forces - Maxwell's, Betti's theorems, Castigliano's first theorem and unit load method - Deflection of simple beams and pin-jointed trusses.

UNIT III

INDETERMINATE STRUCTURES :

Determination of static and kinematic indeterminacies - Solution of trusses having upto two degrees of internal and external indeterminacies - Castigliano's theorem – II – Lack of fit.

UNIT IV

STATICALLY INDETERMINATE BEAMS:

Analysis of propped cantilevers - Shear force and bending moment diagrams - Deflections.

Analysis of fixed beams with udl, point loads, uniformly varying load, couple - shear force and bending moment diagrams - Deflections - Effect of sinking of support.

UNIT V

STATICALLY INDETERMINATE FRAMES:

(i) Slope deflection method, continuous beams with degree of indeterminacy not exceeding three, effect of sinking.

(ii) Moment distribution method, continuous beams and frames with sway limited to single bay single storey, effect of sinking.

TEXT BOOKS :

1) Analysis of Structures Vol.I & II by V.N.Vazirani & M.N.Ratwani.
2) Intermediate Structural Analysis by Wang.
3) Mechanics of Structures Vol.II by S.B.Junarkar.
4. Structural Analysis by L.S.Negi & R.S.Jangid.
5) Theory of Structures - Vol.I by S.P.Gupta, G.S.Pandit & R.Gupta.
6) Fundamentals of Structural Analysis by Sujit Kumar Roy & Subrata Chakrabarty.

Course Outcomes (COs)

After completion of the course the student will have :

1. Ability to apply knowledge of general structures in practice.
2. Ability to analyze statically determinate trusses, beams, frames.
3. Familiarity with professional and ethical issues and the importance of lifelong learning in structural Engineering.

CET 18 TRANSPORTATION ENGINEERING - II

Lectures/week : 3 Hrs. **Sessional Marks : 20+20**

End Exam. : 3 Hrs. **End Exam. Marks: 60**

Course Educational Objective (CEOs)

1. To know the construction and maintenance of various types of roads.
2. To have the knowledge of highway drainage.
3. To understand the various components of Railway Engineering, Airport Engineering, Dock and Harbour Engineering.

UNIT – I

Construction and Maintenance: Construction and Maintenance of Earth, Gravel, W.B.M., Bituminous and Concrete Roads.

Highway Drainage : Importance, surface and subsurface drainage methods.

UNIT - II

Traffic Engineering : Scope, road user and vehicle characteristics, traffic studies (uses, field methods and presentation of data only) volume, speed, origin and destination, flow, capacity, parking, accidents, traffic regulations control devices - signs and signals, road markings, islands, design of intersections. Highway lighting

UNIT – III

Railway Engineering : Comparison of railway and highway transportation, classification of Indian Railways, Engineering surveys, permanent way - Gauges, components, cross sections, coning of wheels, ballast types.

Site selection, Classification and layout of different stations, Station yards.

Points and Crossings: Types of crossings - Types of switche

s – Design of turnouts, factors affecting speed at turnouts. Important terms used in points and crossings.

UNIT – IV

Airport Engineering: Airport planning - Master plan, Regional planning, data for site selection. Site selection, surveys, drawings, estimation of future air traffic needs.

Airport layout and terminal area - Terminal area, Building area, parking area, Blast considerations, Typical airport layouts and their features. Evaluation of air field pavements and

methods of strengthening.

UNIT – V

Dock and Harbour Engineering: Water transportation, Harbours and types of harbours, site selection, ports, classification of ports. Docks - Types, Shapes of docks, dock entrances, repair docks, break water, types of breakwaters, quays, jetties, wharves, dolphis, fender systems, aprons, transit sheds and ware houses, dredging.

Text Books:

1. Highway Engineering by Khanna, S.K. and Justo C.E.G.
2. A text book of Railway Engineering by Saxena, J.C. and Arora.
3. Airport Planning and Design by Khanna, S.K., Arora, M.G. and S.Jain, S.S.
4. Airport Planning and Design - S.K.Khanna, M.G.Arora & S.S.Jain.
5. Docks and Harbour Engineering - S.P.Bindra.
6. Docks and Harbour Engineering - R.Srinivasan.

Course Outcomes (COs)

After completion of the course the student will have :

- Able to design and construct different types of roads.
- To analyze, design different components of Railway Engineering, Airport Engineering, Dock and Harbour Engineering

CET 19 REMOTE SENSING AND GIS

Lectures/week : 3 Hrs. **Sessional Marks : 20+20**

End Exam. : 3 Hrs. **End Exam. Marks : 60**

Course Educational Objective (CEOs)

1. To introduce the basic concepts and principles of various components of remote sensing, and provide an exposure to GIS.

UNIT - I

Remote Sensing:

Definition - History - Physics of Remote Sensing – Electromagnetic Radiation (EMR) – Radiometric quantities – Sources of EMR – Radiation Laws - Interaction of EMR with

Atmosphere – Atmospheric Windows – Interaction of EMR with Earth Surface Features - Vegetation, Soils, Water - Spectral Signature – Introduction to Microwave Remote Sensing.

UNIT - II

Remote Sensing Systems :

Platforms - Introduction - Types - Satellites - Indian Remote Sensing Satellites – Sensors – Introduction - Types - Characteristics of Sensors – Data Products, Visual data analysis. Image interpretation techniques – Elements of image interpretation.

UNIT – III

Cartography : Introduction – Maps Categories – Relief representation – Coordinate Systems – Types – Geographic and Projected Coordinate systems, Geoid, Spheroid, Ellipsoid – Datums – Map projections – Universal Transverse Mercator Coordinate System.

UNIT - IV

Digital Image Processing : Introduction - Overview - Preprocessing - Radiometric correction - Geometric correction - Rectification. Enhancement Techniques - Contrast stretch - Edge enhancement - Filtering Techniques - Classification Techniques - Supervised and unsupervised classification.

UNIT - V

Geographical Information System : Basic Principles - Definition - Components - Data Structures - Raster and Vector formats - Functioning of GIS - Data Input - Data Manipulation - Data Retrieval - Data Analysis - Data Display.

REFERENCE BOOKS

1. F.F.Sabins Jr., Remote Sensing Principles and Interpretation.
2. P.J.Curran, Principles of Remote Sensing.
3. Lille and Kiefer, Remote Sensing Principles and Image Interpretation.
4. C.P.Lo, Principles of Geographic Information Systems.
5. J.R.Jensen, Principles of Remote Sensing.
6. Prithvish Nag, M.Kudrat, Digital Remote Sensing.

Course Outcomes (COs)

After completion of the course the student will have :

- Be able to manage, manipulate and analyze spatial data using GIS technology
- To produce a student who can contribute effectively to the use of image analysis and GIS techniques.
- Knowledge of remote sensing sensors & platforms their properties

CEP 05 GEOTECHNICAL ENGINEERING LAB – 1

Practicals / week : 2 Hrs. **Sessional Marks : 40**

End Exam: 3 Hrs. **End Exam. Marks : 60**

Course Educational Objective (CEOs)

1. The course should enable the students to :
2. Develop laboratory skills in dealing with soil as a medium of water flow, for structural support and a primary building material.
3. Provide the description and classification of soil.
4. Give the procedures to measure/determine Index properties of soil in the lab.
5. To conduct experiments on different types of soils to arrive at the basic properties and compaction characteristics.

- Specific Gravity
- Free Swell Index
- Dry Sieve Analysis
- Insitu density by core cutter method
- Insitu density by sand replacement method
- Liquid Limit & Plastic Limit
- Shrinkage Limit (Green soil)
- Shrinkage Limit (Given dry soil pot)
- I.S. light compaction / Standard Proctor's compaction test
- Harvard Miniature Compaction Test
- Hydrometer Analysis (Demonstration only)

Course Outcomes (COs)

After completion of the course the student will have :

The student acquires the capacity to test the soil and assess its Engineering and Index properties.

- Basic soil properties can be determined and classify the soil for Engineering application
- Basic concepts of soil mechanics is utilized for engineering application.

- Know the engineering properties of the soil such as Strength, Compressibility and permeability and apply the same to the engineering problems.

CEP 06 MATERIAL TESTING LABORATORY

Practicals / Week : 2 Hrs Sessional Marks : 40

End Exam : 2 Hrs End Exam Marks : 60

Course Educational Objective (CEOs)

1. The experimental work involved in the laboratory should make the student understand the fundamental modes of loading of the structures and to determine mechanical properties of materials.

1. Tension Test on Mild Steel bar
2. Tension Test on HYSD bar
3. Torsion Test
4. (a) Deflection Test on Simply Supported Beam
   (b) Charpy Impact Test
5. (a) Deflection Test on Fixed Beam
   (b) Izod Impact Test
6. (a) Compression Test on Wood
   (b) Shear Test on Wood
7. (a) Test on Closed coil Helical Spring
   (b) Bending Test on Carriage Spring
8. (a) Deflection Test on beam under Uniform Bending
   (b) Bending Test on R.S. Joist

Course Outcomes (COs)

After completion of the course the student will have :

1. To a quire the knowledge and behavior in finding the properties of different materials.

CEP 07 SURVEY CAMP

Practicals / week : 2 weeks

End Exam. Marks: 100

End Exam : 3 Hrs.

Course Educational Objective (CEOs)

1. To record all original field observations,
2. To Calculate and plots of detailed field survey using the survey equipments.
3. To Survey of Roads / Buildings
4. Preparation of Contour Maps.
5. Setting out works

Course Outcomes (COs)

After completion of the course the student will have :

- Apply various surveying principle in solving engineering survey using the survey problems
- Display team work and leadership capabilities

CET 20 ADVANCED STRUCTURAL DESIGN

L+T / week : 3+1 Hrs Sessional Marks : 20+20

University Exam : 3 Hrs End Exam Marks : 60

Course Educational Objective (CEOs)

1. To study the design aspects of critical structures like Plate Girders, Roof Stresses, Retain walls and water tank.
2. To understand the conceptual behavior of prestressing methods and systems of prestressing

UNIT – I

PLATE GIRDERS

Riveted and welded plate girders – Design of cross section – Curtailment of flange plate – Vertical and horizontal stiffeners – Splicing of web – splicing of flange.

UNIT – II

ROOF TRUSSES

Loading on roof trusses – Design of purlins – Design of members of roof truss – Angular and tubular members – Design of connection of members.

UNIT – III

RETAINING WALLS

General – Types of Retaining walls – Stability of retaining walls – Design of retaining walls – Cantilever and Counterfort types for different loadings.

UNIT – IV

WATER TANKS

Design of tanks resting on ground - Circular tanks with IS code method and Rectangular tanks with Approximate method. Design of Intz tank.

UNIT – V

PRESTRESSED CONCRETE

Principles of prestressing – Materials used – Methods and systems of prestressing – Losses of prestress – Analysis of rectangular sections for stresses.

TEXT BOOKS

1. Design of Steel Structures – Ramachandra Vol.I & II.
2. Steel Structures – Vol.III – Vazirani and Ratwani.
3. Design of Steel Structures – Arya and Ajmani.
4. Reinforced Concrete Limit State Design by A.K.Jain.
5. RC Design by SN Sinha.
6. RC Structures by BC Punmia Vol. II
7. Prestressed Concrete by N Krishna Raju.

Course Outcomes (COs)

After completion of the course the student will have :

- Able to design the advanced structures like Plate Girders WTS, Roof Trusses etc.,
- Able to analyse the prestressed Structures

CE-0862 ENVIRONMENTAL ENGINEERING – I

Lectures / week : 4 Hrs Sessonal Marks : 20+20

End Exam : 3 Hrs End Exam. Marks : 60

Course Educational Objective (CEOs)

1. To know the different sources of water and water demand.
2. To analyze the distribution network
3. To learn about the sources of water pollution
4. To know the design concepts of water treatment plant
5. To study the different aspects of Air pollution.

UNIT – I

Sources and Demand of Water

Different sources of water, quantity and quality of different sources, Types and variation in water demand, factors affecting water demand, design period, population forecasting – Different methods and their suitability.

Water Collection, Conveyance and Distribution :

Intake works for collection of surface water – Conveyance of water – Gravity and pumping – Their design – Different materials used for conveying conduits and their suitability, systems of distribution – Distribution reservoirs – Distribution networks, design of simple and complex pipe networks, pipe accessories – Valves and their location and suitability.

UNIT – I

Water uses and Quality Requirements

Sources of water pollution, water borne, water carried and water related diseases – Need for protected water supply, water quality – Physical, chemical and biological, water quality requirement and standards for different uses.

Water Treatment :

Conventional water treatment processes units and their functions. Theory and design of aeration, coagulation, flocculation and clarification, Determination of optimum dose of alum for coagulation of water.

UNIT – III

Theory of Filtration – Different types of filters and their design. Disinfection – Disinfectants mechanism of disinfection – Different types, Break point chlorination – Types of calculation – Does of disinfectant.

UNIT – IV

Advanced Treatment Methods :

Removal of fluorides, arsenic, hardness, iron and manganese, salinity, colour, organic chemical and biological residues – Adsorption with activated carbon, ion exchange resigns, membrane processes, chemical oxidation and softening.

UNIT – V

Air Pollution :

Types of pollutants, their sources and impacts, air pollution meterology, air pollution control, air quality standards and limits.

Noise Pollution :

Impacts of noise, permissible limits of noise pollution, measurement of noise and control of noise pollution.

TEXT BOOKS :

1. Water Treatment Principles and Design by James M. Montgomery.
2. Water Supply Engineering, by S.K.Garg.
3. Environmental Engineering by H.S.Peavy et al.
4. Water Supply and Sewerage, by E.W.Steel.
5. Air pollution and its Control by C.S.Rao

Course Outcomes (COs)

After completion of the course the student will have :

- Able to estimate the water demand of any area
- Able to design the distribution network system
- Able to avoid the sources of water pollution
- Able to design water treatment facility
- Able to apply advanced technologies or principles to control air pollution.

CET 22 FOUNDATION ENGINEERING - II

L+T / week : 2+1 Hrs Sessional Marks : 20+20

University Exam : 3 Hrs End Exam Marks : 60

Course Educational Objective (CEOs)

1. The course should enable the students to :
2. To develop and understand of the behaviour of foundations for engineering structures and to gain knowledge of the design methods that can be applied to practical problems.
3. Provide with a basic understanding of the essential steps involved in a geotechnical site investigation.
4. Introduce the principal types of foundations and the factors governing the choice of the most suitable type of foundation for a given solution.
5. Familiarize the students with the procedures used for: a) bearing capacity estimation, b) end bearing capacity, c) skin friction – pile foundation.
6. Introduce the concept of well foundation and its design and construction.

UNIT – I

SOIL EXPLORATION

Site investigations and sub-soil exploration - Site reconnaissance - Depth of exploration - Lateral extent of exploration - Test pits - Auger borings - Wash borings - Soil sampling -Split - spoon sampler -Penetration tests - Geophysical methods - Seismic refraction and electrical resistivity methods - Sub soil investigation reports.

UNIT – II

BEARING CAPACITY OF SHALLOW FOUNDATIONS

Types of foundations - Depth of foundation - Terzaghi's bearing capacity equation - Bearing capacity of square, circular, rectangular and continuous footings - Meyerhof's theory - Skempton's method - Brinch Hansen's method - Effect of ground water table on bearing capacity - - Bearing capacity from building codes**.**

UNIT – III

PILE FOUNDATIONS

Classification of piles - Pile driving - Load carrying capacity of piles - Dynamic formulae - Static

formulae - pile load tests - Insitu penetration Tests - Group action of piles - Negative skin friction.

UNIT – IV

CAISSONS AND WELL FOUNDATIONS

Types of caissons - Bearing capacity - Construction of caissons - Advantages and disadvantages of caisson foundations - Shape and lateral size - Comparision of Caisson types - Lateral stability of caisson foundation - Terzaghi's Analysis.

UNIT – V

SETTLEMENT ANALYSIS

Types of Settlements-Tolerable settlements-Settlement Analysis of Shallow & Deep Foundations (Pile Foundations)-Cohesive & Cohesionless Soils-Settlement from Field Tests (Standard Penetration Test & Plate Load Test).

TEXT/REFERENCE BOOKS :

1. Geotechnical Engineering - C.Venkatramaiah.
2. Numerical Problems, Examples and Objective Questions in Geotechnical Engineering - Prof.A.V.Narasimha Rao and Prof. C.Venkatramaiah.
3. Soil Mechanics and Foundation Engineering - K.R.Arora.
4. Soil Mechanics & Foundations - B.C.Punmia
5. Analysis and design of foundations and retaining structures - Shamsher Prakash, Gopal Ranjan & Swamisaran
6. Basic and Applied Soil Mechanics - Gopal Ranjan & A.S.R.Rao.
7. Soil Mechanics & Foundation Engineering – P.Purushothama.Raj
8. Foundation Engineering - Teng

Course Outcomes (COs)

After completion of the course the student will be able to:

- learn and able to find out the Soil Profile in a given location.
- select suitable foundation for a given structure and site.
- Expertise in the calculation of load carrying capacity of selected foundation.

- Gain experience in solving field geotechnical engineering problems such as slope stability and earth retaining structures.

CET 23 HYDROLOGY

L+T / week : 3+1 Hrs **Sessional Marks : 20+20**

University Exam : 3 Hrs **End Exam Marks : 60**

Course Educational Objective (CEOs)

1. To understand the phases of hydrologic cycle
2. To analyze rainfall, abstractions and runoff
3. To learn the hydrograph analysis and the methods of estimation of floods and their routing
4. To know the basic concepts of groundwater flow and to determine the groundwater yield

UNIT I

INTRODUCTION :

Hydrologic cycle - Hydrologic data - Sources of Data.

PRECIPITATION :

Precipitation - forms and types of precipitation - Measurement of precipitation - Mean precipitation over an area - Rain guage net work - Estimation of missing data - Intensity - Frequency - Duration curves - Depth-Area-Duration curves.

UNIT II

ABSTRACTIONS :

Evaporation, and Evapotranspiration - Factors affecting - Measurement - Methods for reduction - Infiltration - Measurement - Infiltration indices.

UNIT III

RUN OFF :

Run off process - Factors affecting run off - Drainage basin characteristics - Determination of run off - Run off formulae,tables - Importance of stream gauging - Yield - Flow duration curve - Flow mass curve.

UNIT IV

FLOODS :

Importance of flood studies - Methods of estimating flood peak - Empirical formulae - Rational method - Components of a Hydrograph - Base flow separation - Unit hydrograph - Derivation of unit hydrograph of different durations - Distribution graph - Gumbles method of flood frequency analysis.

UNIT – V

FLOOD ROUTING :

Basic equation - Types - Routing by Puls and Muskingum methods.

GROUND WATER :

Ground water occurrence - Darcy's law - Types of aquifers - Dupuit's equation - wells - yield - recuperation test.

TEXT BOOKS:

1. Hand Book of Applied Hydrology by Ven Te Chow.
2. Engineering Hydrology by Subramanya, K. - Tata Mc Graw-Hill Publishing Co. Ltd., New Delhi.
3. Hydrology by H.M. Raghunath, Wiley Eastern Ltd., New Delhi.
4. A Text Book of Hydrology by P.Jayarami Reddy, Laxmi Publications, New Delhi.

Course Outcomes (COs)

After completion of the course the student will have :

- To develop IDF and DAD curves for use in the flood estimation
- To estimate the design flood for use in the design of hydraulic structures
- To perform flood routing for reservoir operation and stream flow control
- To arrive at groundwater yield of open and tube wells

CET 24 STRUCTURAL ANALYSIS - II

L+T / week : 3+1 Hrs Sessional Marks : 20+20

University Exam : 3 Hrs End Exam Marks : 60

Course Educational Objective (CEOs)

1. In continuation of Structural Analysis-I to incorporate the advanced method of analysis like Matrix method and Plastic Analysis
2. Able to find the collapse loads of different structural frames.

UNIT I

KANI'S METHOD : Continuous beams, settlement of supports, single bay portal frames with side sway.

UNIT II

MULTISTOREYED FRAMES : Analysis of multistoreyed frames using substitute frame method, portal and cantilever methods.

UNIT III

INFLUENCE LINES AND MOVING LOADS : Influence lines for reactions, BM and SF; curves of maximum BM and SF for single, two and multipoint loads, udl longer and shorter than span, enveloping parabolic and EUDL – forces in truss members.

UNIT IV

INTRODUCTION TO MATRIX METHODS:

Flexibility and Stiffness Coefficients – Force and Displacement methods – Application to beams.

UNIT V

PLASTIC ANALYSIS : Theory of plastic bending - Idealized stress - strain diagram - Shape factor - Moment - curvature relationships - Plastic hinges - Collapse Mechanisms - Analysis of fixed and continuous beams, and portal frames - Statical method and mechanism method of analysis.

TEXT BOOKS:

1) Structural Analysis by L.S.Negi & R.S.Jangid.
2) Theory of Structures Vol. I by R.S. Khurmi
3) Mechanics of Structures Vol.II by S.B.Junarkar.

4) Steel Structures Vol. II by Ramachandra.

5) Fundamentals of Structural Analysis – Sujit Kumar Roy & Subrata Chakrabarthy

Course Outcomes (COs)

After completion of the course the student will have :

- Ability to solve statically indeterminate structures using matrix (Stiffness & flexibility) methods.
- Ability to analysis framed structures by using appropriate methods and exact methods

CET 25 STRUCTURAL DYNAMICS AND DESIGN OF EARTHQUAKE RESISTANT STRUCTURES

L+T / week : 3+1 Hrs Sessional Marks : 20+20

University Exam : 3 Hrs End Exam Marks : 60

Course Educational Objective (CEOs)

- Able to find the response of the structures subjected to dynamic loads.
- Abilities to analysis and design of Earthquake resisting Structures.

UNIT I

SINGLE DEGREE OF FREEDOM SYSTEMS

Formulation of equation of motion – free and forced vibrations – response to dynamic loading – effect of damping.

UNIT II

MODAL ANALYSIS

Free and forced vibration of motion of un damped and damped MDOF systems. equation of motions – evaluation of natural frequencies ad modes.

UNIT III

INTRODUCTION TO EARTHQUAKE ENGINEERING

Elements of engineering Seismology – Characteristics of earthquake engineering – earthquake history – Indian Seismicity.

UNIT IV

EARTHQUAKE RESISTANT DESIGN

Concept of earthquake resistant design – provision of seismic code 1893 (Part I)- 2002 – response spectrum – design spectrum – design of buildings.

UNIT V

DUCTILE DETAILING

Ductile detailing of reinforced concrete earthquake resistant structures – provision of IS:13920-1993 – Detaining of RC beam, column and beam-column joint.

TEXT BOOKS

1. Mario Paz, Structural Dynamics Theory and Computations, CBS Publishers
2. Anil Kumar Chopra, Dynamics of Structures, Prentice Hall India Pvt. Ltd.
3. O Pankaj Agarwal 7 manish Shrikhomde, Earthquake Resistant Design of Structures, Prentice Hall India Pvt. Ltd.

REFERENCES:

1. R.W.Clough & J.penzien, Dynamics of Structures, Mc. Graw Hill Publications,
2. J.J.Humar, Dynamics of Structures, Prentice Hall India Pvt. Ltd.
3. Jaikrishna & Chandra Sekar Elements of Earthquake Engineering, South Asian Publications N.D.

Course Outcomes (COs)

After completion of the course the student will have :

1. Able to find the response of the structures subjected to dynamic loads.
2. Abilities to analysis and design of Earthquake resisting Structures

CET 26-E1 ECOLOGICAL ENGINEERING

Lectures / Week : 3 Hrs. **Sessional Marks : 20 + 20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objective (CEOs)

1. To understand the principles and concepts of ecology and ecological modeling.
2. To know applications of ecological engineering for low cost sanitation and lakes restoration.

Unit I

Principles and concepts

Definition and Scope of Ecology Ecological Engineering – Development and evolution of ecosystems – Principles of Ecological Engineering – Self Organization

Unit II

Ecosystem structure and Functions

Structural Compounds of natural and manmade ecosystems – terrestrial and aquatic – Energy flow and nutrient cycling – Food chain and food webs – primary productivity – Biochemical cycles of nitrogen, phosphorus, sulfur and carbon dioxide, Habitat ecology Terrestrial, fresh water, estuarine and marine habitats

Unit III

Ecological Modeling

Elements of modeling – Procedure – Classification application

Unit IV

Methods in Ecological Engineering

Biomonitoring and its role in evaluation of aquatic ecosystem, Rehabilitation of ecosystems through ecological principles – range rehabilitation, step cropping, bio- wind screens Wetlands, Root Zone Treatment for wastewater, Reuse of treated wastewater through ecological systems.

Unit V

Application of Ecological Engineering

Applications of Ecological Engineering for the following: Low cost sanitation – Aquaculture – Lakes restoration – Mining.

Text Books:

1. Odum, E.P., “Fundamental of Ecology”, W.B. Sauders, New York, 1990.
2. Mitch, J.W. and Jorgensen, S.E., Ecological Engineering – An Introduction to Ecotechnology, John Wiley and Sons, New york, 1996.
3. Cast Etnur and Bjorn Gutorstam, Ecological Engineering for wastewater Treatment, Lewis Publishers, London, 1996.

Reference Books:

1. Kormondy, E. J. Concepts of Ecology, prentice Hall, New Delhi, 1996.

2. Mc Eldowney, S, Hardman D.J. and Waite S Pollution, Ecology and biotreatment, Longman Publications, Singapore 1993.

Course Outcomes (COs)

After completion of the course the student will have :

- To be capable of applying basic principles and concepts of ecology in identifying ecological problems and establishing solutions in a environmental and social context

CET 26-E2 ENVIRONMENTAL SANITATION

Lectures / Week : 3 Hrs. **Sessional Marks : 20 + 20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objective (CEOs)

1. To understand the status of environmental sanitation in Indian villages, towns and cities
2. To know the different types of waste collection and different waste reduction process
3. To know causes of water borne diseases
4. To understand the mosquito life cycle
5. To study the restaurant sanitation

UNIT I

SCOPE OF THE SUBJECT

Define Environment and Environmental Sanitation, Status of environmental Sanitation in Indian Villages, Towns and cities, Concepts of Holistic cleanliness.

RURAL SANITATION

Conservancy, Public latrine, Night soil collection and disposal – Trenching – Composting – Bore hole latrine, Aqua privy, W.C, Septic tank, Soak pit, Imhoff tank, Tile – Drain systems, Composting.

ANIMAL WASTE DISPOSAL

Sanitary way of dung storage. Bio-gas plants – Classification, operation and maintenance problems.

UNIT II

RURAL WATER SUPPLY

Water borne diseases, protection of well water, protected water, pumps, pump house, over head tank, disinfection, public taps, low cost water treatment methods.

INSECT CONTROL

Fly & Mosquito Life cycles, diseases transmission, control measures.

RODENT CONTROL

Diseases transmitted, common rodents – R.Rattus, R.Norvegious and R.Musculus, Habits, Physical feats, control measure – Trapping – Baiting – Fumigation, Rat – Proof construction.

UNIT III

MILK SANITATION

Diseases transmitted, planning a cow shed, pasteurization, quality control.

RESTAURANT SANITATION

Water supply, food and drink, storage, handling, utensils, equipment, washing, employees, toilet facilities, disposal facilities – Garbage, refuses, drainage. Food preservation.

UNIT IV

SWIMMING POOL SANITATION

Classification of pools – planning of pools, quality of water, recirculation, treatment, pool regulations.

EPIDEMOLOGY

Introduction and definitions, causative agents, symptoms. Vehicles, preventive measures of important communicable diseases including respiratory diseases like measles, mumps, T.B. Water borne diseases like Cholera, dysentery, typhoid, jaundice and arthopod borne diseases like malaria, dengue fever, filariasis.

UNIT V

NATURAL ENVIRONMENTAL HAZARDS

Classification of natural hazards. Impact of hazards on mankind.

OCCUPATIONAL HAZARDS AND PREVENTION

Definition, significant occupational hazards, prevention of occupational hazards.

VENTILATION AND EXHAUST SYSTEM

Natural ventilation, Mechanical ventilation, Local exhaust system.

REFERENCE BOOKS :

1. Salvatol J.A. Jr. (1958). Environmental sanitation, John Wiley and Sons, New York.
2. Chanlett, E.T. (1979). Environmental Protection, Mc-Graw- Hill, Kogakusha Ltd.
3. Krishnan, N.V.(1993). Safety Management in Industry, Jaico Publishing House, Delhi.

Course Outcomes (COs)

After completion of the course the student will have :

1. Able to develop sanitation status in villages, towns

2. Able to employ advanced technique of waste collection
3. Able to communicate effectively and control water borne diseases
4. Able to control mosquitoes by engineering techniques
5. Successfully apply advanced concepts of water and environmental engineering to design, analyze, and develop technologies, processes or systems to meet desired needs of society both, professionally and ethically.

CET 26-E3 EARTH DAM ENGINEERING

Lectures / Week : 3 Hrs. **Sessional Marks : 20 + 20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objective (CEOs)

1. This course will develop students knowledge of rigid and flexible earth retaining
2. structures, analysis and design of retaining walls, bulkheads, braced cuts,
3. mechanically stabilized earth, lateral earth pressure due to soil, water, surcharge
4. loads etc. Local and overall stability of the retaining structures.
5. This course will develop students knowledge of rigid and flexible earth retaining structures, analysis and design of retaining walls, bulkheads, braced cuts, mechanically stabilized earth, lateral earth pressure due to soil, water, surcharge loads etc. Local and overall stability of the retaining structures.

UNIT I

BASIC CONSIDERATIONS

Classification of earth dams - Types of construction - Foundation of earth dams - Materials of construction - Failure of earth dams - Requirements for the safety of earth dams - Section details, slope protection.

UNIT II

SEEPAGE CONTROL THROUGH EMBANKMENT

Methods of seepage control through embankment - Provision of impervious zone or core - Drainage of embankments - Inclined and horizontal drainage blankets.

UNIT III

SEEPAGE CONTROL THROUGH PERVIOUS FOUNDATION SOIL

Methods of seepage control through pervious foundation soil - Cutoffs & impervious blankets - Seepage & Piping problems.

UNIT IV

ANALYSIS OF PORE PRESSURE

Critical stages of design - Construction pore pressures - Pore pressure parameters - Steady seepage pore pressures - Draw down pore pressures.

UNIT V

STABILITY CRITERIA FOR SLOPES

Condition of stability - Safety factor - Bishops method of stability analysis.

TEXT BOOKS:

1. Engineering for Dams Vol.3 by William P.Georger, Joel D. Justin, Hinds.
2. Earth & Rock fill dams by Bharat Singh, H.D. Sharma.
3. Earth Design, Earth rock dams by S.Sherard,
4. Small dams by USBR.

Course Outcomes (COs)

After completion of the course the student will have :

1. Develop an understanding of the fundamental concepts that gooses the behaviour of Earth and Earth Retaining Structures and able to provide designs of the systems in the field.
2. Develop an understanding of the fundamental concepts that gooses the behaviour of Earth and Earth Retaining Structures and able to provide designs of the systems in the field.

CET 26-E4 APPLIED SOIL MECHANICS

Lectures / Week : 3 Hrs. **Sessional Marks : 20 + 20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objective (CEOs)

1. To develop and understand of the behavior of foundations for engineering structures and to gain knowledge of the design methods that can be applied to practical problems.
2. Provide the students with a basic understanding of the essential steps involved in a geotechnical site investigation.
3. Introduce to the students, the principle of earth pressure and design of earth retaining structures.
4. Introduce to the students, the concept and methods of stress distribution in soils due to applied loads.
5. Introduce to the students, the principal types of foundations and the factors governing the choice of the most suitable type of foundation for a given solution.
6. Familiarize the students with the procedures used for: a) bearing capacity estimation, b) end bearing capacity, c) skin friction – pile foundation.
7. Familiarize the students the concept of well foundation and its design and construction.

UNIT I

SOIL IMPROVEMENT TECHNIQUES FOR SHALLOW LAYERS

Soil improvement - Mechanical treatment - Lime stabilization - Cement Stabilization - Bituminous stabilization - Chemical Stabilization - Freezing and heating - Geotextiles.

UNIT II

SOIL IMPROVEMENT FOR DEEP LAYERS

Dynamic compaction and consolidation - Preloading - Sand drains - Electro-osmosis - Lime columns - Stone columns - Grouting.

UNIT III

ARCHING & OPEN CUTS

Arching in soils-Theories of Arching-Cain's Theory-Tunnels through Sand

UNIT IV

BRACED EXCAVATIONS

Braced cut - Apparent pressure diagrams for cuts in both sands and clays - Types of bracing systems - Design of various components of bracing - Bottom heave of cuts in soft clays - Piping failure of cuts in sands

UNIT V

CONDUITS

Classes of Under Ground Conduits-Uses of Conduits-Load on Ditch Conduit-Load on Positive & Negative Projecting Conduits-Load on Conduits due to Live Loads.

TEXT BOOKS :

1. Alam Singh "Modern Geotechnical Engineering"
2. Gopal Ranjan & A.S.R.Rao, “Basic and Applied Soil Mechanics.
3. K.R.Arora - "Soil Mechanics and Foundation Engg.".
4. C.Venkatramaiah - Geotechnical Engineering.
5. A.V.Narasimha Rao and C.Venkatramaiah - Numerical Problems Examples and Objective Questions in Geotechnical Engg.
6. Soil Mechanics and Foundation Engineering - B.C.Punmia

Course Outcomes (COs)

After completion of the course the student will have :

1. A student learn and able to find out the Soil Profile in a given location.
2. A student able to select suitable foundation for a given structure and site.
3. Expertise in the calculation of load carrying capacity of selected foundation.
4. Gain experience in solving field geotechnical engineering problems such as slope stability and earth retaining structures.

CET 26-E5 NEURAL NETWORKS IN CIVIL ENGINEERING

Lectures / Week : 3 Hrs. **Sessional Marks : 20 + 20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objective (CEOs)

1. To furnish the junior year students with the elementary techniques about decision making in conjunction with the systematic approach as applied to engineering.

2. To provide students with exposure to the essentials of resource optimization and allocation in the presence of constraints and uncertainties constitute the main body of the course.
3. To establish a bridge to the higher level of design, engineering management, and environmental engineering courses with the elementary linear algebra and probability and statistics, in order to form students as short-and long-term decision makers.

UNIT I

INTRODUCTION TO ARTIFICIAL INTELLEGENCE SYSTEMS

Artificial Intelligence (AI) – Importance of AI – Early Work in AI – AI and Related Fields – Basic Concepts of Neural Networks.

UNIT II

NEURAL NETWORKS

Model of an Artificial Neuron – Neural Network Architectures – Characteristics of Neural Networks – Learning Methods.

UNIT III

NEURAL NETWORK MODELS

Feed Forward Neural Networks – Back propagation Networks – Current Networks – Top field Networks.

UNIT IV

DATA NORMALIZATION, COLLECTION, PREPARATION, LABELLING INPUT CODING AND OUTPUT CODING

Normalization Techniques : Statistical or Z-score normalization, Uni-max normalization – sigmodal or soft max normalization, Energy normalization Principal Components of Normalization – Data Collection – Feature Selection and Extraction – Output Coding Methods.

UNIT V

APPLICATIONS IN CIVIL ENGINEERING

Training Methods : Supervised Training Methods – Unsupervised Training Methods – Applications : Classification of Soil, Prediction of load from yield patterns of Elastic-Plastic clamped square plate.

TEXT BOOKS

1. Artificial and Intelligence and Expert Systems by DAN W PATTERSON (Unit I).
2. Neural Network, Fuzzy Logic and Genetic Algorithms Synthesis and Applications by S.Rajasekaran and G.A.Vijayalakshmi Pai (Unit II, III and V).
3. Artificial Neural Networks : An Introduction by Kevin L. Priddy and Pall E. Keller (Unit IV and V).

Course Outcomes (COs)

After completion of the course the student will have :

1. An ability to apply knowledge of mathematics, science and engineering
2. An ability to identify, formulate and solve engineering problems
3. The broad education necessary to understand the impact of engineering solutions in a global and societal context
4. A knowledge of contemporary issues
5. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice

CET 26-E6 TRANSPORT PLANNING

Lectures / Week : 3 Hrs. **Sessional Marks : 20 + 20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objective (CEOs)

1. Upon successful completion of the course you will be able to:
2. Critically analyse the origins of current ideas about transport and land use planning
3. Identify procedures that have been developed for planning transport and land use
4. Describe the major international trends and debates in the area
5. Recognise the key issues associated with transport and land use planning
6. Contextualise the history and practice of transport and land use planning in Melbourne and in an international context

UNIT I

Transport Planning Process

Scope, interdependance of the land use and traffic, systems approach to transport planning. Forecast analysis of future conditions and plan synthesis, evaluation, programme adoption and implementation, continuing study, citizen participation, difficulties in the planning process.

UNIT II

Transport Survey

Study area, zoning, types of surveys, Economics factors.

UNIT III

Trip Generation

Trip purpose, factors governing trip generation and attraction rates, multiple linear regression analysis, category analysis.

Trip Distribution

Methods, uniform factor method, Fratar method, Average factor method, Furness method.

UNIT IV

Traffic Assignment

Purpose, general principles, assignment techniques- All-or-nothing assignment, multiple route assignment, capacity restraint assignment, diversion curves.

Model Split

General considerations. Factors affecting model split, model split in the transport planning process. Recent developments in model split analysis.

UNIT V

Evaluation

Need, plans to be formulated, considerations in evaluation, economic evaluation.

Land use transport models

Selection of land-use transport model, Lowry derivative models, Garin-Lowry model, applications in India.

Transport planning for small and medium sized cities - Difficulties present, quick response techniques.

TEXT BOOKS

Traffic Engineering and Transport Planning by L.R.Kadiyali

Course Outcomes (COs)

After completion of the course the student will have the knowledge in

1. Critical analysis
2. International and cross cultural aspects

CET 26-E7 URBAN HYDROLOGY

Lectures / Week : 3 Hrs. **Sessional Marks : 20 + 20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks: 60ss**

Course Educational Objective (CEOs)

- To understand the rainfall analysis.
- To analyze urban and rural storms
- To study the methods of estimation of the maximum storm rainfall.
- To study the design aspects of surface and sub-surface drainage.

UNIT I

INTRODUCTION

Urban Hydrology - Need - Highway drainage - Rainfall Characteristics - Point rainfall for

Standard Duration - Rainfall and its variability in time and space.

UNIT II

DESIGN STORM PROFILES :

Differences between urban and rural storm profiles - Recommended design procedure - Sensitivity - Storm movement.

UNIT III

FLOOD ESTIMATION :

Planning of field investigations - Measurements; Methods of flood estimation - Regional runoff rainfall model - ORSTOM model - TRRL method - Generalized tropical flood model - Effect of land use - Examples.

UNIT IV

URBAN STORM WATER DRAINAGE:

Design Criteria - Rational method - TRRL hydrograph method - HYDRAON - ILLUDAS (Illinois Urban Drainage Area Simulator) - The Walkingford procedure - The Hydrograph volume method (HVM) - Environmental Protection Agency for Storm Water Management model (SWMM).

UNIT V

PLANNING AND CONTROL MEASURES :

Urban water resources planning - Surface and subsurface drainage - Design of subsurface drains - Erosion Control - Control of Gully erosion - Control of sheet erosion.

REFERENCE BOOK :

"Highway and Urban Hydrology in Tropics" by L.H.Watkins and D. Fiddes, Pentech Publishers (London - plymouth).

Course Outcomes (COs)

After completion of the course the student will have :

- Able to develop IDF and DAD curves for use in the design of storm water drain.
- Able to design surface and surface drains.
- Able to determine the design flood for storm water drainage system.
- Able to develop storm water management models and to suggest suitable erosion control measures.

CET 26-E8 PLANNING AND DEVELOPENT OF WATER RESOURCES PROJECTS

Lectures / Week : 3 Hrs. **Sessional Marks : 20 + 20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objective (CEOs)

- To understand the steps involved and common pitfalls I planning of water resources projects.
- To know the different types of projects, costs, benefits and study the importance of cost-benefit analysis.
- To learn the various mathematical aspects of discounting formulae and methods relating to engineering economy.
- To analyze the various aspects of flood control and river basin planning.
- To know the functions and rights related to water law and study some related case studies.

UNIT I

INTRODUCTION :

Significance of planning of Water Resources Projects - Steps involved in planning of Water Resources Projects - Common pit falls - Agencies for collection.

UNIT II

COST AND BENEFIT OF WATER RESOURCE PROJECTS

Single Purpose and Multi Purpose Projects - Comparison - Compatibility among different benefits - Cost - Types - Benefits - Types - Allocation of joint costs.

UNIT III

ENGINEERING ECONOMY

Approach to engineering economic study - Discounting formulae such as compound amount formula, present with formula, capital recovery formula, series present worth formula - Discounting methods such as present worth method, rate of return method, annual cost method and benefit cost method.

UNIT IV

FLOOD CONTROL AND RIVER BASIN PLANNING

Types of flood control planning - Economic analysis of flood control projects - Estimation of flood damages - Estimation of flood control benefits.

Types of river basin planning - Integrated river water management.

UNIT V

WATER LAW

Introduction - Sources, functions of law - Ripanian status and ripanian rights - Special cases such as Narmada, Almatti and Cauvery, Babli

REFERENCES:

1. N.S.Grigg "Water Resources Planning"
2. K.N.Duggal et al "Elements of Water Resources Engineering."

Course Outcomes (COs)

After completion of the course the student will have :

- Able to design an optimum water resources project by considering aspects of cost-benefit analysis.
- Able to apply the knowledge of flood control and river basin planning.
- Application of the functions and rights related to water law.

CET 26-E9 ADVANCED CONCRETE TECHNOLOGY

Lectures / Week : 3 Hrs. **Sessional Marks : 20 + 20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objective (CEOs)

1. To understand extensively the factors affecting the fresh hardened concrete. NDTs.
2. To learn the determination of various properties of concrete like shrinkage, creep, modulus of elasticity.
3. To learn the design of different concrete mixes.

UNIT I

Cements Admixtures and Aggregates different types of cements – Admixtures. Classification of aggregate – particle shape and texture – Bond, strength and other mechanical properties of aggregate specific gravity, Bulk density, porosity, absorption and moisture in aggregate – soundness of aggregate – Alkali – aggregate reaction I Thermal properties - sieve analysis – Finenesses modulus – grading curves- grading requirements - practical grading – Road note No. grading of fine and coarse aggregates gap graded aggregate – maximum aggregate size.

UNIT II

Fresh concrete: Workability – factors affectiong workability – measurement of workability by different tests – Effect of time and temperature on workability – segregation and bleeding – mixing and vibration of concrete – quality of mixing water.

UNIT III

Hardened Concrete: Water/cement ration- abram's law – Gel space ration – effective water in mix- Nature of strength of concrete – Strength in tension and compression Griffith's hypothesis - factors affecting strength - autogeneous healing – Relation between compression and tensile strength - curing and maturity of concrete Influence of temperature on strength – Steam curing - testing of Hardened concrete – compression tests – tension tests – factors affecting strength – flexure tests – splitting tests – Non destructive testing methods.

UNIT IV

Elasticity, Shrinkage and Creep: Modulus of elasticity – dynamic modulus of elasticity – Poisson's ration – Early volume changes – swelling –Drying shrinkage – Mechanism of shrinkage – factors affecting shrinkage – Differential shrinkage – moisture movement carbonation shrinkage – creep of concrete – factors influencing creep – relation between creep and time – Nature of creep – Effect of creep.

UNIT V

Mix Design: Proportioning of concrete mixes by various methods fineness' modulus, trial and error, mix density, Road Note. No.4, ACI and ISIS code methods – factors in the choice of mix proportions- Durability of concrete – quality control of concrete Statistical methods – High strength concrete mix design.

TEXT/ REFERECNE BOOKS:

1. MS. Shetty, Concrete Technology – Theory and practice, S, chand and Company, New Delhi,
2. F.K. Garas, J.L Clarke, GST Armer, Structural Assessment, Butterworths, UK. April, 1987.
3. Mehta Concrete Technology.

Course Outcomes (COs)

After completion of the course the student will have :

1. Able to find the physical and mechanical properties of concrete materials.
2. Able to utilize different admixtures in mixes.
3. Able to perform the different mix design.

CET 26-E-10 INDUSTRIAL WASTE MANAGEMENT

Lectures / Week : 3 Hrs. **Sessional Marks: 20 + 20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks: 60**

Course Educational Objective (CEOs)

1. To study the characteristics of industrial waste.
2. To learn concepts of waste management
3. To study the industrial waste water treatment process.
4. To analyse the different disposal methods.
5. To study the sources, chrematistics and treatment of different industrial wastewater.

UNIT-I

Industrial Pollution Scenario:

Types of Industries and Industrial pollution – Characteristics of Industrial wastes – effects of Industrial effluents on streams, sewer, land, sewage treatment plants and human health – Hazardous Wastes – Sources and effects- Environmental legislations related to prevention and control of industrial effluents and hazardous wastes – Role of environmental Engineer – Regulating.

UNIT-II

Cleaner Production:

Waste management Approach – Waste Audit – Volume and strength reduction – material and process modifications – Recycle, reuse and byproduct recovery – Life Cycle Assessment – Zero discharge concept.

UNIT-III

Treatment of Industrial Wastewater

Equalization –neutralization-removal of suspended and dissolved organic solids-Chemical Oxidation-Removal of dissolved in organics-Combined treatment of industrial and municipal wastes-Residue management.

UNIT-IV

Treatment and Disposal of Hazardous wastes

Physio – Chemical treatment – solidification- incineration – Secured land fills – Legal Provisions.

UNIT-V

Case Studies:

Sources, ,Characteristics, waste treatment flow sheets for selected industries such as Textiles, Tanneries, Dairy, Sugar, Paper, Distilleries, Steel plants, Refineries, Fertilizer, Thermal power plants

TEXT BOOKS

1. M.N. Rao and A.K. Dutta, Wastewater Treatment, Oxford IBH Publication , Calcutta, 1995.
2. W.W Eckenfelder Jr., Industrial Water Pollution Control, Tata McGraw –Hill book Company, New Delhi, 2000.
3. S.C. Bhatia, Handbook of Industrial pollution and control. Vol.II & CBS Publishers, New Delhi, 2003.

REFERENCE BOOKS

1. H.M. freeman, Industrial pollution Prevention Hand Book, McGraw Hill Inc., New Delhi, 1995.
2. Metcalf & Eddy, Wastewater Engineering, Treatment and Reuse, Tata Mc Graw hill , New Delhi, 2003.
3. Frankwoodard, Industrial Wastewater treatment, Hand book, Butter worth- Heinmanu, New Delhi, 2001.
4. 4. R.L.Stephenson and J.B. Blackburn, Jr., Industrial Wastewater Systems Handbook, Lewis Publisher, New York, 1998.

Course Outcomes (COs)

After completion of the course the student will have :

Able to reduce the industrial wastes.

Able to design scientifically different treatment process.

CET 26-E-11 ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL AUDIT

Lectures / Week : 3 Hrs. **Sessional Marks : 20 + 20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objective (CEOs)

1. To understand the historical development of environmental impact assessment
2. To know the objectives environmental impact assessment
3. To study the elements of EIA
4. To analyze the mitigation measures to control environmental pollution
5. To know the importance of environmental audit.

UNIT-I

Introduction:

Impact of Development on Environment and Environmental Impact Assessment (EIA) and Environmental Impact Statement (EIS) – Objectives – Historical development – EIA Types – EIA in Project cycle- capability and limitations- Legal provisions on EIA.

UNIT-II

Methodologies:

Elements of EIA – Process screening, Methods of EIA- Strengths, weaknesses and applicability – appropriate methodology.

UNIT-III

Prediction and Assessment

Socio Economic Impact – Prediction and Assessment of Impact on land, water, air and noise energy impact; Impact on flora and fauna; Mathematical models for prediction; Public participation – Reports – Exchange of Information – Post Audit – rapid EIA.

UNIT-IV

Environmental Management Plan:

Plan for mitigation of adverse impact on environment - options for mitigation of impact on water, air and land, flora and fauna; Addressing the issues related to the Project Affected People – Environment management Plan

UNIT-V

Environmental audit:

Environmental Audit and Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocel, stages of Environmental audit, onsite activities, evaluation of Audit data and preparation of Audit report.

Case Studies:

EIA case studies on Roads, Bridges, Ports, Harbour, Airport, Dams, Irrigation Projects, Power Plants, Railways.

TEXT BOOKS

1. Anjaneyulu, Y. Environmental Impact Assessment methodologies B.S. Publications, Hyderabad 2002.

2. Canter, R.L. Environmental Impact Assessment, McGraw Hill Inc., NewDelhi,1996.

3. S.K. Shukla and P.R. Srinivastava, Concepts in Environmental Impact Analysis, Common Wealth Publishers, New Delhi, 1992.

4.Environmental science and Engineering by j. Glynn and Gary W. Hein Ke- Prentice Hall Publishers.

REFERENCE BOOKS

1. John G.Rau and David C Hooten (Ed)**.,** Environmental Impact Analysis Hand book, McGraw Hill Book Company, 1990.
2. Environmental Assessment Source book, Vol. II and III. The World Bank, Washington, D.C., 1991.
3. Judith Petts, Handbook of Environmental Impact Assessment Vol.I and II. Blackwell Science, New York, 1999.
4. Environmental science and Engineering, by Suresh K.Dhaneja-S.K., Katania and sons Publication., New Delhi.
5. Environmental pollution and control, by Dr. H. S. Bhatia - Galgotia Publication (P) Ltd, Delhi.

Course Outcomes (COs)

After completion of the course the student will be :

Able to reduce air, water, noise and land pollution using advanced technologies to meet desired needs of society both professionally and ethically.

CET 26-E-12 URBAN ENVIRONMENTAL QUALITY MANAGEMENT

Lectures / Week : 3 Hrs. **Sessional Marks : 20 + 20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objective (CEOs)

1. To know the consequences of urbanization and related environmental issues
2. To understand the disaster management technics in urban scenario

UNIT – I

URBANISATION IN INDIA :

Consequences of urbanisation, demand of resources by the public.

SOURCES OF POLLUTION TO THE URBAN ENVIRONMENT :

Status of pollution levels in major cities.

UNIT – II

AIR POLLUTION SOURCES :

Nature of air pollution in the Urban environment due to human activities of industrialization, effect of air pollution on urban Environment. Air pollution Indices for assessment of status of Urban air quality.

WATER DEMANDS AND POLLUTION IN URBAN AREAS :

Nature of water pollutants and assimilative capacity of natural Urban aquatic systems. Urban water quality indices.

UNIT – III

SOURCES OF LAND POLLUTION IN URBAN AREAS :

Impact of Urban soil pollution on quality of living system – Prediction of soil pollution indices.

NOISE POLLUTION :

Sources of noise pollution in urban areas, effect of noise pollution on urban environment, status of noise pollution in major cities.

UNIT – IV

SLUM FORMATION :

Impact of slum on general quality of life on urban elite - status of slum settlements in major cities.

MANAGEMENT OF URBAN ENVIRONMENT QUALITY :

Land use planning – traffic management – Planning of safe municipal water supply and drainage system- solid waste management including disposal – abatement of noise pollution- provision of zones – regulation of settlements.

UNIT –V

NATURAL CONSERVATION :

Planning of urbanization on ecological basis, preservation and development of green recovery areas.

URBAN DISASTER MANAGEMENT :

Management of Industrial Explosions, Land slides, Earthquakes, Floods and Managements of epidemics.

REFERENCE BOOKS:

1. Varshney, C.K. (ed.), (1985), ' Water Pollution and Management ", Wiley Eastern Ltd., New Delhi.
2. M.J. Suess and S.R.Craxford, (1976), Manual on Urban Air Quality, WHO, Copenhagen.
3. Buchanan, C.D.(1963), Traffic in towns. London, H.M.Stationery Office.
4. Plowden, S.(1970) The Cost of Noise, London, Metra.
5. Gallion, A.B.and E.Simon, (1973). The Urban Pattern. Van Nistrand, New York.

Course Outcomes (COs)

After completion of the course the student will be :

Capable of predicting and applying mitigation measures in event of disasters in urban scenario.

CEP 08 ENVIRONMENTAL ENGINEERING LABORATORY I

Practicals / Week : 2 Hrs Sessional Marks : 40

End Exam : 3 Hrs Exam Marks : 60

Course Educational Objective (CEOs)

1 To be aware of water quality analysis

1. (a) Determination of Color.
   (b) Determination of Taste and Temperature
2. Determination of (a) Total Suspended and Dissolved Solids.
   (b) Organic and Inorganic Solids.
3. (a) Determination of pH and Electrical Conductivity.
   (b) Determination of Turbidity.
4. (a) Determination of Acidity.
   (b) Determination of Alkalinity.
5. Determination of Hardness
6. (a) Determination of Chlorides.
   (b) Determination of Sulphates.
7. (a) Determination of Dissolved Oxygen.
   (b) Determination of Residual Chlorine.
8. (a) Determination of Optimum Coagulant Dose.
   (b) Determination of MPN Index of water.
9. (a) Ambient Air Quality Monitoring.
   (b) Determination of Ambient Noise.

Course Outcomes (COs)

After completion of the course the student will have :

1. Able to Perform common environmental experiments relating to water quality
2. Able to Statistically analyze and interpret laboratory results
3. Demonstrate good written and oral communication skills

CET 09 TRANSPORTATION ENGINEERING LABORATORY

Practicals / Week : 2 Hrs **Sessional Marks : 40**

End Exam : 3 Hrs **End Exam Marks : 60**

Course Educational Objective (CEOs)

1. To enable to study different highway construction materials.
2. To facilitate students to perform different tests on highway construction materials.

CYCLE – I

1. Specific Gravity and Water Absorption Test.
2. Aggregate Impact Test
3. Elongation Index Test
4. Flakiness Index Test
5. Angularity Test
6. Los Angles Abrasion Test
7. Aggregate Crushing Test
8. Stripping Value of Aggregate

CYCLE – II

1. Flash & Fire Point Test
2. Softening point Test
3. Specific Gravity of Bitumen
4. Penetration Test on Bitumen
5. Ductility Test

Course Outcomes (COs)

After completion of the course the student will have :

Able to perform various tests for selection of various materials used in highway construction

CEP 10 GEOTECHNICAL ENGINEERING LAB – II

Practicals / Week : 2 Hrs **Sessional Marks : 40**

Course Educational Objective (CEOs)

1. This course is aimed to develop laboratory skills in dealing with determination engineering soil as a medium of water flow, a medium for structural support and a primary building material.
2. Provide the description and classification of soil.
3. Provide the soil properties determination in the lab.
4. To conduct experiments in different types of soils to determine the properties and characteristics.

1. Density Index test
2. Coefficient of Permeability by falling head method.
3. Coefficient of Permeability by Constant Head method.
4. North Dakota Cone Test
5. California Bearing Ratio test
6. Direct Shear test
7. Unconfined Compression test
8. Triaxial compression test (Demonstration only)
9. Consolidation test (Demonstration only)

Course Outcomes (COs)

After completion of the course the student will have :

3.1.1. The student acquires the capacity to test the soil and assess its Engineering and Index properties.

3.1.2. Basic soil properties can be determined and classify the soil for Engineering application

3.1.3. Basic concepts of soil mechanics is utilized for engineering application.

3.1.4. Know the engineering properties of the soil such as Strength, Compressibility and permeability and apply the same to the engineering problems.

CEP 11 CONCRETE TECHNOLOGY LABORATOTY

Practicals / Week : 2 Hrs **Sessional Marks : 40**

End Exam : 3 Hrs **End Exam Marks : 60**

Course Educational Objective (CEOs)

3.1.4.1. To find the properties of concrete making materials

3.1.4.2. To know the properties of fresh & hardened concrete under different loading conditions.

1. Sieve Analysis of coarse and fine aggregates
2. Bulking of Sand by Volume and Weight methods
3. Normal consistency, Initial and Final Setting Times of Cement
4. (a) Slump Test
   (b) Compressive Strength of Concrete Cubes
5. (a) Specific gravity & Water absorption of Coarse aggregate
   (b) Specific gravity of Cement
6. Flow Table in Cement mortar and Concrete
7. Water absorption and Compressive Strength of Bricks
8. (a) Compaction Factor Test
   (b) Compressive Strength of Concrete Cylinders

Course Outcomes (COs)

After completion of the course the student will be :

1. Able to fine the quality of materials used in concrete and the properties of hardened concrete.

CET 27 QUANTITY SURVEYING AND VALUATION

L+T / week : 3+1 Hrs **Sessional Marks : 20+20**

University Exam : 3 Hrs **End Exam Marks : 60**

Course Educational Objectives (CEOs)

1. To acquire knowledge of preparation of detailed estimates specification, rate analysis, contracts and valuation.

UNIT - I

General items of work in building - Standard units - Principles of working out quantities for detailed and abstract estimates, approximate and detailed estimates of simple buildings.

UNIT - II

Standard specifications for different items of building construction - Earth work for foundations, mortors, foundation concrete - Reinforced concrete, Brick work, Stone masonry, sand, cement, kankar, lime, mosaic flooring, terrozoic flooring, RCC roof and AC roof and GI sheets, plastering, painting, pointing and wood works.

UNIT - III

Rate analysis for the following items :

Earth work for foundations and basement of buildings.

Mortars : Lime mortar (1:1.5), Cement mortar (1:4)

Foundation Concrete : Lime concrete (1:2:4), Cement Concrete (1:5:10)

Reinforced Concrete : Lintels, slabs, beams, columns (1:2:4)

Brick work : Constructed with first class bricks with L.M. (1:1.5) and C.M (1:6

Stone masonry : C.R.S - Ist sort constructed with C.M. (1:2) and R.R.Masonry in mud, lime mortar (1:1.5), C.M (1:2).

Flooring : (a) with Cuddapah or Shahbad slabs. (b) ellis pattern flooring with 10 cm. concrete and 20mm cement concrete surface - Mosaic flooring.

Roofing : (a) R.C.C roof 10cm thick, 2 courses of flat tiles to top.

(b) A.C. corrugated sheet roofing on steel purlins.

Plastering : (a) with L.M (1:1.5) 2 coats (20mm thick)

(b) C.M. (1:4) 12 mm thick.

Pointing : a) with C.M (1:3) flush pointing to R.R.masonry.

b) C.M (1:3) for brick masonry.

c) Pointing to Cuddapah slab flooring.

Painting : a) White washing and colour washing of walls : 2 coats.

b) Painting iron and wood work : 3 coats.

Wood work : Panelled doors and windows.

Road works : a) Soling course 15 cm thick consolidated to 8 cm thick.

b) W.B.M. road with bituminous carpet 20 mm thick.

UNIT - IV

Contracts, Types of contracts, contract document, conditions of contracts, contract procedure, termination of contracts, specification important condition of contract, arbitration and tenders.

UNIT - V

Valuation:

Introduction, technique of valuation, elements of valuation and factors affecting valuation, methods of valuation of land property and building property, rate of interest for sale, purchase, mortgage, Fixation of rent.

Valuation – Gross income, Net income, Outgoings, Scrap value, Salvage value, Obsolescence, Annuity, Capitalized value, Year's purchase, Sinking fund, Depreciation; Determination of depreciation.

TEXT BOOKS :

1. Text book of estimating and costing - B.N.Dutta.
2. Estimating Costing by G.S.Biride.
3. Valuation by Rangwala.
4. A.P.D.S.S. Standard data book Vol.II.
5. A.P.Department standard specifications.
6. Professional practice - by Roshan Namvati

Course Outcomes (Cos)

After completion of the course the student will have :

1. Ability to prepare estimates, contracts for various civil engineering projects.
2. Skill to develop specifications for civil engineering projects.
3. To become proficient in civil engineering structures & valuations.

CET 28 FINITE ELEMENT METHOD

L+T / week : 3+1 Hrs **Sessional Marks : 20+20**

University Exam : 3 Hrs **End Exam Marks : 60**

Course Educational Objectives (CEOs)

1. To understand the analysis of Structures of first of kind.

2. To study the application of the matrix method of analysis to the FEM of analysis concept.

UNIT I

INTRODUCTION TO FINITE ELEMENT METHOD

Introduction – finite difference method – advantages and disadvantages, basic steps, limitations, finite element modeling and discretisation, interpolation and shape functions, types of elements, nodes, degrees of freedom.

UNIT II

ONE DIMENSIONAL FINITE ELEMENTS

Introduction, bar element, beam element, bar and beam elements of arbitrary orientation, assembly of elements, stiffness matrices, boundary conditions.

UNIT III

TRUSSES

Plane trusses, local and global co-ordinate systems, direction cosines, element stiffness matrix, assembly of global stiffness matrix, stress calculation.

UNIT IV

FINITE ELEMENT FORMULATION

Introduction, beam stiffness, assembly of beam stiffness matrix, loading and boundary conditions, plane stress and plane strain analyses.

UNIT V

ISOPARAMETRIC ELEMENTS

Isoparametric formulation, isoparametric elements for 2D analysis, formation of CST elements, four noded and eight noded isoparametric QUAD elements.

TEXT BOOKS:

Finite Element Analysis, Theory and Programming – C.S. Krishnamurty

Introduction to Finite Element Engineering – Chandrapatla & Belagundu.

REFERNCE BOOKS:

O. Zenkinwicz – The Finite Element method.

Robert Cook and Dais Markens – Concepts and Applications of FE Analysis.

Course Outcomes (Cos)

1. To study the application of the concept of finite element methods of analysis of Structures.
2. To apply FEA techniques in real life engineering problems.
3. To learn the use of FEA software's in real life problems

CET 29 IRRIGATION AND HYDRAULIC STRUCTURES

L+T / week : 3+1 Hrs Sessional Marks : 20+20

University Exam : 3 Hrs End Exam Marks : 60

Course Educational Objectives (CEOs)

1) To calculate the irrigation requirements of crops
2) To understand the components and design concepts of diversion and storage head works
3) To learn the hydraulic design principles of spillways and energy dissipaters

UNIT I

IRRIGATION ENGINEERING:

Benefits and ill effects of Irrigation - Methods of irrigation - Duty and Delta - Irrigation efficiencies - Irrigation water requirements - assessment of Irrigation water - crop seasons - principal crops - Rotation of crops- effects, causes and prevention of Water logging.

UNIT II

IRRIGATION STRUCTURES

Falls – Necessity and location – Classification Regulators – Head and cross regulators - cross drainage works – Types – Selection of suitable type of C.D. work – Escapes - canal outlets – Types.

UNIT III

DIVERSION HEAD WORKS:

Location of diversion head work - Components - Causes of failure of weirs and remedial measures - Bligh's and Khosla's theories of design of weirs on permeable foundation - Design of vertical drop and sloping glacis weir.

UNIT IV

STORAGE HEAD WORKS:

Types of dams - Site selection and Reservoir Planning - Forces acting on and causes of failure of a gravity dam - Elementary and practical profiles - Stability analysis - Single and multiple step methods of design - Grouting.

UNIT V

SPILLWAYS:

Requirements, components and types of spillways - Design principles of ogee spillway - Methods of energy dissipation below spillways - Effect of TWC and JHC - Scour protection

below spillways - Stilling basins and its appurtenances - Hydraulic design of energy dissipators - Crest gates.

TEXT BOOKS :

1. Irrigation Engineering and Hydraulic Structures - P.N.Modi.
2. Irrigation Engineering and Hydraulic Structures - S.K.Garg.
3. A text book of Irrigation Engineering and Hydraulic Structures - R.K.Sharma.
4. Irrigation and Water Power Engineering – B.C.Punmia and Dr.Pande.
5. Irrigation and Water Resources and Water Power Engineering – Dr. P.N.Modi.

Course Outcomes (Cos)

To plan irrigation projects and management of irrigation water

To design weirs, barrages and dams

CET 30 ENVIRONMENTAL ENGINEERING - II

L+T / week : 3+1 Hrs Sessional Marks : 20+20

University Exam : 3 Hrs End Exam Marks : 60

Course Educational Objectives (CEOs)

1. To know how to estimate quantity of waste water generation from any area
2. To study the physical, chemical and biological characteristics of the waste water.
3. To learn the design concepts involved in the waste water treatment plant.
4. To know the advanced technologies involved in the waste water treatment plant.

UNIT I

WASTEWATER COLLECTION:

Sanitation - systems of sanitation, water carriage system, sewerage, systems of sewerage, sources of wastewater - Estimation of quantity of municipal wastewater - Estimation of quantity of storm water - Different types of sewers, design flows through sanitary sewers, storm sewers and combined sewers. Hydraulic design of sewers - Sewer appurtenances

House drainage and Plumbing systems

UNIT II

CHARACTERISTICS OF DOMESTIC WASTEWATER:

Characteristics and composition of sewage - Physical, chemical and biological.

BOD equation and factors affecting the BOD rate of reaction, population equivalent.

PRELIMINARY AND PRIMARY SEWAGE TREATMENT:

Concept of wastewater treatment, primary, secondary and tertiary treatment - Conventional treatment process flow diagrams of municipal wastewater treatment plants - Functions of each unit Principles and design of screens, grit chamber, and primary settling tanks.

UNIT III

SECONDARY TREATMENT OF SEWAGE:

Principles of biological treatment, nutritional requirement of biological treatment system, factors affecting biological treatment systems

Design, construction, operation and maintenance of activated sludge process, oxidation ditch trickling filters and waste stabilization ponds.

UNIT IV

SLUDGE MANAGEMENT:

Quantity and characteristics, and types of sludges, sludge conditioning and dewatering, handling, treatment, sludge utilisation and disposal.

Tertiary treatment - Removal of nitrogen, phosphorus, refractory organic, heavy metals, suspended solids and pathogenic bacteria.

UNIT V

EFFLUENT DISPOSAL:

Standards for disposal - disposal into surface water bodies - Self purification, zones of pollution - Dissolved oxygen sag curve- Streeter - Phelps equation, Marine disposal - On land disposal and treatment systems - overflow, flooding and irrigation.

Onsite Disposal System: Septic tank and effluent disposal system.

MUNICIPAL SOLIDWASTES:

Characteristics, generation, collection and transportation of solid wastes, Engineered systems for solid waste management (reuse/recycle ,energy recovery, treatment and disposal).

TEXT BOOKS :

1. Sewage Disposal and Air Pollution Engineering, by S.K.Garg.
2. Environmental Engineering by H.S.Peavy et al.
3. Water Supply and Sewerage, by E.W.Steel and Mc.Ghee.

REFERENCE BOOKS :

1. Wastewater Engineering, Treatment, Disposal, and Reuse by Metcalf and

Eddy.

Course Outcomes (Cos)

1. Able to estimate the quantity of waste water generation from any area.
2. Able to understand the impacts of mismanagement of waste water.
3. Able to apply advanced concepts in the design of waste water treatment plant.
4. Successfully apply advanced concepts of water and environmental engineering to design, analyze, and develop technologies, processes or systems to meet desired needs of society both, professionally and ethically.

CET 31 E 1 ENVIRONMENTAL BIOTECHNOLOGY

Lectures / Week : 3 Hrs. **Sessional Marks : 20+20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objectives (CEOs)

1. To study the fundamental of microorganisms
2. To know the use of biosensors in detecting the environmental pollution
3. To educate the different treatment process involved in the industrial waste water treatment process
4. To learn the different types of techniques to manage the different types of industrial wastes
5. To understand the methods of conserving biodiversity.

UNIT I

FUNDAMENTALS OF MICRO-ORGANISMS

Microbial flora of soil, growth, ecological adaptations, interactions among soil microorganisms, biogeochemical role of soil microorganisms.

UNIT II

PRODUCTION OF PRIMARY AND SECONDARY METABOLITES

Simple aromatics, chlorinated polyaromatic petroleum products, pesticides and surfactants. Biosensors to detect environmental pollution.

UNIT III

INDUSTRIAL WASTE WATER MANAGEMENT

Waste water characteristics, biological waste water treatment, unit operations, design and modeling of activated sludge, trickling filter, lagoon processes, mathematical modeling of anaerobics digested dynamics.

UNIT IV

TREATMENT OF INDUSTRIAL WASTES

Design of treatment systems for Dairy, pulp, dye, leather and pharmaceuticals industries, solid waste management.

UNIT V

BIODIVERSITY AND CONSERVATION

Concepts of Biodiversity, endangered species, in-situ and Ex-situ conservation-gene banks.

TEXT BOOKS

Foster C. F., John Ware D. A. "Environmental Biotechnology", Ellis Horwood Ltd., 1987

Karnely D., Chakrabarty K., Omen G. S., "Biotechnology and Biodegradation., Advances in Applied Biotechnology Series", Vol. 4, Gulf Publications Co., London, 1989.

Course Outcomes (Cos)

Able to utilize the microorganisms for the well being of the human beings and to control the pathogenic bacteria by advanced engineering technologies

CET 31 E 2 SOLID AND HAZARDOUS WASTE MANAGEMENT

Lectures / Week : 3 Hrs. **Sessional Marks : 20+20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objectives (CEOs)

1. To know the impacts of mismanagement of solid waste
2. To study the elements of solid waste management
3. To learn the design aspects of landfill

UNIT I

INTRODUCTION :

Goals and objectives of solid waste management; Impacts of solid waste generation in a technological society, quantities of solid wastes, future challenges and opportunities.

GENERATION OF SOLID WASTES :

Solid waste generation sources; classification of solid waste; data on Indian city wastes; factors

influencing generation of solid wastes; characterisation and analysis of solid wastes.

UNIT II

ONSITE HANDLING, STORAGE AND PROCESSING :

Public health and aesthetics, onsite handling, methods used at residential and commercial sources; onsite storage dust bins; community containers, container locations; onsite processing methods.

COLLECTION :

Frequency of collection, equipment and labour requirements; collection routes, transport means and location of transfer stations.

UNIT III

PROCESSING TECHNIQUES AND EQUIPMENT :

Purpose of processing; Baling; Shredding; and Incineration.

RECOVERY OF RESOURCES, CONVERSION PRODUCTS, AND ENERRGY :

Material processing and recovery systems, recovery of chemical conversion products, recovery of biological conversion products, recovery of energy from conversion products.

UNIT IV

DISPOSAL OF SOLID WASTES :

Sanitary land fills – General considerations, site selection – operational management systems in land fill – Gas and leachate control – construction; ocean disposal of solid wastes; combustion – Incineration and types of incinerators – Application of GIS in land fill.

UNIT V

HAZARDOUS WASTES :

Special wastes, hazardous wastes, Hospital wastes, sewage sludges; industrial solid wastes – Methods of disposal.

REFERENCE BOOKS :

1. Bhide, A.D. and Sundaresan, B.B. (1983) Solid Waste Management in Developing Countries, INSDOC, New Delhi.
2. Techobanglous, G.Theisen, H. and Ehasin, R.(1996). Solid waste engineering principles and Management Issues – McGraw Hill, Tokyo.

Course Outcomes (Cos)

1. Capable of reducing the impacts due to solid waste

2. Can employ scientific methods of disposal of solid waste

CET 31 E 3 ADVANCED FOUNDATION ENGINEERING

Lectures / Week : 3 Hrs. **Sessional Marks : 20+20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objectives (CEOs)

1. To develop and understand of the behavior of foundations for engineering structures and to gain knowledge of the design methods that can be applied to practical problems.
2. Provide the students with a basic understanding of the essential steps involved in a geotechnical site investigation.
3. Introduce to the students, the principle of earth pressure and design of earth retaining structures.
4. Introduce to the students, the concept and methods of stress distribution in soils due to applied loads.
5. Introduce to the students, the principal types of foundations and the factors governing the choice of the most suitable type of foundation for a given solution.
6. Familiarize the students with the procedures used for: a) bearing capacity estimation, b) end bearing capacity, c) skin friction – pile foundation.
7. Familiarize the students the concept of well foundation and its design and construction.

UNIT I

FOUNDATION DESIGN CONSIDERATIONS:

Depth and spacing of footings - Displaced soil effects - Water table fluctuation - Foundations in sands and clays - Environmental considerations.

UNIT II

ISOLATED FOOTINGS:

Classification and purpose - Contact pressure under footings - proportioning of Isolated footings - Principles of footing design.

UNIT III

STRAP & COMBINED FOOTINGS:

Need of Strap & Combined Footings-Types of Combined Footings-Proportioning of Rectangular & Trapezoidal Combined Footings-Strap Footing-Principles of Design.

UNIT IV

MAT FOUNDATIONS:

Types of Mats- Allowable bearing pressure for mat foundations - conventional design of mat foundations - Modulus of subgrade reaction approach.

UNIT V

DEEP FOUNDATIONS:

Single piles versus pile groups - pile spacing - pile caps - Analysis of pile load in a group of piles.

REFERENCE AND TEXT BOOKS:

1. V.N.S.Murthy - Soil mechanics and foundation engineering.
2. Alam Singh - Modern geotechnical engineering.
3. Bowles, J.E. - Foundation analysis and design.
4. Brahma, S.P. - Foundation engineering.
5. Teng, W.C. - Foundation Design.
6. Shamsher Prakash, Gopal Ranjan and Swami Saran - Analysis and Design of foundation and Retaining structures.
7. Peck, Hansen, Thornburn - Foundation Engineering.
8. Gopal Ranjan & A.S.R.Rao, "Basic and Applied Soil Mechanics".
9. C.Venkatramaiah - Geotechnical Engineering.
10. A.V.Narasimha Rao and C.Venkatramaiah - Numerical Problems, Examples and Objective Questions in Geotechnical Engg.

Course Outcomes (Cos)

1. A student learn and able to find out the Soil Profile in a given location.
2. A student able to select suitable foundation for a given structure and site.
3. Expertise in the calculation of load carrying capacity of selected foundation.
4. Gain experience in solving field geotechnical engineering problems such as slope stability and earth retaining structures.

CET 31 E 4 SOIL DYNAMICS AND MACHINE FOUNDATIONS

Lectures / Week : 3 Hrs. **Sessional Marks : 20+20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objectives (CEOs)

1. To study theory of vibrations and its effect on machine foundation.
2. To learn about different types of machine foundations.
3. To develop and understand the behaviour of machine foundation and to gain knowledge of design method that can be applied to practical problems.

UNIT I

ELEMENTS OF SOIL DYNAMICS:

Characteristics of Soil under Dynamic Loads-Basic Definitions-Simple Harmonic Motion-Degree of Freedom-Modes of Vibration-Natural Frequency-Resonance-Types of Damping-Norm Harmonic Motion-Beat Phenomenon-Applications of Soil Dynamics.

UNIT II

THEORY OF VIBRATIONS :

One degree freedom Systems - undamped and damped free vibrations - Forced vibrations - Transient vibrations.

UNIT III

DYNAMIC SOIL PROPERTIES :

Natural Frequency of Foundation –Tolerance Limits –Permissible Amplitudes – Wave Propagation through Soils-Determination of Additional Soil Properties-Cyclic Plate Load Test-Block Vibration Test.

UNIT IV

DESIGN OF MACHINE FOUNDATIONS:

Types of machines- Types of Machine foundations- General Criteria for Design of Machine Foundations- Elastic half space theory - lumped parameter model - Design of block foundations'- Foundations for Impact Machines - Foundations for Reciprocating Machines - Soil mass participating in vibrations.

UNIT V

VIBRATION ISOLATION:

Active and passive types of isolation - Screening of vibrations - Isolation in existing machine

foundations - Construction details of machine foundations.

TEXT/REFERENCE BOOKS:

1. Soil Dynamics and Machine Foundations By Swamy Saran.
2. Vibration analysis and design of foundations for machines and turbines By Major
3. Hand Book of Machine Foundations By P.Sreenivasulu and C.V. Vaidyanathan
4. Geotechnical Engineering - C.Venkatramaiah.
5. Soil Mechanics and Foundation Engineering - K.R.Arora.
6. Soil Mechanics & Foundations - B.C.Punmia
7. Basic and Applied Soil Mechanics - Gopal Ranjan & A.S.R.Rao.
8. Soil Mechanics & Foundation Engineering – P.Purushothama.Raj
9. Geotechnical Engineering By Gulhati & Datta

Course Outcomes (Cos)

1. Familiarize the student to learn wave and wave propagation and dynamic properties of soils
2. Familiarize the student with the procedure used for machine foundation design.
3. Familiarize the student about the vibration isolation and screening techniques.

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CET 31 E 5 FUZZY LOGIC IN CIVIL ENGINEERING

Lectures / Week : 3 Hrs. **Sessional Marks : 20+20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objectives (CEOs)

1. To furnish the junior year students with the elementary techniques about decision making in conjunction with the systematic approach as applied to engineering.
2. To provide students with exposure to the essentials of resource optimization and allocation in the presence of constraints and uncertainties constitute the main body of the course.
3. To establish a bridge to the higher level of design, engineering management, and environmental engineering courses with the elementary linear algebra and probability and statistics, in order to form students as short-and long-term decision makers.

UNIT I

INTRODUCTION TO ARTIFICIAL INTELLEGENCE SYSTEMS

Artificial Intelligence (AI) – Importance of AI – Early work in AI – AI and related fields – Basic concepts of Fuzzy logic.

UNIT II

FUGGY LOGIC SET THEORY

Basic definitions and terminology – Membership functions formulation and parameters – Basic operations on fuzzy sets – Complement – Intersection – Union, Parameterized T-norm and T-conorm.

UNIT III

FUZZY RULES AND FUZZY REASONING

Extension Principle and Fuzzy Relations – Fuzzy If-Then-Rules – Fuzzy Reasoning.

UNIT IV

FUZZY INFERENCE SYSTEMS

Mamdani Fuzzy Models – Sugeno Fuzzy Models, Fuzzy Modelling – Fuzzy Modelling.

UNIT V

FUZZY SYSTEMS

Defuzzification Methods – Applications – Greg Viot's Fuzzy Cruise Controller – Air Conditioner Controller.

TEXT BOOKS

Artificial Intelligence and Expert Systems by DAN.W.PATTERSON (Unit I).

Jang, ISR, C.T. Sun and E. Mizutan – Neuro-Fuzzy and Soft Computing – Prentice Hall (Unit II, III & IV)

Neural Networks, Fuzzy Logic and Genetic Algorithms by S.Rajasekaran and G.A. Vijayalakshmi Pai (Unit IV & V).

Course Outcomes (Cos)

1. An ability to apply knowledge of mathematics, science and engineering
2. An ability to identify, formulate and solve engineering problems
3. The broad education necessary to understand the impact of engineering solutions in a global and societal context
4. A knowledge of contemporary issues

5. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice

CET 31 E 6 ADVANCED HIGHWAY ENGINEERING

Lectures / Week : 3 Hrs. **Sessional Marks : 20+20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objectives (CEOs)

1. Understand the geometric design of highways.
2. Understand the design principles of Pavements.
3. Get exposed to the various highway engineering aspects.

UNIT I

Machinery and Plant - Equipment used for earth work, rock excavation, production of aggregates, transportation of materials, watering, compaction, bituminous and concrete works and bridge construction.

UNIT II

Low cost roads - Natural soil roads, soil treated roads, roads of other local materials wall burnt brick andbrick-aggregate pavements.

Soil stabilized roads - various methods, special problems in soil stabilisation work.

UNIT III

Hill roads - Alignment, geometrics of hill roads, design and construction of hill roads, drainage in hill roads, maintenance problems- special areas.

UNIT IV

Road side development - environmental factors in planning and development of highways, road side development and arboriculture, planning plantation of trees, care of trees.

Highway economics and finance - Highway user benefits, highway costs, economic analysis, highway finance.

UNIT V

Quality control in Highway Engineering - Importance, Process Control, Statistical Methods, Acceptance Sampling.

TEXT BOOKS

1. Highway Engineering - S.K.Khanna & C.E.G.Justo.
2. Principles and Practices of Highway Engineering by - L.R.Kadiyali.

Course Outcomes (Cos)

1. Familiarize about Highway Planning and alignment and the Engineering surveys for highway alignment.
2. Know about highway maintenance and pavement evaluation techniques.

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CET 31 E 7 CONCRETE DAMS

Lectures / week : 3hrs. Sessional Marks : 20 + 20

Univ. Exams : 3 hrs. University Exam Marks : 60

Course Educational Objectives (CEOs)

1. To know how to select a dam site and different types of dams
2. To understand design of gravity dams, arch dams, buttress dams and spillways
3. To learn about various types of energy dissipaters

UNIT I

PLANNING AND SELECTION OF DAMS :

Planning-Investigation programme - Choice of dam site - Environmental considerations - Storage requirements - Sedimentation in reservoirs - Selection of type of dam.

UNIT II

.GRAVITY DAMS :

Profile - Loads - Design concepts and criteria - Gravity method of stability analysis - Internal Stress analysis - Joints - Keys - Water stops - Openings.

UNIT III

ARCH DAMS :

Classification - Layout - Factors affecting layout - Methods of analysis - Thin cylinder theory - Thick cylinder theory - Trial load analysis.

UNIT IV

BUTTRESS DAMS

Types - Selection - Design Principles - Buttress design by unit column theory

UNIT V

SPILLWAYS :

Factors affecting design - Components - Types of spillways - Design principles.

ENERGY DISSIPATORS:

Hydraulic jump type slilling basin with horizontal aprons, sloping aprons - Jet diffusion and free jet stilling basins - Bucket type energy dessipators

TEXT REFERENCE BOOKS:

1. H.D.Sharma - Concrete dams
2. R.S.Varshney - Concrete dams
3. S.K.Garg - Irrigation and Hydarulic structures

Course Outcomes (Cos)

1. Planning and design of dams
2. Energy dissipaters

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CET 31 E 8 GROUND WATER DEVELOPMENT

Lectures / Week : 3 Hrs. **Sessional Marks : 20+20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objectives (CEOs)

1. To known about different types of wells, construction and maintenance of wells
2. Learn about quantitative analysis of groundwater
3. To known about various types of pollution in groundwater and their modeling
4. To learn about various steps involved in basin management
5. To understand different methods of drilling of wells and recharge of ground water

UNIT I

WATER WELLS

Shallow Well - Deep well - Well Construction - Well Completion - Well development - Testing of wells for yield - Protection of wells - Well rehabilitation.

UNIT II

QUANTITATIVE MODELLING

Discharge of streams-velocity-area method, tracer method, measurement at hydraulic structures-miscellaneous methods.

.UNIT III

POLLUTION OF GROUND WATER AND QUALITATIVE MODELLING

Municipal, Industrial and Agricultural sources of pollution - Attenuation, distribution and

evaluation of ground water pollution - Monitoring ground water quality.

UNIT IV

GROUND WATER MANAGEMENT

Concept of basin management - Equation of hydrologic equilibrium - Ground water basin investigation - Data Collection - Alternative basin yields - Evaluation of perennial yield - Basin management by conjunctive use.

UNIT V

SUBSURFACE INVESTIGATIONS AND ARTIFICIAL RECHARGE

Test drilling - Geophysical, resistivity and spontaneous potential logging - Concept of artificial recharge - Methods of artificial recharge

REFERENCES:

1. Ground water hydrology D.K.Todd

2. Ground water H.M.Raghunath

3.Ground water assessment development and management K.R. Karanth

Course Outcomes (Cos)

1. Planning, construction and maintenance of well
2. Quantitative and qualitative assessment of groundwater
3. Groundwater improvement techniques

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CET 31 E 9 ADVANCED STRUCTURAL ANALYSIS

Lectures / Week : 3 Hrs. **Sessional Marks : 20+20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objectives (CEOs)

1. To understand the typical structural components analysis of beams curved in plan, Arches, Cables.
2. To learn the different theories like yield line theory of slabs and unsymmetrical bending of beams.

UNIT I

Analysis of Portal frames with inclined legs and gable frames.

BEAMS CURVED IN PLAN : Analysis for internal forces – circular beams supported on symmetrically placed columns – semicircular beams simply supported on three equally spaced

supports.

UNIT II

ARCHES

Eddy's theorem, analysis of three and two hinged parabolic and circular arches for static and moving loads.

UNIT III

CABLES: Analysis of cables under uniformly distributed and concentrated loads - shape of cable under self weight - Effect of temperature in suspension cables – Anchor cables- suspension bridges – moving loads.

UNIT IV

Yield line theory: method of yield line analysis of slabs for different support conditions – Strip method.

UNIT V

UNSYMMETRICAL BENDING

Introduction – Centroidal principal axes of section – graphical method for locating principal axes – moments of inertia referred to any set of rectangular axes – stress in beams subjected to unsymmetrical bending – principal axes –resolution of bending moment due to two rectangular axes through the centroid – location of neutral axis – deflection of beams under unsymmetrical bending.

TEXT BOOKS:

Analysis of Structures – Vol.I, II – Vazirani and Ratwani.

Indeterminate structural analysis by C.K. Wang, Mc-Graw Hill Publications.

Course Outcomes (Cos)

Able to analysis for use in design of the typical structures like circular beams, parabolic and circular arches with different support conditions of slabs and purlins in the trusses.

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CET 31 E 10 OPTIMIZATION METHODS IN CIVIL ENGINEERING

Lectures / Week : 3 Hrs. **Sessional Marks : 20+20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objectives (CEOs)

1. To learn about different approaches in civil engineering
2. To known about formulation of the problem
3. To understanding problem solution by Linear programming method, duality theory and sensitivity analysis
4. To know various applications of linear programming with respect to civil engineering

UNIT I

Introduction to planning and optimization - Planning process - systems - Systems approach in Civil Engineering - Principles of modelling.

UNIT II

Linear programming - Formulation of the problem - Graphical solution

UNIT III

Solution Methods of Linear Programming Problems - Standard form of linear programming problems - Simplex method - Simple problems.

UNIT IV

Duality theory and its application - Sensitivity analysis.

UNIT V

Applications of linear programming in civil engineering - Transportation - Construction– Structural Design - Pipe network - Water resource planning.

TEXT BOOKS :

1. Operation Research by S.S.Rao.
2. Operation Research by Kranthiswamy.

Course Outcomes (Cos)

- Students able to formulate a problem and based upon different conditions solved by appropriate method

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CET 31 E 11 GEOSYNTHETICS IN CIVIL ENGINEERING

Lectures / Week : 3 Hrs Sessional Marks : 20 + 20

End Exam. : 3 Hrs End Exam Marks: 60

Course Educational Objectives (CEOs)

1. To acquaint the student with the traditional and the most recent developments of improving the geotechnical characteristics of the soils for construction purposes.
2. To know soil improvement techniques using different forms of fibres.
3. Gain knowledge about properties, different forms and functions of geotextiles.
4. Applied to d of increase the shear strength, or to reduce the pore pressure, permeability or compressibility in such a way that the soil properties do not deteriorate as a result of weathering or of changes in water content.

UNIT – I

AN OVERVIEW :

Historical development – Natural Materials – Jute and Coir, Synthetic Materials – Geotextiles – Geogrids – Geonets – Geomembranes and Geocomposites.

UNIT – II

FUNCTIONS :

Functions – Separation – Reinforcement – Filtration – Drainage and Barrier function.

UNIT – III

PHYSICAL AND HYDRAULIC PROPERTIES :

Physical Properties – Mass per unit area, Thickness and Specific gravity.

Hydraulic Properties – Apparent open size – Permitivity and Transmissitivity.

UNIT – IV

MECHANICAL PROPERTIES :

Unixial Tensile strength – Burst and punture strength and soil geosynthetic friction tests.

UNIT – V

APPLICATIONS OF GEOSYNTHETICS :

Use of geosynthetics for filtration and drainage, in roads and in land fills.

TEXT BOOKS :

1. Engineering with Geosynthetics by G.V. Rao and G.V.S.S. Raju – Tata Mc Graw hill, New Delhi, 1990.
2. Construction and Geotechnical Methods in Foundation Engineering by Robert M.Koerner – Mc Graw Hill, New York, 1985.

Course Outcomes (Cos)

- By the completion of the course, the students should be able to:
- Discuss functions of geosynthetics
- Able to use appropriate geosynthetics for a particular application.

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CET 31 E 12 FUNDAMENTALS OF ROCK MECHANICS

Lectures / Week : 3 Hrs Sessional Marks : 20 + 20

End Exam. : 3 Hrs End Exam Marks: 60

Course Educational Objectives (CEOs)

1. Recognize geological consideration needed in rock mechanics course.
2. Determine physical properties of rock.
3. Analyze compressive strength of rock
4. Identify tensile strength of rock
5. Analyze shear strength of rock
6. Design an experimental model to correlate all the rock testing together.
7. Distinguish stress and strain analysis of rocks.
8. Evaluate stress distribution around under-ground openings.
9. Evaluate rock quality.
10. Design rock supporting system.
11. Outline principle of rock slope.
12. Apply some software which is available in network for rock mechanics applications.

UNIT – I

PHYSICAL PROPERTIES OF ROCKS :

Porosity, Density, Moisture Content, Degree of saturation, Coefficient of Permeability, Electrical properties, Thermal properties, Swelling, Anisotropy and Durability.

UNIT – II

MECHANICAL PROPERTIES :

Strength, Deformability, Elasticity and Plasticity and Hardness.

UNIT – III

ROCK EXPLORATION :

Objects, Methods of Rock Exploration – Direct Methods – Core Borings – Core Recovery – RQD – Logging of Cores – Geophysical Methods – Seismic and Electrical Methods.

UNIT – IV

ROCK TESTING (Laboratory testing only)

Uniaxial Compressive Strength – Tensile Strength – Flexure Strength – Shear Strength and tests for elastic constants.

UNIT – V

IMPROVEMENT IN PROPERTIES OF ROCK MASS

Grouting – Grouting Materials – Grouting Operations – Methods of grouting – Rock bolting – Mechanism – Principles of design.

TEXT BOOKS :

1. Engineering Properties of Rocks – I.W. Farmer, published by Spon Ltd.
2. Fundamentals of Rock Mechanics – R.E. Goodman, Jhon Wiley & Sons.

Course Outcomes (Cos)

1. an ability to apply knowledge of mathematics, science, and engineering fundamentals.
2. an ability to design and conduct experiments, and to critically analyze and interpret data.
3. an ability to design a system, component or process to meet desired needs.
4. an ability to function in multi-disciplinary teams.
5. an ability to identify, formulate and solve engineering problems.

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CET 31 E 13 TRAFFIC ENGINEERING

Lectures / week : 3 hrs. **Sessional Marks : 20 + 20**

End Exam : 3 hrs. **EndExam. Marks : 60**

Course Educational Objectives (CEOs)

1. The course introduces the concepts of traffic engineering and capacity analysis techniques based on current practices used by the industry, concepts of highway safety analysis techniques, traffic regulation and control and provides a general introduction to intelligent transportation systems.

UNIT I

Functions of traffic engineering, Organizational structure in state departments and for a city. Traffic Forecasting - Need, Limitations, methods, period for forecasting.

UNIT II

Miscellaneous traffic control aids and street furniture - Road delineators, hazard markers,

object markers, speed breakers, rumble strips gaurd rails.

Traffic regulations - Basic principles of regulation, regulation of speed, vehicles, driver, mixed traffic, parking regulations, enforcement of regulations

UNIT III

Traffic management - Traffic management measures, restrictions of turning movements, one way streets, tidal flow operation, closing side streets, exclusive bus lanes.

UNIT IV

Traffic problems in cities - growth of towns and traffic present difficulties in urban traffic conditions, measures to meet the problems, land use and city planning controls, traffic restraint measures. Promotion of public transport, pedestrainisation, staggering of office hours, promotion of bicycle traffic.

UNIT V

Traffic and environment - Effects of traffic on environment, noise, air pollution, vibration, visual intrusion and degrading the aesthetics, severance and land consumption, evaluation procedures, situation in India.

TEXT BOOKS:

1. Traffic Engineering and Transport Planning by L.R.Kadiyali.
2. Highway Engineering by Justo and Khanna.
3. Transportation Engineering by S.P.Bindra.
4. Transportation Engineering by Ahuja.

Course Outcomes (Cos)

Upon completion of the course the students should be able to:

1. Understand the general characteristics related to main components of the highway system such as road users, vehicles, traffic and control systems, and various interactions among those components.
2. Perform capacity analysis of rural highways, freeways, signalized intersections, and unsignalized intersections using the procedures described in the current version of the Highway Capacity Manual.
3. Perform the capacity analysis of highway facilities by using the Highway Capacity Software.

4. Understand highway safety related issues, calculate and interpret highway crash frequencies and rates, perform the methods to identify critical highway locations, and suggest applicable countermeasures.
5. Perform the common traffic engineering studies, analyze the data and extract the necessary information needed for general traffic engineering practice.
6. Understand and apply the applications of traffic control devices (signs, signals, and pavement markings) based on the guidelines provided in the most current version of the Manual on Uniform Traffic Control Devices.
7. Understand the general concepts related to intelligent transportation systems.

CET 31 E 14 IRRIGATION WATER SYSTEMS AND MANAGEMENT

Lectures / week : 3 hrs. **Sessional Marks : 20+20**

Univ. Exams : 3 hrs. **University Exam Marks : 60**

Course Educational Objectives (CEOs)

1. To understand the fundamental principles, development and distribution of irrigation systems.
2. To study the various aspects of soil physics and soil chemistry.
3. To estimate the crop water requirements by various methods
4. To study the various components and design of irrigation systems

UNIT – I

INTRODUCTION :

Fundamentals principles – Development and distribution of irrigation systems – System design process.

ECONOMIC ANALYSIS:

Economic analysis – Predicting yield response.

UNIT – II

SOIL PHYSICS AND SOIL CHEMISTRY:

Terminology – Soil water and hydraulic conductivity – soil chemical properties – Impact of soil and water chemical concentrations on yield – Management of soil chemical concentrations.

UNIT – III

CROP WATER REQUIREMENTS:

Definitions – Methods of estimation – methods based on temperature and pan evaporation – Combined method – Crop coefficient curves.

SURFACE SYSTEM DESIGN:

Definitions – Furrow system design – Level basin system design – Grade border system design.

UNIT – IV

SPRINKLER SYSTEM DESIGN:

Uniformity and adequacy of water application – Evaporation and wind drift – Components of system design – Distribution system design and layout – Centre pivot system – Linear move system – Big gun and Boom systems.

UNIT – V

TRICKLE SYSTEM DESIGN:

Concept of the trickle system – Emitters – Flow through laterals – Filtration and water treatment systems – Fertilizer injection systems.

MODELS:

Models for irrigation management and irrigation operation.

REFERENCE BOOKS:

1. Richard H. Cuenea (1989), "Irrigation System Design. (An Engineering Approach)" Published by Prentice Hall Inc.
2. Deniel P. Louchs, Jerry R. Stedinger and Danglass A Haith, "Water Resources Systems Planning and Analysis " Published by Prentice – Hall Inc.

Course Outcomes (Cos)

1. Able to classify the different irrigation systems.
2. Able to measure and estimate the crop water requirements.
3. Analyze, design and evaluate the various components of different irrigation systems.

EOT 01 MANAGERIAL ECONOMICS

L+T / week : 2 Hrs **Sessional Marks : 20+20**

University Exam : 3 Hrs **End Exam Marks : 60**

Course Educational Objectives (CEOs)

1. To know about demand analysis.
2. To understand about cost and production supply analysis.
3. To learn about price and output decision under market structure.
4. To know about various policies and practices.
5. To learn about profit management and capital management.

UNIT I

Introduction - Nature and Scope of Managerial Economics, Economic Theory and Managerial Economics, Managerial Economist: Role and Responsibilities.

Demand Analysis and Forecasting – Demand Determinants, Demand Distinctions, Demand Forecasting: General Considerations, Methods of Demand Forecasting.

UNIT II

Cost Analysis – Cost Concepts, Classifications and Determinants; Cost-Output Relationship, Economies and Diseconomies of Scale, Cost Control and Cost Reduction.

Production and Supply Analysis – Production Functions, Supply Analysis.

UNIT III

Price and Output Decisions Under Different Market Structures – Perfect Competition, Monopoly and Monopsony; Price Discrimination, Monopolistic Competition, Oligopoly and Oligopsony.

UNIT IV

Pricing Policies and Practices – Pricing Policies, Pricing Methods, Specific Pricing Policies, Price Discounts and Differentials; Product-line Coverage and Pricing; Price Forecasting.

UNIT V

Profit Management – Nature of Profit, Measuring Accounting Profit,

Profit Policies, Profit Planning and Forecasting.

Capital Management - Capital Budgeting, Cost of Capital, Appraising Project Profitability, Risk, Probability and Investment Decisions.

Text Book:

Varshney R L and Maheshwari K L, *Managerial Economics*, 19th Edition, Sultan Chand and Sons, 2009.

Reference Book:

- Estimation of cost production and supply analysis.
- Able to do Profit management with respect to goods.

Course Outcomes (Cos)

- Estimation of cost production and supply analysis.
- Able to do Profit management with respect to goods.

COT 02 MANAGEMENT ACCOUNTING

Lectures/week : 2 Hrs. **Sessional Marks : 20+20**

End Exam. : 3 Hrs. **End Exam. Marks: 60**

Course Educational Objectives (CEOs)

1. To know about various principles in finance and preparing a balance sheet.
2. To understand various methods and analysis in financial statement
3. To learn about capital budgeting in accountancy.
4. To understand about ananlysis of marginal costing and standard cost.
5. To know about budgetary control.

UNIT I

Management Accounting – Definition, Objectives, Scope and Functions. Financial Accounting – Introduction, Process, Principles and Concepts. Financial Statements – Trading Account, Balancing Process, Profit & Loss Account and Balance Sheet.

UNIT II

Financial Statement Analyses – Trend Percentage Analysis, Ratio Analysis, Fund Flow Statement Analysis, Cash Flow Statement Analysis

UNIT III

Methods of Depreciation – Straight line, Depletion, Machine Hour Rate, Diminishing Balance, Sum of Digits, Sinking Fund and Insurance Policy Methods.

Inventory Valuation Methods – FIFO, LIFO, Average Weighted Average, Base Stock and HIFO Methods.

UNIT IV

Capital Budgeting – Pay Back Period, ARR, NPV, PI and IRR Methods.

Unit Costing – Introduction, Direct Cost Classification and Indirect Cost Classification.

Introduction to Process Costing, Job Costing and Activity Based Costing

UNIT V

Marginal Costing – Introduction, Definition, Meaning and BEP Analysis and BEP in units.

Standard Costing – Introduction, Variance Analysis Material Cost Variance, Material Price Variance, Labor Variance, and Sales Variance.

Budgetary Control – Introduction and Classification of Budgets, Production, Material / Purchase, Sales, Sales Overhead, Cash and Factory Overheads Budgets. Flexible Budget.

Text Book:

Pandikumar M P, *Management Accounting: Theory and Practice*, 1st Edition, Excel Books, 2007.

UNIT	Chapters
I	1,2 and 3
II	5,6,7 and 8
III	4 and 11
IV	9,10, 13 , 14 and 18
V	15, 16 and 17

Reference Book:

Khan M Y, Jain P K, *Management Accounting*, 4th Edition, Tata McGraw-Hill, 2007.

Course Outcomes (Cos)

- Students are able to prepare a balance sheet Budgeting.
- Optimization of cost benefit analysis.

CEP 12 TECHNICAL SEMINAR AND PRESENTATION SKILLS

Practicals / week : 2 Hrs. **Sessional Marks : 100**

Course Educational Objectives (CEOs)

1. an understanding of professional and ethical responsibility.
2. an ability for effective oral and written communication.
3. To broaden education necessary to understand the impact of engineering solutions in a global and societal context.

Preparation of technical presentations on identified area related to Civil Engineering

- Critical discussion on the presentations.
- Submission of a report on technical seminar.
- Evaluation of presentation skills.

Course Outcomes (Cos)

- a recognition of the need for, and an ability to engage in life-long learning.
- a knowledge of contemporary issues.
- an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

CEP 13 ENVIRONMENTAL ENGINEERING LABORATORY II

WASTEWATER ANALYSIS

Practicals / week : 2 Hrs. **Sessional Marks : 40**

End Exam. : 3 Hrs. **End Exam. Marks: 60**

Course Educational Objectives (CEOs)

1. To be aware of waste water analysis

1. (a) Determination of Color.
   (b) Determination of Odor and Temperature.
2. Determination of Total Dissolved Solids.
3. (a) Determination of Settleable Solids.
   (b) Determination of pH.
4. Determination of Total Nitrogen.
5. Determination of Total Phosphorous.
6. Determination of Sulphates
7. Determination of BOD of sewage water.

8. Determination of COD.

9. Solid Waste Analysis for physical components.

Course Outcomes (Cos)

- Able to Perform common environmental experiments relating to water and waste water quality
- Able to Statistically analyze and interpret laboratory results

Able to Demonstrate good written and oral communication skills

CEP 14 FIELD TRAINING

Practicals : 3 week **Sessional Marks : 100**

Course Educational Objectives (CEOs)

To enrich knowledge of field oriented problems.

1. Field Visit, Study of Drawings, Study of Components of Constructions of Buildings, Hydraulic Structures.
2. Collection of Water Samples and Testing.
3. Collection of Soil Samples and Testing.

Course Outcomes (Cos)

1. Able to give engineering solutions to field related problems.

CED 02 DESIGN AND DRAWING OF IRRIGATION STRUCTURES

L + D / week : 1+3 (Drg) **Sessional Marks: 20+20**

University Exam.: 3 Hrs. **End exam Marks: 60**

Course Educational Objectives (CEOs)

1. To learn the components, their design principles and preparation of drawings of irrigation structures

Design and Drawing of

1. Surplus weir
2. Tank sluice with a tower head
3. Canal drop-notch type
4. Siphon well drop
5. Canal regulator
6. Siphon Aqueduct (Type-II)
   (Under tunnel)

Text Book :

1. "Water Resources Engineering Principles and Practice" – C.S.Murthy.

Course Outcomes (Cos)

To design and to prepare drawings of irrigation structures for use in the execution of irrigation projects

CET 32 CONSTRUCTION PLANNING & PROJECT MANAGEMENT

L+T / week : 3+1 Hrs **Sessional Marks : 20+20**

University Exam : 3 Hrs **End Exam Marks : 60**

Course Educational Objectives (CEOs)

1. Able to plan construction projects, schedule the activities determine and control the cost of the project, by creating cash flows and budgeting.
2. Understand the operation of construction equipment.
3. To know the labour and safety laws, quality control and ethical audit in construction industry.

UNIT I

INTRODUCTION :

Significance of construction management, Objectives and functions,Construction types,Resources,Stages in construction,personnel involved in construction planning and their roles,Engineering drawings, specifications and tender documents and their importance in planning.

Scheduling and control,Advantages,Classification of scheduling,Methods of planning and scheduling,Bar charts (Gnat charts),Mile stone charts.

UNIT II

CPM and PERT ,Comparision between CPM and PERT,Network techniques terminology,Event and activity,Network representation,AON and AOA system,Development of net-work,errors and dummies in net-work logic,calculation of network(CPM) times,floats and slacks,project scheduling and critical path,superificial path,Up-dating,Resources smoothening and levelling.

Cost-time analysis in Net-work planning,Importance of time-cost analysis,Direct costs and Indirect costs,Operation time-cost Trade off graphs,Normal and crash points,Project

Time-cost Trade, off curves,optimizing project costs, Recompression of multiple critical paths,Crash limit and free float limit,optimization of costs.

UNIT III

Constuction Equipment:

Engineering Fundamentals ,classification,rolling resistance,Rim pull,Coefficient of friction ,Conditions of Management factor,Coefficient of traction swelling and shrinkage of soils,Selection of construction equipment,Depreciation,Methods of cost reduction in construction,Earth Moving Equipment,Excavating plants and equipment,Transporting equipment,earth compaction equipment,Earth spreading Equipment,Equipment for concrete construction.

UNIT IV

Progress control, purpose, Methods of recording progress, Recording and analysis of progress, corrective action, productivity and methods to increase productivity, work study, Time-study, operation analysis, process charts.

Organising construction: Types of organization, Details, Principles of organization, Details, Organisational relationship, organization charts, Functions of different personnel involved in

organizing construction, Types of contracting firms, Temporary services, Job Layout.

Inspection and Quality Control: Importance of Inspection and quality control,principles of Inspection,Enforcement of specifications,stages of Inspection and quality control,Testing services and Inspection Team,Testing of structures,Different types of tests,Assessment of quality of construction work.

UNIT V

Construction Labour: Status of construction worker,Types of labour,Wages,Trade unions,Trade union Act 1936,Labour welfare fund Act 1965,payment of wages Act,Minimum wages act,Contract labour Act,Industrial dispute Act,Factories Act.

Safety in construction Industry: Importance of safety,Accidents,causes and safety measures in construction Industry,Safety campaign.

ETHICAL AUDIT

Introduction, Aspects of project realization,Ethical audit procedures, The decision makers,Variety of interests, Formulation of briefs, The environment ,The audit statement, The audit reviews.

TEXT BOOKS

1. Construction Planning and Management by P.S.Gohlot and B.M.Dhir, Wiley Eastern Limited, New Delhi (1992).
2. Construction Equipment and its Management by S.C.Sarma, Khanna Publishers, Delhi (1995).
3. Engineering Ethics by M.Govinda Rajan, S.Natarajan and V.S.Senthilkumar, Prentice-Hall of India Pvt. Ltd. (2004), New Delhi (Chapters 4 and 7).
4. Construction Management and Accounts by J.L.Sharma, Satya Prakashan Publications, New Delhi.
5. Construction Engineering and Management by S.Seetharaman, Umesh Publications, Delhi (1997).
6. Construction Management and Accounts by Harpal Singh, Tata McGraw-Hill Publishing Limited, New Delhi.
7. PERT and CPM: Principles and Application.3rd edn.-L.S.Srinath Affliated East-West press pvt.Ltd., New Delhi.
8. Planning and control with PERT and CPM -Richard,Levin and Charles A.Kirkpatrick

Tata McGraw-Hill publishing Co.Ltd,New Delhi.

Course Outcomes (Cos)

1. Compute and sketch CPM and PERT diagram.
2. Assemble and sketch scheduling of construction activities in construction industry.

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CET 33 PROFESSIONAL ETHICS

L+T / week : 3 Hrs Sessional Marks : 20+20

University Exam : 3 Hrs End Exam Marks : 60

Course Educational Objectives (CEOs)

1. To include senses of engineering ethics
2. To educate about the responsibilities and rights of employee during their profession.

UNIT – I

1. ENGINEERING ETHICS

Senses of 'Engineering Ethics' - variety of moral issued - types of inquiry - moral dilemmas - moral autonomy - consensus and controversy – Models of Professional Roles - Self-interest.

UNIT – II

2. ENGINEERING AS SOCIAL EXPERIMENTATION

Engineering as experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law.

UNIT – III

3. ENGINEER'S RESPONSIBILITY FOR SAFETY

Safety and risk - assessment of safety and risk - risk benefit analysis - reducing risk - the Government Regular's Approach to Risk.

UNIT – IV

4. RESPONSIBILITIES AND RIGHTS

Collegiality and loyalty - respect for authority - collective bargaining - confidentiality - conflicts of interest - occupational crime - professional rights - employee rights - Intellectual Property Rights (IPR) - discrimination.

UNIT – V

5. GLOBAL ISSUES

Multinational corporations - Environmental ethics - computer ethics - engineers as managers-consulting engineers-engineers as expert witnesses and advisors -moral leadership-sample code of conduct.

TEXT BOOK

1. Govindarajan M, Natarajan S, Senthil Kumar V. S, “Professional Ethics”, Prentice Hall of India, 2004.
2. Mike Martin and Roland Schinzinger, “Ethics in Engineering”, Tata McGraw-Hill, New York 2005.
3. Charles E Harris, Michael S. Protchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Wadsworth Thompson Learning 2000.
4. Charles B. Fledderman, Engineering Ethics, Pearson Education, New delhi, 2004.

Course Outcomes (Cos)

1. Ability to apply ethics while decision making during their profession.
2. Enable to feel their responsibility and rights delivering the goods during their profession.

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CET 34 E 1 AIR POLLUTION AND CONROL

Lectures / Week : 3 Hrs. **Sessional Marks : 20 + 20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objectives (CEOs)

1. To educate the concepts of various sources of air pollution
2. To know the environmental and health impacts of air pollution
3. To study the characteristics of air pollutants
4. To learn the advanced technologies involved in the control of air pollution.

UNIT I

INTRODUCTION :

Definition of Air Pollution, Global effects of air pollution.

POLLUTION SOURCES AND EMISSION INVENTORIES :

Anthropogenic and natural sources. Particulates, Carbon monoxide, sulphur oxide, Nitrogen oxide, Hydrocarbons, Oxidants, Emission factors. Sampling train – stack sampling – Phytomonitoring of air quality.

UNIT II

EFFECTS OF AIR POLLUTANTS :

Effects of different air pollutants on human beings, animals, plants and materials.

AIR QUALITY AND EMISSION STANDARDS :

UNIT III

METEOROLOGY :

Wind profiles, wind roses, mixing depths, inversions, plume behaviour.

PLUME DISPERSION AND PLUME RISE :

The Gaussian Model , Diffusion coefficients, Box model, Inversion effects.

UNIT IV

AIR POLLUTION CONTROL :

General methods of control – Zoning – Town planning – Control of particulate matter – Settling chambers, Cyclons, bag –filter, Electrostatic precipitators – Removal of gaseous matter – SO_2, NO_X, VOCs and CO.

UNIT V

AUTOMOBILE POLLUTION :

Sources, emissions from diesel and petrol engines, Euro II standards, Management of automobile pollution.

AIR POLLUTION AND LEGISLATION :

Legislation – Air Act, 1981, and Environment (Protection) Act, 1986.

REFERENCE BOOKS :

1. Crawford, M (1976). Air pollution Control Theory, Mc Graw-Hilll, New York .
2. H.C.Perkins (1974). Air Pollution, Mc-Grew Hill, Tokyo.
3. Wark, Kenneth and Cecil F. Warner (1976). Air Pollution: Its origin and control, Dun-Dunnelley, New York.

Course Outcomes (Cos)

1. Able to monitor global effects
2. Able to apply measures in the protection of environment
3. Can Successfully apply advanced concepts of air quality management to design, analyze and develop technologies, process or systems to meet the desired needs of society both professionally and ethically.

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CET 34 E 2 NOISE POLLUTION AND CONTROL

Lectures / Week : 3 Hrs. **Sessional Marks : 20 + 20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objectives (CEOs)

1. To know the different sources of noise pollution
2. To understand the impacts of noise pollution
3. To know methods of noise monitoring
4. To learn the advanced technologies to control the noise pollution

UNIT I

ACOUSTICAL CONCEPTS :

Nature of sound – sound propagation characteristics – Propagation of sound in air – absorption of sound in air – Hearing mechanics – Measurement scale – Equal loudness contours.

NOISE CHARACTERISTICS AND SOURCES OF NOISE :

Noise characterization – Sources of noise.

UNIT II

MEASURING INSTRUMENTS AND TECHNIQUES :

Methodology of noise measurements – Sound level meter – Noise dose meter – Audiometer – Noise survey techniques- Vehicular noise measurement techniques –Air craft noise measurement techniques – Sound power determination techniques - Techniques for characterization of acoustical materials.

UNIT III

HEALTH EFFECT OF NOISE :

Annoyance –Sleep disturbance – Effect of noise on task performance and cardio - vascular system – Effect of noise on speech communication – Noise induced hearing loss (NIHL) : Effect of continuous sounds – Hearing damage due to impulse sounds.

ENVIRONMENTAL NOISE MEASUREMENTS :

Introduction – Traffic noise survey – Vehicular noise level – Domestic appliances noise level – Industrial noise- Aircraft noise – Community noise- Ship board noise- impulse noise.

UNIT IV

NOISE STANDARDS AND LIMITS :

Introduction – Legal position in India – Environmental standards – Occupational / Industrial

noise standards – Road vehicles noise standards – Noise standards for construction equipment and domestic appliances – Impulse noise (Fire works) exposure standards.

NOISE IMPACT ASSESSMENT STUDIES :

Definition of the problem- Elements of environmental noise – Assessment – Fractionalization approach to impact assessment- Impact of vibration environments – Case study.

UNIT V

NOISE CONTROL TECHNIQUES :

Mechanism of noise generation- Control methodology – Noise control at source – Noise control along the path- Control on the receiver end.

NOISE STRATEGY – FUTURE GUIDELINES :

Current trend – Noise control measures – Environmental noise management – Noise labeling – Diagnostics – Noise strategy – Problems for future investigations.

REFERENCE BOOKS:

1. S.P.Singal, (1999) Noise Pollution and Control, Narosa Publishing House, New Delhi.
2. Cunniff, P.F.(1997), Environmental Noise Pollution, Wisley, New York.
3. Thumann, A., and R.K.Miller (1986). Fundamentals of Noise Control Engineering, Prentice Hall, Englewood Cliffs, N.J.

Course Outcomes (Cos)

- Able to communicate the sources of noise pollution
- Able to understand the professional and ethical responsibilities of an environmental engineer in controlling noise pollution
- Successfully apply advanced concepts of environmental engineering to design, analyze and develop technologies, process to meet desired needs of society, both professionally and ethically in controlling noise pollution.

CET 34 E 3 GEOENVIRONMENTAL ENGINEERING

Lectures / Week : 3 Hrs. **Sessional Marks : 20 + 20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objectives (CEOs)

1. To know the composition and structure of the soils and their role in engineering behavior
2. To understand waste reduction techniques and waste containment systems

UNIT I

SOIL COMPOSITION & STRUCTURE

Phase Composition of Soil – Minerological Composition of solid phase – Role of Composition in Engineering behaviour of soils – Fabric and Structure – Types of soil structure – Diffused double layer – Role of soil structure in the Engineering behaviour of soils.

UNIT II

SUBSURFACE CONTAMINATION

Industrialisation and Urbanisation – Pollution – Control & Remediation – Subsurface Contamination – Mechanisms of contaminant transport – Effects of subsurface contamination – Detection of polluted zones – Monitoring effectiveness of designed facilities.

UNIT III

WASTE CONTAINMENT SYSTEM

Essentials of waste containment – Factors influencing contaminant mobility in the subsurface – Containment site selection techniques – Types of containment systems – Configuration of land fills, slurry wells and surface impoundments for containment.

UNIT IV

CONSTRUCTION AND DESIGN OF CONTAINMENT SYSTEMS

Leachate generation – Leachate collection and Removal systems – Stability of land fills – Land fill construction and operation – Construction of Impoundments – Design of Impoundments – Construction of Slurry trench walls.

UNIT V

GEOTECHNICAL REUSE OF WASTE MATERIAL

Waste Reduction – use of waste in Geotechnical Constructions – Engineering properties of waste – Waste material in embankments and fills.

REFERENCE BOOKS

Geotechnical Engineering by S.K. Gulhalti & Manoj Delta.

Geoenvironmental Engg. by L.N. Reddi and H.J. Inyaung.

Course Outcomes (Cos)

- Able to analyze and design waste containment systems to preserve and conserve the environment

CET 34 E 4 NUMERICAL METHODS IN GEOTECHNICAL ENGINEERING

Lectures / Week : 3 Hrs. **Sessional Marks : 20 + 20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objectives (CEOs)

1. To introduce students to major techniques used to solve boundary-value and initial-value problems in geotechnical engineering.
2. To develop students' skills at using modelling software to solve in geomechanics.
3. To develop students ability at critically assessing assumptions behind models and critically evaluating the quality of numerical results.

UNIT I

Introduction, Basic Concept, Finite Difference Approximations: diagonal five point formula. Laplace's Equation: Jacobi Method Gauss-Siedal Method. Accuracy Convergence and Stability. Some explicit Schemes.

UNIT II

Applications in Geotechnical Engineering: Finite Difference formulations for one dimensional Consolidation and two dimensional seepage.

UNIT III

Finite Element Methods: Introduction; Boundary and Initial value problems; Methods of approximation: The Rayleigh Ritz Method and The Galerkin Method. One Dimensional Finite Elements, Shape Function.

UNIT IV

:Two dimensional problems using Constant Stain Triangles. Introduction, Finite Element Modeling, Constant Strain Triangle. Problem Modeling and Boundary Conditions. Finite Element Equation for Consolidation.

UNIT V

Constitutive Models for Soils: Use of models in Engineering, Elasticity: ,plasticity, Yield function, Hardening law. Flowrule, Examples of von Mises criterion .

References:

Introductory Methods or numerical Analysis bySS Sastry, Prentice Hall of India.

Soil Mechanics and Foundations By Muni Budhu, John Wiley and Sons, INC.
Finite Element analysis by George R.Buchanan, Schaum's Out Line Series, Mcgraw-Hill Internations Editions.
Introduction to Finite Elements in Engineering by TR Chandrupatia and AD Belegundu
An Introduction to Critical State Soil Mechanics by Atkinson and Bransby, Mc graw Hill.
Analytical and computer Methods in Foundation Engineering By Bowels JE, Mc Graw Hill.
Numerical Methods in Geotechnical Engineering by Desai and Christian Jt, Mc graw Hill.

Course Outcomes (Cos)

1. Learning outcomes are the key abilities and knowledge that will be assessed in this unit. See assessment summary table below for details of which outcomes are assessed where. Outcomes are listed according to the course goals
2. that they support.
3. Design (Level 3)
4. Critically appraise the strengths and limitations of the various numerical techniques listed under point 4, as they apply to the solution of Geomechanics problems.
5. Use computer software to solve mechanical and hydrological problems in Geomechanics and critically appraise the quality of the solutions obtained.
6. Identify and characterise problems where coupling between mechanical and hydrological fields occurs,conditions under which coupling is important, as well as ways of assessing the strength of coupling. Maths/Science Methods and Tools (Level 4)
7. Critically appraise the strengths and weaknesses of experimental vs numerical investigations of Geomechanics problems and the design of geotechnical engineering solutions.
8. Derive the mathematical formulation for a numerical algorithm such as finite difference or finite element method to solve mechanical and hydrological problems in Geomechanics.
9. Derive the mathematical formulation for a numerical algorithm such as finite difference or finite element method to solve consolidation problems in Geomechanics.

10. Understand the fundamentals of other numerical techniques not covered in learning outcomes 2 or 3 (finite difference method, finite element method, discrete elements method).

CET 34 E 5 WATER POWER ENGINEERING

Lectures / Week : 3 Hrs. **Sessional Marks : 20 + 20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objectives (CEOs)

1. To know about different sources of energy
2. To understanding about low and high head plants
3. To know about design of pumped storage power plant
4. To learn about water conveyance losses
5. To know about planning of power house

INTRODUCTION

Introduction - Sources of Energy - Hydro-power - Estimation of Water power potential.

ELECTRICAL LOAD ON HYDRO-TURBINES

General - Load curve - Load factor - Capacity factor - Utilization factor - Diversity factor - Load duration curve - Firm power - Secondary power - Prediction of load.

UNIT II

HYDRO-POWER PLANTS

Low and High Head Plants :Classification of Hydel Plants - Run-of-River Plants - General Arrangement of Run-of-River Plants - Valley dam plants - Diversion canal plants. High Head diversion plants - Storage and pondage.

UNIT III

Pumped Storage Power Plants : Basic features - Advantages of pumped storage plants - Types of pumped storage plants - Relative merits of two-unit and three-unit arrangement - Reversible pump-turbines - Problems of operation - Topography, Reservoirs and water conveyance - Power house - Efficiency.

UNIT IV

WATER CONVEYANCE

Classification of penstocks - Design criteria - Economical diameter - Anchor blocks - Conduit valves - Bends and Manifolds.

Water Hammer - Resonance in Penstocks - Channel surges - Surge tanks.

Intakes - Types - Losses - Air Entrainment - Inlet Aeration - Canals - Forebay – Tunnels –

Selection of Turbines.

UNIT V

POWER HOUSE PLANNING

Surface Power Station: Power House Structure - Power house dimensions - Lighting and ventilation.

Underground Power Station: Location - Types - Advantages - Components - Types of Layout - Structural Design of Power Houses

Reference Books:

1. Water Power Engineering by M.M.Dandekar and K.N.Sharma.
2. A Text Book of Water Power Engineering by R.K.Sharma and T.K.Sharma.

Course Outcomes (Cos)

- Students able to plan and design a power house in surface and subsurface.

CET 34 E 6 WATERSHED MANAGEMENT

Lectures / Week : 3 Hrs. **Sessional Marks : 20 + 20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objectives (CEOs)

1. To learn about Rainfall-Runoff analysis and estimation and design of storm
2. To known about effective watershed management methods and optimization
3. To understand about different soil conservation equation and principles
4. To understand about artificial recharge techniques

UNIT I

WATERSHED HYDROLOGY:

Basic characteristics – Rainfall analysis – Runoff analysis – Estimation of design storm and the design flood – Flood routing – Flood mitigation through planning of reservoir capacities and operation of reservoirs.

UNIT II

WATERSHED MANAGEMENT:

Classification of effective watershed management methods – Factors affecting integrated watershed management – Watershed inventory – Problem definition and scope – Consultation process – Developing workable management options – Evaluation of constraints and criteria –

Simple assessment methods.

UNIT III

SOIL CONSERVATION:

Soil loss estimation – Universal soil loss equation – Soil erosion principles – Gully erosion – Design of permanent gully control structures – Stream bank erosion – Erosivity and erodability – Engineering measures and control practices.

UNIT IV

WATER HARVESTING TECHNIQUES:

Farm ponds – percolation tanks – Drop spillway chutes and flumes – Pipe spillways.

UNIT V

ARTIFICIAL GROUNDWATER RECHARGE TECHNIQUES:

Artificial recharge – Considerations – Methods – Induced infiltration – Water spreading – Flooding – Artificial recharge basins and ditches – Natural channel modifications – Recharge pits and shafts – Recharge wells.

REFERENCE BOOKS:

1. Prof. R. Suresh, "Watershed Hydrology " Standard Publishers.
2. Isobel W. Heathiote. "Integrated Watershed Management – Principles and Practices".
3. Schwab, G.O. & others, "Soil and water Conservation Engineering".
4. Prof. R. Suresh, "Soil and water Conservation Engineering".(Standard Publishers).
5. Wayne A. Pettyjohu, "Introduction to Artificial Ground Water Recharge" Scientific Publishers, Jodhpur.
6. Murthy J. V. S., "Watershed Management".

Course Outcomes (Cos)

- To perform planning and design of watershed
- To evaluate losses in watershed and placing of water harvesting structure
- Groundwater recharge techniques

CET 34 E 7 DESIGN AND DRAWING SPECIAL STRUCTURES

Lectures / Week : 3 Hrs. **Sessional Marks : 20 + 20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objectives (CEOs)

1. To understand the typical structural components analysis of beams curved in plan, Arches, Cables.
2. To learn the analysis and design of Bunkers and Silos.

UNIT I

Gantry Girder.

UNIT II

Steel Water Tank – Design of Rectangular Tanks

UNIT III

Elevated water tanks – types of over head tanks, Design of Intz-type tank including bracings & columns.

UNIT IV

Bunkers and silos: Design of Bunkers, Design of silos.

TEXT/ REFERECNE BOOKS:

Advanced R.C. Design – N. Krishna Raju CBS Publishers & Distributors.

Steel Structures - Ram Chandra

Advanced R.C Design - B.C Punmia

Course Outcomes (Cos)

2.1. Able to analysis for use in design of the typical structures like circular beams, parabolic and circular arches with different support conditions of slabs and purlins in the trusses.

CET 34 E 8 BRIDGE ENGINEERING

ectures / Week : 3 Hrs. **Sessional Marks : 20 + 20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objectives (CEOs)

1. To learn the different classifications of bridges, site investigation and planning.
2. To understand the loading standards for Bridge design.

UNIT I

INTRODUCTION:

History, Components, definitions, classification of bridges, requirements of an ideal bridge, identification of bridges.

SITE INVESTIGATION AND PLANNING:

Selection of site, alignment, collection of data, subsurface investigations.

BRIDGE HYDROLOGY:

Flood discharge, water way, economic span, depth of foundation, Scour and afflux, clearance, free board.

UNIT II

STANDARDS OF LOADING FOR BRIDGE DESIGN:

Evolution of bridge loading standards, Highway bridge loading standards, Railway bridge loading standards, impact factors, analysis of I.R.C. Loads.

UNIT III

CULVERTS:

PIPE CULVERTS: Generals features, classification of R.C.C. pipes, Design principals, Design examples.

BOX CULVERTS: General aspects, Design loads, Design moments, shears, Thrusts, design critical sections, design examples.

UNIT IV

REINFORCED CONCRETE SLAB BRIDGE DECKS:

General Design features, Analysis of Slab Decks, Design examples.

UNIT V

BRIDGE SUBSTRUCTURES:

BRIDGE BEARINS: General features, Types of bearings, Design principles and examples.

PIERS AND ABUTMENTS: General features, bed block, materials for piers and abutments, types of piers, forces acting of pier, stability analysis of piers, design of abutment, design of abutment, forces acting on abutments, stability analysis of abutments, types of wing walls, approaches.

BRIDGE FOUNDATIONS:

General aspects, types of foundations, pile foundations, well foundations, caisson foundations.

TEXT BOOKS:

Principles and practice of Bridge Engineering by Bindra.S.P.

Design of Bridge structures by T.E. Jagadeesh and M.A.Jayaram

Essentials of Bridge Engineering, by D.J.Victor,

Design of Bridges by N.Krishna Raju.

Course Outcomes (Cos)

1. Able to design pipe culverts, box culverts and RCC slab bridges decks.

CET 34 E 9 APPROPRIATE TECHNOLOGIES FOR RURAL DEVELOPMENT

Lectures / Week : 3 Hrs. **Sessional Marks : 20 + 20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objectives (CEOs)

1. To identify and learn the usage of appropriate technologies for several development.

UNIT I

INTRODUCTION: Definition and relationship between environment, sustainable development, rural development and appropriate technologies. Criteria for appropriate technologies and the village perspective.

APPROPRIATE TECHNOLOGIES : Problems connected with identifica-tion, assessment and dissemination of appropriate technologies for rural development.

UNIT II

RURAL HOUSING : Traditional Indian village houses and their components. Mud and thatch as building materials. Planning of low-cost houses. Appropriate building materials and technologies like pressed mud bricks, sand-cement blocks, ferrocement doors and roof arches, brick panel roofs, filler R.C.C. slab, rat trap bonding, Pabal Dome. Use of fly-ash.

UNIT III

DRINKING WATER : Sources, quality, problems connected with control of water borne diseases. Operation and maintenance of hand pump.

UNIV IV

HEALTH AND SANITATION : Relation between health, individual, household and community cleanliness. Control of open defecation, overflowing sullage, garbage and agricultural wastes. Low cost latrines, their components and usage. Garbage pits and vermi-compost, school sanitation.

UNIT V

ROADS : Different types of local materials for use in village roads.

ENERGY : Smokeless stoves, biogas plants and solar water heaters.

REFERENCE BOOKS :

i) Appropriate Technology Source Book - By Ken Darrow and Mike- Sexemian, A Volunteer's in Asia Publication, P.O.Box No.4543 Stanford, California, 94309, USA.

ii) Low-cost house - By Central Building Research Institute Roorkee.

iii) Appropriate Technologies for Rural Sanitation and Drinking Water - By National Institute of Rural Development, Rajendra nagar, Hyderabad.

Course Outcomes (Cos)

1. Application of appropriate technologies in rural development
2. Maintenance of better sanitary conditions to provide good environment

CET 34 E 10 FLOODS AND DROUGHTS-THEIR MANAGEMENT

Lectures / Week : 3 Hrs. **Sessional Marks : 20 + 20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objectives (CEOs)

1. To understand the rainfall analysis.
2. To study the methods of estimation of maximum probable flood runoff.
3. To know types, control and management methods of flood and droughts.

UNIT I

FLOODS

Introduction-Features of flood-Design flood-Standard project flood and maximum probable flood-guidelines for selecting design project(CWC)- stastical analysis of stream flow records-standard project flood estimates for small and large drainage basins-maximum probable flood estimates-design storm, risk reliability and safety factor.

UNIT II

FLOOD CONTROL AND MANAGEMENT

Flood control methods – Structural and non structural measures - Flood plain Zoning –Flood disaster monitoring and mitigation procedure – Methods of forecasting – Data analysis and warning – Flood fighting -Remote Sensing for flood management.

UNIT III

DROUGHTS

Definitions based on rainfall, stream flow, vegetation and comprehensive aspects - Characterisation of Drought/water shortage/aridity/desertification - NCA classification –Direct and indirect losses

UNIT IV

DROUGHT ASSESSMENT

Drought indices - Drought severity assessment – meteorological, hydrological and agricultural aspects - IMD, Palmer, Herbst, Aridity Indices .

UNIT V

DROUGHT MONITORING AND MANAGEMENT

Drought monitoring - Supply and demand oriented measures – Traditional water conservation - Drought Prone Areas Programme (DPAP) – Integrated drought management – Remote Sensing Applications for drought mitigation - NDVI concepts.

REFERENCES:

1. Chow V.T., Maidment D.R., Mays L.W., Applied Hydrology, McGraw Hill Publications, New York, 1995.
2. Vijay P.Singh., Elementary Hydrology, Prentice Hall of India, New Delhi, 1994.
3. Yevjevich V., Drought Research Needs, Water Resources Publications, Colorado State University, USA, 1977.

4. Engineering Hydrology by Subramanyam

Course Outcomes (Cos)

1. Able to do rainfall analysis.
2. Able to estimate maximum probable flood.
3. Able to classify floods and droughts
4. Able to control and manage floods.

CET 34 E 11 MAINTENANCE AND REHABILITATION OF STRUCTURES

Lectures / Week : 3 Hrs. **Sessional Marks : 20 + 20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objectives (CEOs)

1. To understand the quality assurance of concrete construction.
2. To arrive the maintenance and repair strategies.
3. Able to learn the materials and techniques required for repairs of concrete structures.

UNIT –I

General: - quality assurance for concrete construction, as built concrete properties, strength, permeability, volume changes, thermal properties, cracking. Influence on serviceability and Durability effects due to climate, temperature, chemicals, wear and erosion, design and construction errors, corrosion mechanism, Effects of cover thickness and cracking methods of corrosion protection, inhibitors, resistant steels, coatings cathodic protection

UNIT – II

Maintenance and Repair Strategies: - Inspection, Structural Appraisal, Economic appraisal, components of quality assurance, conceptual base for quality assurance schemes.

UNIT - III

Materials for Repair : - Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, expansive cement, polymer concrete, sulphur infiltrated concrete, ferro cement, Fibre reinforced concrete.

UNIT –IV

Techniques for Repair :- Rest eliminators and polymers coating for rebars during repair, foamed concrete, mortar and dry pack, vacuum concrete, Gunite and shotcrete Epoxy injection, Mortar repair for cracks, shoring and underpinning.

UNIT – V

Examples of repairs to structures: - Repairs to overcome low member strength, Deflection, cracking, chemical disruption, weathering, wear, fire leakage, marine exposure.

TEXT/ REFERECNE BOOKS:

1.Dension Campbell, allen and Harold Roper, Concrete Structures, Materialsa,

Maintenance and Repair, Longman Scientific and Technical, U.K. 1991.

2.RT. Allen and S.C Edwards, Rapair of concrete Structures, Blakie and sons, UK, 1987.

3.MS. Shetty, Concrete Technology – Theory and practice, S, chand and Company, New Delhi,

4.Santhakumar, S.R Training course notes on damage assessment and Repair in low cost housing RHDC-NBO Anna University, Madras, July, 1992.

5.Raikar, R.N. learning from failures – deficiencies in Design, construction and service – R& D centre (SDCPL), Raikar Bhavan, Bombay, 1987.

6.N.Palaniappan, estate Management, Anna Institute of Management, Madras Sep. 1992.

7.F.K. Garas, J.L Clarke, GST Armer, Structural Assessment, Butterworths, UK. April, 1987.

8.A. R santhakumar, concrete Chemicals – Theory and applications, Indian society for Construction Engineering and Technology, Madras.

Course Outcomes (Cos)

1. Able to know the repairs materials and techniques of concrete structures where ever found distressed.

CET 34 E 12 CIVIL ENGINEERING PROFESSIONAL PRACTICE

Lectures / Week : 3 Hrs. **Sessional Marks : 20 + 20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objectives (CEOs)

1. To expose the student to the civil engineering field practice in knowledge the department setup, needs and methods of measurements, PWD accounts and produce for works

UNIT - I

P.W.D. ACCOUNTS AND PROCEDURE FOR WORKS : Organisation of Engineering Department - Works, Classification of works - Methods of carrying out works - Contracts - Measurement Book - stores - Tools and plants - Mode of payment - Public Works Account.

UNIT -II

RULES AND METHODS OF MEASUREMENTS : General Rues, Earth work - Concrete - Brick

work - Stone masonry - Wood work - Carpenter's works - Joinery - Steel and iron work - Roof covering - Sloping roof - Flat terraced roof - Ceiling - Floor - Plastering and pointing - White washing - Colour washing - Painting - Sanitary and water supply works - Electrical works - Road works - Bituminous road - Dismantling - Demolition - Materials.

UNIT - III

EASEMENTS AND COVENANTS AND LAND ACQUISITION:Indian Easement Act. Natural light and easements in respect of Air, light, water etc. Acquisition of easements, loss of easements, Land Acquisition Act, purpose of acquisition, claim report for acquisition, ceiling act - Introduction of main provisions.

FIRE INSURANCE: Insurance Policy duties of architect, fire loss assessment, insurable value of property.

UNIT - IV

ARBITRATION: Introduction - arbitration, arbitrators, umpire, nature of aribitration, conduct, powers and duties of arbitration and umpire procedure - Procedure for arbitration, preparation and publication of awards, impeachment. Claims - fire insurance and arbitration of insurable value, claims and damages. Injunctions - easements and its definition, features of easements, interim, permanent and mendatory injunctions.

UNIT - V

Architects Registration Act. Code of professional conduct. Code for architectural competition. Architectural services - normal additional, special and partial. Scale of fees and mode of payment, claiming of fees. Architects Act of Registration of 1972, copy right of drawings.

TEXT BOOKS :

1. B.S.Patil, 'Civil Engineering Contracts and Estimates' - Orient Longman Publishers.
2. Roshan H.Namavasi - 'Professional Practice', Lakshmi Book Depot.
3. 'National Building Code' by ISI.
4. Estimation, Cost and Valuation - B.N.Dutta.

Course Outcomes (Cos)

1. To provide the know low of the department produces for execution of civil works

2. Ability to understand the procedures of the department in civil engineering field works

CET 34 E 13 CONSTRUCTION ECONOMICS AND FINANCE

Lectures / Week : 3 Hrs. **Sessional Marks : 20 + 20**

Univ. Exam. : 3 Hrs. **Univ. Exam. Marks : 60**

Course Educational Objectives (CEOs)

1. To learn the cost evaluation of present and future worth of project
2. To know the cost ratio evaluation, concepts of replacement analysis.

UNIT I

Basic terminology - Interest calculations - Equivalence - Simple and compound interest - Cash flow diagram - single - Payment formulas - uniform series present worth factor and the capital recovery factor - uniform series compound amount factor and sinking fund-factor - Standard factor notation and use of interest tables - Definition and derivation of gradient formulas - Present worth, future worth and equivalent uniform annual series - Present worth and equivalent uniform annual series of conventional gradients - Calculation of unknown interest sates - Calculation of unknown years.

UNIT II

Nominal and effective rates - Effective interest - Rate formulation - effective interest rates - payment periods longer than compounding periods - Location of present worth and future worth - uniform series and randomly distributed amounts - Equivalent uniform annual sereis of both uniform and single payments - Prsent worth and equivalent annual series of shifted gradients - Decreasing gradients.

UNIT III

Present - Worth and Capatalized - Cost Evaluation

Present - Worth Comparison of equal-lived alternatives and different lived alternatives - capitalized - Cost calculations - Capitalized cost comparision of two alternatives.

Equivalent - Uniform - Annual - Cost Evaluation

Study period for alternatives - Salvage sinking - Fund method - Comparing alternatives by EUAC - EUAC of a perpentual investment.

UNIT IV

Rate-of-Return Computations for Single Project

Overview of Rate-of-Return Computation - Rate of Return calculations by the present-worth method and equivalent - Uniform - Annual cost method.

Rate of Return Evalaution for Multiple Alternatives

Tabulation of Net Cash Flow - Interpretation of rate of return on extra investment - Incremental rate of return evaluation using the present worth method - Incremental - Rate of return evaluation using the EUAC method - Selection from mutually enclusive alternatives using Rate-of-Return Analysis.

UNIT V

Benefit / Cost Ratio Evaluation

Classification of benefits, costs and disbenefits - Benefits, disbenefits, and cost calculations of a single project - Alternative comparison by benefit / cost analysis - Benefit / Cost analysis for multiple alternatives - Selection from mutually exclusive alternatives using incremental benefit / cost ratio analysis.

Replacement Analysis

The defender and challenger concepts in replacement analysis - Replacement analysis using a specified planning horizon - Replacement analysis for one additional year retention - Minimum cost life.

Depreciation

Depreciation models and switching between depreciation models.

REFERENCE:

Engineering Economy - Leland T. Blank and Anthony J. Targuin.

Course Outcomes (Cos)

- Ability to design single / multiple projects based on validity and economy.

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CEP 15 PROJECT WORK

Tutorials / week : 3 Hrs **Sessionals : 40**

End Exams : Viva-Voce **End Exam Marks : 60**

Course Educational Objectives (CEOs)

1. To enable the students to work in convenient group on a project involving theoretical and experimental studies related to Civil Engineering

Carrying out project work in the choosen area of Civil Engineering.

Preparations of Detailed Project Report.

Course Outcomes (Cos)

2. To enable the students to work in convenient group
3. Capable of doing a project involving theoretical and experimental studies.
4. Modern trend and technology in civil engineering

CEP 16 CAD LAB

Practicals / week : 2 Hrs. **Sessional Marks : 40**

End Exam : 3 Hrs. **End Exam. Marks: 60**

Course Educational Objectives (CEOs)

1. To acquire hands on experience in design and preparation of structural drawings for concrete / steel structural normally encountered in civil engineering practices

Analysis and Design

1. Axial members
2. Beams
3. Plane Trusses
4. Space Trusses
5. Plane Frames
6. Space Frames

Course Outcomes (Cos)

1. Ability to apply computer aided design techniques to complete all phases to top-down civil engineering design problems.

2. Use computer aided software techniques to prepare and deliver written and drawing presentation of design specifications
3. Understanding to interpret the detailing drawing of components with relevant IS codes.

CEP 17 GIS LAB

Practicals / week : 2 Hrs. **Sessional Marks : 40**

End Exam : 3 Hrs. **End Exam. Marks : 60**

Course Educational Objectives (CEOs)

1. To gain practical experience in using spatial data in GIS environment.

1. Concept of GIS – Understanding Map projections
2. Map projections – preliminaries
3. Topographic map interpretation
4. Introduction to ILWIS software
5. Spatial data input
6. Spatial data management
7. Spatial data analysis

Course Outcomes (Cos)

1. Ability to handle spatial data in GIS environment
2. Analysis and data management of spatial data for solution of engineering projects.s