

## **CE 801 – Geo. Technical Engg.II**

**Branch:** Civil Engineering-VIII Semester **Course:** CE801 Geo Tech. Engg. – II

### **Unit - I**

Shallow Foundations : Type of foundations shallow and deep. Bearing capacity of foundation on cohesion less and cohesive soils. General and local shear failures. Factors effecting B.C. Theories of bearing capacity - Prandle, Terzaghi, Balla, Skempton, Meyerh of and Hansan. I.S. code on B.c. Determination of bearing capacity. Limits of total and differential settlements. Plate load test.

### **Unit - II**

Deep Foundation : Pile foundation, Types of piles, estimation of individual and group capacity of piles in cohesion less and cohesive soils. Static and dynamic formulae.. Pile load test, Settlement of pile group, Negative skin friction, under- reamed piles and their design. Piles under tension, inclined and lateral load Caissons. Well foundation. Equilibrium of wells. Analysis for stability tilts and shifts, remedial measures.

### **Unit - III**

Soil Improvement Techniques : Compaction. Field and laboratory methods, Proctor compaction tests, Factors affecting compaction. Properties of soil affected by compaction. Various equipment for field compaction and their suitability. Field compaction control. Lift thickness. Soil stabilisation : Mechanical, Lime, Cement, Bitumen, Chemical, Thermal, Electrical- stabilisation and sabilisation by grouting. Geo-synthetics, types, functions, materials and uses.

### **Unit - IV**

Soil Exploration and Foundations on Expansive and Collapsible soils : Methods of soil exploration. Planning of exploration programme for buildings, highways and earth dams. Disturbed and undisturbed samples and samplers for collecting them. Characteristics of expansive and collapsible soils, their treatment, Construction techniques on expansive and collapsible soils. CNS layer.

### **Unit - V**

Sheet piles/Bulkheads and Machine foundation : Classification of sheet piles/bulkheads. Cantilever and anchored sheet piles, Cofferdams, materials, types and applications. Modes of vibration. Mass-spring analogy, Natural frequency. Effect of vibration on soils. Vibration isolation. Criteria for design. Design of block foundation for impact type of machine.

**LABORATORY WORK:** Laboratory work will be based on the course of Geotech. Engg. I & II as required for soil investigations of engineering projects and not covered in the lab. Work of Geotech. Engg. I.

### **Reference Books :--**

1. Soil Mechanics & Foundation Engg. by Dr. K.R. Arora - Std. Publishers Delhi
2. Soil Mechanics & Foundation Engg. by B.C. Punmia - Laxmi Publiscations Delhi
3. Modern Geotech. Engg. by Dr. Alam Singh-IBT Publishers Delhi.
4. Geotech. Engg. by C.Venkatramaiah-New AGE International Publishers, Delhi
5. Found. Engg. by GALEonards McGraw Hill Book Co. Inc.
6. Relevant IS Code

## **LIST OF EXPERIMENTS**

1. Indian Standard Light Compaction Test/Std. Proctor Test
  2. Indian Standard Heavy Compaction Test/Modified Proctor Test
  3. Determination of field density by Core Cutter Method
  4. Determination of field density by Sand Replacement Method
  5. Determination of field density by Water Displacement Method
  6. The corifiled Compression Test
  7. Triaxial compression test
  8. Lab. Vane Shear test.
  9. CBR Test
  10. Demonstration of Plate Load Test SPT & DCPT
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## **CE 802 – Construction Planning & Management**

**Branch:** Civil Engineering-VIII Semester

**Course:** CE802 Construction Planning & Management

### **Unit -I**

**Preliminary and detailed investigation methods:** Methods of construction, form work and centering.

Schedule of construction, job layout, principles of construction management, modern management techniques like CPM/PERT with network analysis.

### **Unit -II**

**Construction equipments:** Factors affecting selection, investment and operating cost, output of various equipments, brief study of equipments required for various jobs such as earth work, dredging, conveyance, concreting, hoisting, pile driving, compaction and grouting.

### **Unit -III**

**Tenders & Contracts:** Different types of Tenders & Contracts, notice inviting tenders, contract document, departmental method of construction, rate list, security deposit and earnest money, conditions of contract, arbitration, administrative approval, technical sanction.

### **Unit -IV**

**Specifications & Public Works Accounts:** Importance, types of specifications, specifications for various trades of engineering works.

Various forms used in construction works, measurement book, cash book, materials at site account, imprest account, tools and plants, various types of running bills, secured advance, final bill.

### **Unit-V**

**Site Organization & Systems Approach to Planning:** Accommodation of site staff, contractor's staff, various organization charts and manuals, personnel in construction, welfare facilities, labour laws and human relations, safety engineering.

Problem of equipment management, assignment model, transportation model and waiting line models with their applications, shovel truck performance with waiting line method.

### **Reference Books :-**

1. Construction Equipment by Peurify
2. CPM by L.S. Srinath
3. Construction Management by S. Seetharaman
4. CPM & PERT by Weist & Levy
5. Construction, Management & Accounts by Harpal Singh
6. Tendering & Contracts by T.A. Talpasai

## **CE 803 – Advanced Structural Design II (Steel)**

**Branch:** Civil Engineering-VIII Semester

**Course:** CE803 Advanced Structural Design- II (Steel)

### **Unit – I**

Plate girder bridges (Riveted and welded)

### **Unit – II**

Trussed girder bridges for railways and highways (IRC & IRS holding). Bearings for bridges.

### **Unit – III**

**Water Tanks:** Pressed steel tanks, tanks with ordinary plates, square, rectangular, circular with hemispherical bottom and conical bottom.

### **Unit - IV**

**Chimneys:** Guyed and self supporting steel stacks.

### **Unit – V**

Bunkers, Silos & Towers

### **Reference Books :-**

1. Design of Steel Structures – Ramammutham
2. Design of Steel Structures – Punia
3. Steel Str. by Ramchandra Vol II
4. Steel Str. by Arya & Ajmani
5. Design of steel structures – L.S. Negi

## **CE -8041 Structural Dynamics & Earthquake Engineering**

### **Unit - I.**

Single DOF systems - Undamped and Damped, Response to Harmonic and periodic excitations, Response to Arbitrary, Step, Ramp and Pulse Excitations.

### **Unit - II.**

Numerical Evaluation of Dynamic Response - Time stepping methods, methods based on Interpolation of Excitation, Newmark's and Wilson -  $\alpha$  method, Analysis of Nonlinear Response, Introduction to frequency domain analysis.

### **Unit - III.**

Elements of seismology - Definitions of the basic terms related to earthquake (magnitude, intensity, epicenter, focus etc.), seismographs Earthquake Response of structures - Nature of dynamic loading resulting from earthquake, construction of Response spectrum for Elastic and Inelastic systems.

### **Unit - IV.**

Multiple DOF systems : Stiffness and Flexibility matrices for shear buildings, free and forced vibrations-undamped and damped, Modal and Response History Analysis, Systems with distributed mass & elasticity.

### **Unit - V.**

Earthquake Resistant Design of Structures, Design of structures for strength & serviceability, Ductility and energy absorption, Provisions of IS : 1893 and IS : 4326 for aseismic design of structures, Code for ductile detailing IS : 13920.

### **Reference Books :--**

1. Chopra A.K., Dynamics of structures - Theory and Applications to Earthquake Engineering, Prentice Hall of India, New Delhi.
2. Berg G.V. Elements of Structural Dynamics, Prentice Hall of India, Englewood Cliffs, NJ
3. Paz Mario, Structural Dynamics, CBS Publishers, Delhi
4. Clough R.W. & Penzien J., Dynamics of structures McGraw Hill, New York.

## **CE -8042 Pavement Design**

### **Unit -I.**

Equivalent Single Wheels Load concepts and applications, Relationship between wheel arrangements and loading effects, tyre contact area, Effect of load repetition, Effect of transient loads, Impact of moving loading, Factors to be considered in Design of pavements, Design wheel load, soil, climatic factors, pavement component materials, Environmental factors, Special factors such as frost, Freezing and thawing.

### **Unit -II.**

Flexible Pavements : Component parts of the pavement structures and their functions, stresses in flexible pavements, Stress distribution through various layers, Boussinesque's theory , Burmister's two layered theory, methods of design, group index method, CBR method, Burmister's method and North Dakota cone method.

### **Unit -III.**

Rigid Pavements : Evaluation of subgrade, Modulus-K by plate bearing test and the test details, Westergaard's stress theory stresses in rigid pavements, Temperature stresses, warping stresses, frictional stresses, critical combination of stresses, critical loading positions.

### **Unit -IV.**

Rigid pavement design : IRC method, Fatigue analysis, PCA chart method. AASHTO Method, Reliability analysis.

PAVEMENT JOINTS : Types of joints, contraction and warping joints, dowel bars and tie bars, Temperature reinforcements, filling and sealing of joints.

### **Unit -V.**

Evaluation and Strengthening of Existing Pavements : Benkleman beam method, Serviceability Index Method.

Rigid and flexible overlays and their design procedures.

### **Reference Books :--**

1. Principles of pavement design by E.J.Yoder & M.W. Witczak
2. AASHO, "AASHO Interim Guide for Design of Pavement Structures", Washington, D.C.
3. Portland Cement Association, Guidelines for Design of Rigid Pavements, Washington
4. DSIR, Conc. Roads Design & Construction
5. Srinivasan M. "Modern Permanent Way"

## **CE- 8043 Air Quality Monitoring & Control**

### **Unit - I**

**Air pollution problem:** Economics and social aspects, historical episodes of air pollution.

Sources of Air

pollution, effects of air pollution on health, animal, plants and materials

### **Unit - II**

Role of meteorological condition, properties of typical air pollutants, air diffusion and concentration pollutants.

general diseases caused by air pollutants. toxicity of various pollutants. Plumes patterns and height of chimneys.

### **Unit - III**

Atmospheric chemistry, formation of secondary pollutants – PAN, PBN, Photolytic cycles, general diseases and toxicity of pollutants

### **Unit - IV**

**Sampling and Analyzing of Air Pollutants:** Instruments pollution survey, standards of air pollution.

Principle of air pollution control, site selection and zoning, various control methods, process and equipment changes, design and operation of various air pollution control equipments.

### **Unit - V**

Air pollution control legislation, public education pollution standards, status of air pollution control in various countries.

**Industrial Hygiene:** Concept and importance, factory Involved in environmental hazards, industrial ventilation occupational diseases, control methods.

### **Reference Books :--**

1. "Air Pollution" - Faith W.L, John Wiley & Sons
2. "Air Pollution" - McCabe L.C., McGraw Hill, International
3. Air Pollution - Stern A.C., Academic Press N. York
4. Fundamentals of Air Pollutions - Raju BSN Oxford & IBH Publishing Co. Pvt. Ltd.
5. "Air Pollution" - Rao M.N. & Rao HVN - Tata McGraw Hill
6. Air Pollution – Wark and Warner

## **CE- 8044 Energy Efficient & Green Building**

### **UNIT-I**

Energy efficient Green Buildings - The green Building concept, rating systems in India and world, GRIHA, LEED, etc. , green building rating agencies and some top green buildings in the world, sustainable practices used in the design and construction phases of Energy Efficient Green Buildings. Green Rating for Integrated Habitat Assessment (GRIHA), Energy Efficient Solar Homes & Buildings, Energy Savings in Homes, IGBC certification.

### **UNIT-II**

Energy Conscious Buildings - CLIMATE AND BUILDINGS IN INDIA, Introduction ,Factors affecting climate, Climatic zones and their characteristics, Implications of climate on building design ,Urban climate ,Microclimate, Tools for analyzing weather data, Illustrative example, References.

Codes: National Building Code, Energy Conservation Building Codes, Key barriers to 'building green in India, Overcoming the barriers, implementation approach, etc.

### **UNIT-III**

PRINCIPLES OF ENERGY CONSCIOUS DESIGN OF BUILDINGS IN INDIA –  
Introduction

Building Envelope, Site, Orientation, Building Configuration, Building Components, Passive Heating, Direct Gain ,Indirect Gain, Thermal storage wall, Roof top collectors, Isolated Gain, Solarium (Attached greenhouse / sunspace), Passive Cooling, Ventilation Cooling, Cross ventilation, Wind tower, Induced ventilation, Nocturnal cooling ,Evaporative Cooling ,Passive downdraft evaporative cooling (PDEC) ,Roof surface evaporative cooling (RSEC) ,Direct

evaporative cooling using drip-type (desert) coolers 3.4.3 Nocturnal ,Radiation Cooling, Desiccant Cooling, Earth Coupling, Earth-air pipe system ,Daylighting ,Basic Principles of Daylighting ,Daylighting Systems, Building Materials ,Embodied Energy of Building Materials ,Alternative Building Materials

### **UNIT -IV**

THERMAL PERFORMANCE OF BUILDINGS - Introduction, Heat Transfer, Solar Radiation, Simplified Method for Performance Estimation ;Example Computer-based Tools  
DESIGN GUIDELINES: Description of Buildings, Methodology, General Recommendations, Specific Guidelines.

### **UNIT-V**

Zero Energy Buildings - Opportunities and challenges in designing a Net zero building ,Energy efficient solar homes/buildings, Design aspects ,Climatic zones ,Passive design features and ,. their advantages, Orientation of building, Sunshades, Window design, Double glazed windows Building insulation, Roof treatment ,Evaporative cooling ,Landscaping ,Surface to volume ratio Passive heating ,Earth air tunnel ,Solar chimney, Wind tower, Applicable passive features for various climatic zones, Energy-efficient lighting, Indoor lighting ,Outdoor lighting ,Energy-efficient air conditioners, Selecting the right size, Selecting an efficient AC ,Installing an AC, Renewable energy devices/systems, Solar water heating system Building integrated PV system, Other renewable energy devices/systems.



## **CE 8045 : DESIGN OF PRESTRESSED CONCRETE STRUCTURES**

### **Unit – 1.**

Introduction, Principles of prestressing, Different methods of prestressing – post tensioning and pre-tensioning.

Prestressed concrete materials. Need for high strength concrete and High concrete tensile steel.

Creep and shrinkage of concrete, relaxation of steel. Losses of prestress friction and anchorage of steel.

### **Unit – 2.**

Flexural strength of prestressed concrete section. Analysis of prestress, Resultant stress at a section, Line of Thrust, Load Balancing. Cracking moments.

Shear strength and torsional strength of prestressed concrete section. Principle stresses and principal shear stresses, Ultimate shear resistance.

### **Unit – 3.**

Stress-pattern in anchorage zones. Transmission length. End zone reinforcement. Stress distribution in end block.

### **Unit – 4.**

Design of members for flexure. Code recommendations. Rectangular and I-section. Working out of section dimensions for concrete and prestressing forces for steel. Application to design of slabs and continuous beams and Bridge girders. Design for concordant table and tendon profiles.

### **Unit – 5.**

Design of tension and compression members, Design for combined bending and compressive, Different approaches for design, Introduction to design of transmission poles, roof truss members, purlin, railway sleepers.

### **Books & References Recommended:**

1. Lin T.Y., *Design of Prestressed Concrete Structures*.
2. Varatnam P., *Prestressed Concrete Structures*.
3. Ramarathan S., *Prestressed Concrete*.
4. Graduate I.I., *Prestressed Concrete*.
5. Krishna Raju, *Prestressed Concrete*.
6. Evans R.H. and Bennett R.S., *Prestressed Concrete*. 7. IS-1343.
8. Mullick S.K. and Rangaswamy R.S., *The Mechanics of Prestressed Concrete Design*.
9. Sinha and Raj, *Prestressed Concrete*.

## **CE-8047 Advance Water Resources Engg**

### **Unit - 1**

Optimal Raingauge Network Design, Adjustment of Precipitation Data, Depth Area-Duration Analysis, Design Storm, Probable Maximum Precipitation, Probable Maximum Flood, Flood Frequency Analysis, Risk Analysis,

### **Unit - 2**

Flood Management, Flood Routing through Reservoirs, Channels Routing Muskingum Method, Introduction to Stochastic Models in Hydrology like AR, ARMA, ARIMA etc. Concept of Correlogram.

### **Unit - 3**

System Analysis: Need, Water Resources Systems, Optimisation Techniques, Linear Programming, Feasible Solutions, Graphical Method, Simplex Method, Use of LP in Water Resources, Introduction to Reservoir Operation, Rule curves, Linear Decision Rule

### **Unit - 4**

Dynamic Programming, its utility in Resource Allocation and other Decision Making Problems, Optimal Operating Policies, Use of D. P. in Reservoir, Operation.

### **Unit-5**

Network Methods, Project Optimality Analysis. Updating of Network, Utility in Decision Making.

### **Book Recommended: Test Books**

1. Subramany K., Engg. Hydrology.
2. Philipps & Ravindran: Operations Research
3. Hire D.S. & Gupta: Operation Research

### **Reference Books**

1. Loucks D.P., Stedinger I.R. & Haith D.A : Water Resources Systems Engg.
2. Kottegoda N. T., Stochastic Water Resources Technology.
3. Singh V.P. : Elementary Hydrology

## **CE 804 – Major Project**

**Branch:** Civil Engineering-VIII Semester

**Course:** CE805 Major Project - I

Each candidate shall work on an approved Civil Engg. Project and shall submit design and a set of drawings on the project.