

CEC 801 – Geo. Technical 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

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

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 Publications 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

CEC 802 – 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

PRACTICAL & SESSIONAL WORK: Laboratory work will be based on the course of STEEL-II as required for The design of engineering projects.

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

CEC-803(A) Departmental Elective VII

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 modals 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

CEC-803(B) Departmental Elective VII

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 - α 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.

CEC-804(A) Departmental Elective VIII

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. AASHTO, "AASHTO 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"

CEC-804(B) Departmental Elective VIII

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" - Mc Cabe L.C., Mc. Graw 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 Mc Graw Hill
6. Air Pollution – Wark and Warner

CEC-805(A) Open Elective

Advance Water Resources Engineering

Unit - 1

Optimal Rain-gauge 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

CEC-805(B) Open Elective

Environmental Impact Assessment

UNIT-I

Concept of EIA: Introduction of EIA, Utility and scope of EIA, Significant Environmental Impacts, Stage of EIA, Environmental Inventory, Environmental Impact Statement (EIS)

UNIT-II

Methods of Impact Identification: Environmental Indices and indicators for describing the affected environment, matrix methodologies, network, checklist, and other method.

UNIT-III

Impact analysis: Framework, statement predication and assessment of impact of air, water, noise and socio-economic environment.

UNIT-IV

Preparation of written documentation: Initial planning phase, detailed planning phase, writing phase, organizing relevant information, co-ordination of team writing effort.

UNIT-V

Public Participation in Environmental Decision making : Basic definitions, Regulatory requirements, Advantages & disadvantages of Public Participation, Selection of Public participation techniques, Practical considerations for implementation.

Reference Book :-

1. Environmental Assessment in Practice 1st Edition, Kindle Edition by Owen Harrop , Ashley Nixon
2. The Role of Environmental Monitoring and Audit in the Environmental Impact Assessment Process By Kai-Hang Choi (Author)
3. Environmental Impact Assessment by R.R. Barthwal.
4. Environmental Studies by M. P. Punia.
5. Policy Intervention Analysis: environmental Impact Assessment by Ritu Paliwal, Leena Srivastav

CE 806 – Industrial Training Project -II

Each candidate should work on project Assigned or Approved by Civil Engineering Department. Student submit report to department.