

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Civil Engineering, VIII-Semester

Departmental Elective CE 802(A) Engineering Hydrology

UNIT I

Hydrological cycle, water budget, Practical applications of Hydrology, Hydrometeorology, airmasses. Formation of precipitation, types of precipitation, meteorological observations, probability & random variables, regression analysis, catchment its type and importance, measurement of precipitation, Raingauges, location of raingauges, interpretations & analysis of rainfall data, calculation of average rainfall, Hyetograph, Intensity-duration, Frequency curves , Mass curve.

UNIT II

Stream flow measurement and various methods, stage-discharge relations. Rating curve and its extension, stream gauge Networking, stage & discharge hydrographs, evaporation & evapotranspiration-calculation, factors affecting measurement, Reducing evaporation.

UNIT III

Infilleration, Factors affecting it, measurement of Infilleration, Infilleration equation and Indices. Occurance of ground water, Darcey's law, flow in wells (steady & unsteady). Ground water exploration. Yield of well, determination of yield.

UNIT IV

Runoff and its components, factors affecting runoff, Basin yield, Rainfall-Runoff relationships, flow-duration curve, flow mass curve, Hydrograph, separation of hydrograph, unit hydrograph - theory & application, derivation of unit hydrograph convolution equation, unit hydrograph from complex storms unit hydrograph for various durations, synthetic unit hydrograph, S-curve hydrograph, distribution graph, use & applications of unit hydrograph, Dimensionless unit Hydrograph.

UNIT V

Instantaneous unit Hydrograph, Derivation of IUH, flood routing, reservoir routing, different methods, storage discharge relationship, ISD method, puls method, channel routing –muskingham method, design flood –Empirical & rational formula, frequency analysis, Gumbel's distribution, Reservoir sedimentation-causes, factors affecting & control.

Books:

1. Engineering Hydrology by Subramanyam
2. Introduction to hydrology By: Viessman & lewis
3. Applied Hydrology By: CW Fetter
4. A text Book of Hydrology By: Reddy
- 5.

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New Scheme Based On AICTE Flexible Curricula

Civil Engineering, VIII-Semester

Departmental Elective CE 802(B) Foundation Engineering

UNIT 1. Selection of foundation and Sub-soil exploration/investigation: Types of foundation, Factors affecting the selection of type of foundations, Steps in choosing types of foundation based on soil condition. Objectives and planning of exploration program, methods of exploration-wash boring and rotary drilling-depth of boring, Soil samples and soil samplers-representative and undisturbed sampling, Field penetration tests: SPT, SCPT, DCPT. Introduction to geophysical methods, Bore log, report writing.

UNIT 2. Shallow Foundation: Introduction, significant depth, design criteria, modes of shear failures. Detail study of bearing capacity theories (Prandtl, Rankine, Terzaghi, Skempton, Meyerhof), Bearing capacity determination using IS Code. Settlement, components of settlement & its estimation, permissible settlement, Proportioning of footing for equal settlement, allowable bearing pressure. Bearing capacity from in-situ tests (SPT, SCPT, PLATE LOAD), Factors affecting bearing capacity, Contact pressure under rigid and flexible footings. Floating foundation.

UNIT 3. Pile foundations: Introduction, Load transfer mechanism, Types of piles and their function, Factors influencing selection of pile, their method of installation and their load carrying characteristics for cohesive and granular soils, Piles subjected to vertical loads- pile load carrying capacity from static formula, dynamic formulae (ENR and Hiley), Pile load test, Pile group: carrying capacity, efficiency and settlement. Negative skin friction.

UNIT 4. Foundations on problematic soil & Introduction to Geosynthetics: Significant characteristics of expansive and collapsible soils, footing on such soils, Problems and preventive measures. Under-reamed pile foundation-its concept, design & field installation. Introduction to geosynthetics-materials, types, functions and uses.

UNIT 5. LATERAL EARTH PRESSURE: Active, Passive and Earth pressure at rest. Rankine's theory of earth pressure, Earth pressures in layered soils, Coulomb's earth pressure theory, Culmann's graphical method.

RETAINING WALLS: Types of retaining walls- stability of retaining walls against overturning, sliding, bearing capacity and drainage from backfill. Reinforced earth retaining walls.

Reference Book:

1. Murthy, V.N.S., "Text book of Soil Mechanics and Foundation Engineering", CBS Publishers Distribution Ltd., New Delhi, 2014.
2. Arora, K.R., "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, New Delhi, 7th Edition, 2017 (Reprint).
3. Punmia, B.C., "Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd. New Delhi, 16th Edition 2017.
4. Joseph E bowles, "Foundation Analysis and design", McGraw Hill Education, 5th Edition, 28th August 2015.

5. Shamsheer Prakash et al, "Analysis, Design of foundations and Retaining Structures" Sarita Prakashan.
6. Murthy, V.N.S., "Advanced Foundation Engineering", CBS Publishers and Distributors
7. Coduto D.P., Foundation design; principles and practices, Pearson Publication

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Civil Engineering, VIII-Semester

Departmental Elective CE 802(C) Bridge Engineering

UNIT 1: Types of Bridge Super Structures

Introduction and types, temporary bridge superstructures, military bridges, other temporary bridges, permanent bridges, R.C.C. bridges, Pre-stressed concrete bridges, steel bridges, movable steel bridge.

Consideration of loads and stresses in road bridges: Introduction, loads, forces and stress, dead loads, bridge loading as per relevant IRC and IRS specifications traffic lanes, foot way, kerbs, railing and parapet loading, impact, wind load, longitudinal forces, Temperature effect of live load on back fill and on the abutment.

UNIT 2: Design of R.C. Bridge

Slab culvert, pipe culvert, T-beam, box culvert bridge super structure, Courbon's theory for load distribution, balanced cantilever bridges, design examples.

UNIT 3: Design of Steel Bridges

Types of steel superstructure, plate girder bridge, truss bridge, wind forces of lattice girder bridge, bracings, arch and bowstring girder bridge, design example.

UNIT 4: Pier, Abutment and Wing Walls

Types of piers and abutments, stability analysis of piers and abutments, design of piers, Forces on piers, stability, abutment, bridge code provision for abutments, wing walls, design examples.

UNIT 5: Foundations and Bearings

Types of bridge foundations and general design criteria, shallow foundations, deep foundations, piles, wells and pneumatic caissons, river training works.

Bearings: functions and types of bearings, necessity of bearings, design of elastomeric bearings, expansion joints, necessity and types of expansion joints, design considerations.

References Books:

1. Victor, D.J., Essential of Bridge Engineering , Oxford & IBH Publishing Co., New Delhi.
2. Rowe, R.E., Concrete Bridge Design , C.R. Books Ltd., London
3. Krishna Raju N, Design of Bridges, Oxford & IBH Publishing Co., New Delhi.
4. Bakht. B and Jaeger, L.C., Bridge Analysis Simplified, McGraw Hill Book Co. Inc.
5. Ponnuswamy, S., Bridge Engineering, Tata McGraw Hill, New Delhi.
6. Bakht, B. and Jaeger, L.G., Bridge Deck Analysis Simplified, McGraw Hill International Edition, Singapore
7. Aswani M.G., Vazirani V.N. and Ratwani M.M., Design of Concrete Bridges, Khanna publishers, New Delhi.
8. Hambly E.C., Bridge Deck Behaviour.
9. Sastry V.V., Design of Bridges, Dhanpat Rai & Co
10. Raina V.K., Concrete Bridge Design and Practice, Tata McGraw Hill, New Delhi.

11. Jagadeesh .T.R. and Jayaram.M.A., "Design of Bridge Structures", Prentice Hall of India Pvt. Ltd, Learning Pvt. Ltd., 2013
12. Indian Standard Codes and IRC codes related to bridges.

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New Scheme Based On AICTE Flexible Curricula

Civil Engineering, VIII-Semester

Departmental Elective CE 802(D) Earthquake Resistant Design of Structures

Unit I

Engineering Seismology: Introduction to engineering seismology, Geological and tectonic features of India, Origin and propagation of seismic waves, Earthquake measurement parameters, Characteristics of earthquake and its quantification- Magnitude and Intensity scales, Seismic instruments. Seismic zoning map of India.

Unit II

Response Spectrum: Response history and strong motion characteristics. Response Spectrum- elastic and inelastic response spectra, tripartite (D-V-A) response spectrum, use of response spectrum in earthquake resistant design .Computation of seismic forces in multi-storeyed buildings - using procedures as per codal provisions.

Unit III

Aseismic Structural Modelling: Structural configuration for earthquake resistant design, Concept of plan irregularities and vertical irregularities, Soft storey, Torsion in buildings. Design provisions for these in IS-1893. Effect of infill masonry walls on frames, modeling concepts of infill masonry walls. Behaviour of masonry buildings during earthquakes, failure patterns, strength of masonry in shear and flexure, Slenderness concept of masonry walls,

Unit IV

Design of structure for earthquake resistance: Seismic design philosophy, Load combinations, Ductility and energy absorption in buildings. confinement of concrete for ductility, design of columns and beams for ductility, ductile detailing provisions as per IS-1893. Lateral load resisting structural systems.

Unit V

Seismic control of structures: Introduction, concept and types of seismic control systems as active, passive and semi-active systems. Requirements of efficient earthquake resistant structural system, damping devices, base isolation systems. Retrofitting of structures.

Reference Books:

1. Chopra Anil Kumar, Dynamics of Structures - Theory and Application to Earthquake Engineering, Pearson Education.

2. Hosur Vinod, Earthquake Resistant Design of Building Structures, Wiley (India).
3. Duggal S. K., Earthquake Resistant Design of Structures, Oxford University Press.
4. Agarwal Pankaj, Shrikande Manish, Earthquake Resistant Design of Structures, Prentice Hall of India, New Delhi India.
5. Pauley & Priestly, Seismic Design of Reinforced Concrete and Masonry Buildings, John Wiley & Sons.
6. Stratta J. L, Manual of Seismic Design, Prentice-Hall India Pvt Ltd.
7. Kramer S. L., Geotechnical Earthquake Engineering, Prentice-Hall India Pvt Ltd.
8. All relevant IS codes:
IS 1893: Criteria for earthquake resistant design of structures, Bureau of Indian Standards, New Delhi.
IS 4326: Code of practice for earthquake resistant design and construction of buildings, Bureau of Indian Standards, New Delhi.
IS 13920: Ductility detailing of reinforced concrete structures subjected to seismic forces, Bureau of Indian Standards, New Delhi.