



**Biju Patnaik University of
Technology, Odisha B.E./B.Tech
CIVIL Sem 6 syllabus**

Design of Steel Structures

RCI6C001 Design of Steel Structures

Module I

Introduction, advantages/disadvantages of steel, structural steel, rolled steel section, various types of loads, design philosophy. Limit state design method, limit states of strength and serviceability, probabilistic basis for design Riveted, bolted and pinned connections, Welded connections-assumptions, types, design of fillet welds, intermittent fillet weld, plug and slot weld, failure of welded joints, welded joints vs bolted and riveted joints

Module II

Tension members, types, net cross-sectional area, types of failure, slenderness ratio, design of tension members, gusset plate.

Module III

Compression members, effective length, slenderness ratio, types of cross-section, classification of cross section, Design of axially loaded compression members, lacing, battening, design of column bases, and foundation bolts.

Module IV

Design of beams, types of c/s, lateral stability of beams, lateral torsional buckling, bending and shear strength, web buckling and web crippling, deflection, design procedure.

Module V

Plate girders- various elements and design of components Eccentric and moment connections, roof trusses

Books:

1. Design of Steel Structures- Limit State Method by N. Subramanian,

Oxford University Press

2. Limit State Design of Steel structures by S.K. Duggal, Mc-Graw Hill

3. Design of steel structures by S.S.Bhavikatti, I.K. International Publishing house.

4. Design of Steel Structures by K. S. Sairam, Pearson

5. Steel Design by William T. Segui, Cengage Learning

6. Fundamentals of Structural Steel Design by M.L.Gambhir, Mc Graw Hill

7. Steel Structures-Design and Practice by N. Subramanian, Oxford University Press

Hydrology & Irrigation Engineering

RCI6C002 Hydrology & Irrigation Engineering

MODULE-I Hydrologic cycle, World water balance; Forms, types & measurement of precipitation; Mean precipitation over an area; Curves of precipitation: Depth-area-duration, Intensity-duration-frequency & Depth-duration-frequency; Probable maximum precipitation; World's greatest observed rainfalls; Abstractions of precipitation: Measurement of evaporation; Evapotranspiration & its equations; Infiltration: measurement & indices.

MODULE-II Major methods for Measurement of stage, velocity & streamflow; Stage-discharge relationship: linear & log-log; Runoff characteristics of streams; Runoff volume estimation by Curve Number method; Flow mass curve & reservoir capacity estimation; Hydrographs: components, affecting factors & base flow separation methods; Unit hydrographs (UHs): derivation, use & limitations; UHs of different durations; Peak flood estimation by Rational method, empirical formulae, enveloping curves & Gumbel's Method.

MODULE-III Irrigation: necessity, advantages & disadvantages; Water distribution techniques in farms: free flooding, border flooding, check flooding, basin flooding, furrow irrigation, sprinkler irrigation & drip irrigation; Crop water requirement: duty, delta, base period & crop period; Irrigation efficiencies; Soil moisture - irrigation frequency relationship; Irrigation channels: classification & alignment; Distribution system, water losses in irrigation channels; Stable & regime channel design: comparison of Kennedy's & Lacey's Theories; Irrigation canal lining: types, advantages, economics &

preliminary design.

MODULE-IV Types of Cross-Drainage (CD) Works, , Design considerations for CD works; Diversion Head works: Types of weirs and barrages, Layout of a diversion head works; Design of weirs and barrages: Comparison among Bligh's creep theory, Lane's weighted creep theory and Khosla's method of independent variables, Exit gradient; Canal Falls: Necessity, Proper location, Types, Gravity Dams: Typical cross section, Various forces acting on gravity dam, Combination of forces for design, Modes of failure and criteria for structural stability, High and low gravity dams, Typical section of low gravity dam; Earth Dams: Types, Causes of failure, Preliminary section, Seepage control. Spillways: Brief study of various types.

Books:

1. Irrigation Engineering and Hydraulic Structures by S. K. Garg, Khanna Publication, New Delhi
2. Irrigation Engg. By B.C. Punmia and Pande, Laxmi Publication, New Delhi
3. Engineering Hydrology by K Subramanya, McGraw Hill Education, New Delhi
4. Hydrology Principles Analysis Design by H M Raghunath, New Age International Publishers, New Delhi

Artificial Intelligence and Machine Learning

Artificial Intelligence and Machine Learning

Module-I: INTRODUCTION -The Foundations of Artificial Intelligence; - INTELLIGENT AGENTS - Agents and Environments, Good Behaviour: The Concept of Rationality, the Nature of Environments, the Structure of Agents, SOLVING PROBLEMS BY SEARCH - Problem-Solving Agents, Formulating problems, Searching for Solutions, Uninformed Search Strategies, Breadth-first search, Depth-first search, Searching with Partial Information, Informed (Heuristic) Search Strategies, Greedy best-first search, A* Search, CSP, Means-End-Analysis.

Module-II: ADVERSARIAL SEARCH - Games, The Mini-Max algorithm, optimal decisions in multiplayer games, Alpha- Beta Pruning, Evaluation functions, Cutting off search, LOGICAL AGENTS - Knowledge-Based agents, Logic, Propositional Logic, Reasoning Patterns in Propositional Logic, Resolution, Forward and Backward chaining - FIRST ORDER LOGIC - Syntax and Semantics of First-

Order Logic, Using First-Order Logic, Knowledge Engineering in First-Order Logic - INFERENCE IN FIRST ORDER LOGIC - Propositional vs. First-Order Inference, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution

Module-III: UNCERTAINTY - Acting under Uncertainty, Basic Probability Notation, The Axioms of Probability, Inference Using Full Joint Distributions, Independence, Bayes' Rule and its Use, PROBABILISTIC REASONING - Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient Representation of Conditional Distribution, Exact Inference in Bayesian Networks, Approximate Inference in Bayesian Networks

Module-IV: LEARNING METHODS - Statistical Learning, Learning with Complete Data, Learning with Hidden Variables, Rote Learning, Learning by Taking Advice, Learning in Problem-solving, learning from Examples: Induction, Explanation-based Learning, Discovery, Analogy, Formal Learning Theory, Neural Net Learning and Genetic Learning. Expert Systems: Representing and Using Domain Knowledge, Expert System Shells, Explanation, Knowledge Acquisition.

Books:

- [1] Elaine Rich, Kevin Knight, & Shivashankar B Nair, Artificial Intelligence, McGraw Hill, 3rd ed., 2009
- [2] Stuart Russell, Peter Norvig, Artificial Intelligence -A Modern Approach, 2/e, Pearson, 2003.
- [3] Nils J Nilsson, Artificial Intelligence: A New Synthesis, Morgan Kaufmann Publications, 2000
- [4] Introduction to Artificial Intelligence & Expert Systems, Dan W Patterson, PHI., 2010
- [5] S Kaushik, Artificial Intelligence, Cengage Learning, 1st ed. 2011

Foundation Engineering

RCI6D001 Foundation Engineering

Module:I

Lateral Earth Pressure and Retaining Structures: Concept of earth pressure, Earth pressure at rest, active and passive earth pressure for both cohesionless and cohesive soils, Earth pressure theories: Rankine's theory, Coulomb's Wedge theory, Graphical methods: Rebhan's and Culmann's graphical solutions, Stability

conditions for retaining walls.

Module: II

Bearing Capacity: Definitions, Rankine's analysis, Types of failures: General and local shear failure, Terzaghi's Analysis, Brinch-Hansen analysis, Meyerhof's analysis, Vesic's bearing capacity equation, Effect of water table on bearing capacity, IS code method for computing bearing capacity, Field Methods: Plate load test and its limitations, Standard penetration test. Shallow Foundations: Types of foundations: Spread footing, combined and strap footing, mat or raft footing, Settlement of footings.

Module: III

Deep Foundations: Difference between shallow and deep foundations, Types of deep foundations. Pile Foundations: Types of piles, pile driving, load carrying capacity of piles-static and dynamic formulae, Pile load test and its limitations, correlation with penetration tests, Group action in pile settlement and efficiency of pile groups in clay, negative skin friction, Under reamed pile foundation. Basics of well foundation - types, component parts and ideas about the forces acting on a well foundation.

Module: IV

Subsoil Exploration: Necessity and planning for subsoil exploration, Methods - direct (test pits and trenches), indirect (sounding, penetration tests and geophysical methods). Soil sampling - types of samples, standard penetration test, static and dynamic cone penetration test, in-situ vane shear test, Rock coring, soil exploration report.

Books:

1. Principles of Foundation Engineering by B. M. Das, Cengage Learning
2. Basic and Applied Soil Mechanics by Gopal Ranjan and A. S. R. Rao, New Age International Publishers
3. Geotechnical Engineering by C. Venkatramiah, New Age International Publishers
4. Geotechnical Engineering by S. K. Gulati & Manoj Gupta, Mc Graw Hill
5. Soil Mechanics and Foundations by B. C. Punmia et al., Laxmi Publications
6. Soil Mechanics & Foundation Engineering by B.N.D. Narasinga Rao, Wiley

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