

Theory

Types of Load and use of BIS code

Design of steel structures: Specifications, use of IS code (IS 800-2007) and steel table, design of steel sections under tension, compression and bending, use of any one design software such as Staad Pro, ETABS, etc. for design of roof truss.

Design of RCC structures: Specifications, use of IS code (IS 456-2000), analysis and design of singly and doubly reinforced sections, design of beams, design of one way and two-way slabs, columns and foundations, design considerations for retaining walls and silos, use of design software for simple RCC structures.

Practical

Design and drawing of steel roof truss including tension member, compression member, and member under bending; use of design softwares; Design and drawing of RCC building, including single reinforced beam, double reinforced beam, one-way slab, two-way slabs, columns and foundations; use of design softwares for simple RCC structures.

Suggested Readings

1. Bhavikatti, S. S. 2014. *Design of Steel Structures: By Limit State Method as Per IS: 800-2007*. I K International Publishing House Pvt. Ltd.
2. Duggal, S. K. 2017. *Limit State Design of Steel Structures*. McGraw Hill Education.
3. Punmia, B. C., Jain, A. K. and Jain, A. K. 2016. *Limit State Design of Reinforced Concrete*. Laxmi Publications.
4. Raju, N. K. 2019. *Design of Reinforced Concrete Structures: IS:456-2000*. CBS Publishers & Distributors.

Building Construction and Cost Estimation

2 (2+0)

Objective

To make the students acquainted with the methods of construction of agricultural buildings and to enable them to prepare various types of estimates of buildings

Theory

Building materials: Description of important building materials, rocks, different stones; formation of stones, types of stones, quarrying process, stone products and uses; Bricks, types, preparation and burning of bricks, properties and uses; Tiles, types and classification; Lime, properties and uses, cement, different uses and grades.

Concrete: Grades, preparation, mixing and laying of concrete, use of sand; Use of ferrous material, iron and steel products; Use of non-ferrous metals, glass, rubber, plastics, aluminum, copper, nickel; Timber and its uses, seasoning, defects, commercial form of timber, miscellaneous building materials.

Building construction: Building components, foundations, brick work, lintels, columns, roofs and stair cases, different types of floors, plastering and pointing, damp proofing and waterproofing,

white washing, distempering and painting, steps for building construction, needs of different agricultural buildings, types and uses, types of roofs, slope and flat roof buildings.

Estimating and costing: Types of estimates, rough cost, detailed and supplementary estimate, preparation of cost estimate, cost analysis, schedule of rates, analysis of rates, factors affecting building costs, building codes, estate development.

Cost economics: Measurement and pricing, economic methods for evaluation of buildings, benefit cost calculation, rate of return period (payback period).

Suggested Readings

1. Duggal, S. K. 2012. *Building Material*. New Age International Publishers.
2. Dutta, B. N. 2000. *Estimating and Costing*. UBS publishers.
3. Punmia, B. C., Jain, A. K. and Jain, A. K. 1984. *Building Construction*. Laxmi Publications (P) Ltd., New Delhi.
4. Rangwala, S. C. 1994. *Engineering Materials*. Charotar Publishing House, Anand.
5. Sane, Y. S. 1964. *Planning and Designing of Buildings*. Engineering Book Publishing Co. Pune.

Watershed Hydrology

3 (2+1)

Objective

To make the students acquainted with the different hydrological processes, their methods of analysis so as to enable them to apply these for watershed development, water harvesting, minor irrigation, drought and flood control, etc.

Theory

Hydrologic cycle, components; Precipitation and its forms, rainfall measurement and estimation of mean rainfall, estimation of missing rainfall, optimum number of rain gauges.

Frequency analysis of point rainfall; Mass curve, hyetograph, depth-area-duration curves and intensity-duration-frequency relationship.

Hydrologic processes- interception, infiltration -factors influencing, measurement and indices; Evaporation- estimation and measurement; Runoff- factors affecting, measurement, stage - discharge rating curve, estimation of peak runoff rate and volume, rational method, Cook's method and SCS curve number method.

Geomorphology of watersheds – linear, aerial and relief aspects of watersheds- stream order, drainage density and stream frequency; Hydrograph - components, base flow separation, unit hydrograph theory, s-curve, synthetic hydrograph, applications and limitations.

Flood routing – channel and reservoir routing; Hydrology of dry land areas, Troll's climatic classification; Drought- classification, causes and impacts, drought management strategy.

Practical

Visit to meteorological observatory and study of different instruments; Study of optimal rain gauge network; Study of intensity - frequency - duration curves; Study of depth - area - duration