CE 701 – Design of Hydraulic Structure

Unit - I

Reservoir Planning: Investigations, Capacities, Zones of storage, Mass Inflow and Mass Demand curves, Life of Reservoir.

Earth Dams: Types, causes of failure and design criteria, soils suitabllity for earth dam construction, construction methods, foundation requirements, typical earth dam sections, estimation of seepage through and below the dam, seepage control, stability of slopes by slip circle method of analysis, pore pressures, sudden draw down, steady seepage and construction pore pressure condition.

Unit - II

Gravity dams: Design Criteria, forces acting on gravity dams, elementary profile, low and high gravity dams, stability analysis, practical profile, evaluation of profile by method of zoning, foundation treatment, construction joints, galleries in gravity dams.

Unit - III

Spillways: Ogee spillway and its design, details of syphon, shaft, chute and side channel spillways, emergency spillways.design of outlets and rating curves

Energy dissipators: Principles of energy dissipation Energy dissipators based on tail water rating curve and jump height curves Spillway crest gates - vertical lift and radial gates, their design principles. Design of canal regulating structures, Design of Channel transitions,Design of Sarda type Falls, Design of cross drainage works viz Syphon aquaduct and Canal syphon.

Unit – IV

Structures on Pervious formations: Bligh's creep theory,limitations, Khoslas's theory of independent variable,Khosla's corrections,Design of Weir and Barrages :design of waterways and crest levels,design of impervious floors and protection works.

Unit - V

Canal Structures and Hydropower Plants: Design of canal falls, Regulators, Cross drainage works, Introduction of Hydropower development, , general features of hydro-electric schemes, selection of turbines.

Reference Books: -

1. Engineering for Dams (Volumes I, II & III) by Creager, Justin & Hinds
2. Hydroelectric Hand Book by Creager
3. Hydraulic Structures by Varshney
4. Irrigation & Water Power Engg. by Punmia & Pandey B.B.Lal
5. Water Power Engineering by Dandekar