

B. Tech. Civil Engineering

Course code: Course Title	Course Structure. Credit=4			Pre-Requisite
CE 334: Design of Hydraulic Structures	L	T	P	Nil
	3	0	2	

Course Objective: The objective of this course is to provide students with the comprehensive knowledge and skills necessary for the design, analysis, and evaluation of hydraulic structures. The course focuses on the principles, methodologies, and practical aspects of designing various hydraulic structures such as dams, spillways, weirs, and culverts, with an emphasis on safety, efficiency, and sustainability.

S. No	Course Outcomes (CO)
CO1	Understanding of the fundamental principles and concepts involved in the design and functioning of various hydraulic structures, including the forces acting on these structures and the methods to analyse them.
CO2	Ability to design hydraulic structures such as dams, spillways, weirs, and culverts.
CO3	Safety assessments and risk analyses for hydraulic structures, understanding the potential hazards, failure modes, and designing structures to mitigate these risks effectively.
CO4	Proficient in using computational tools and software.
CO5	Enhance their project management skills, including planning, executing, and presenting design projects.

S. No	Contents	Contact Hours
Unit 1	Gravity dams: Design Criteria, forces acting on gravity dams, elementary profile, low and high gravity dams, stability analysis, evaluation of profile by method of zoning, practical profile, foundation treatment, construction joints, galleries in gravity dams.	12
Unit 2	Earth and Rock fill dams: Earth Dams: Types, causes of failure and design criteria, soils suitable 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 drawdown, steady seepage and construction pore pressure condition. Rock fill dams: Types, merits and demerits, conditions favourable for their adoption.	7

Unit 3	Spillways: Ogee spillway and its design, details of syphon, shaft, chute, and side channel spillways, emergency spillways.	8
Unit 4	Energy dissipators and gates: 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 and details. Design of canal regulating structures, Detailed design of Sarda Falls, design of cross drainage works, and syphon aqueduct.	10
Unit 5	Hydropower Plants: Introduction of Hydropower development, assessment of power potential, types of hydropower plants, general features of hydro-electric schemes, selection of turbines, draft tubes, surge tanks, penstocks, power house dimensions, development of micro hydel stations, tidal plants, pumped storage plants, and their details.	5
Total		42

Suggested Books:

S. No.	Name of Books/ Authors	Year of Publication
1	Garg, S.K, “Irrigation Engineering and Hydraulic Structures”, Khanna Publishers, New Delhi. (ISBN 0-07-06487-1).	2014
2	Modi , P.N., “Irrigation Water Resources and Water Power Engineering”, Standard Book House, Delhi. (ISBN 0-07-078546-7).	1990
3	Asawa, G. L. “Irrigation and Water Resources Engineering”, New Age International Publishers. (ISBN 0-07-795568-3).	1993
4	Sharma, R. K. and Sharma, T. K., “Water Power Engineering”, S. Chand & Company, New Delhi	2003
5	Varshney, R.S., “Hydropower Structures”, Nem Chand and Bros., Roorkee (U.P.),	2014
6	Deshmukh, M.M., “Water Power Engineering, Dhanpat Rai Publications”, New Delhi,	1998