GUJARAT TECHNOLOGICAL UNIVERSITY

CIVIL (WATER RESOURCES ENGINEERING) (33)
Master of Engineering
Subject Code: 3733301
Semester – III
Subject Name: Design of Hydraulic Structures

Type of course: Program Elective-V

Prerequisite: Fundamental knowledge of Irrigation, Hydraulic structures.

Rationale:
Students will be able to understand various forces necessary to be considered in the design of gravity dam, earthen dam, spillways etc. They will also be able to understand elementary design of energy dissipation works.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
2	0	2	3	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	Investigation for dam-site: Different types of dams, selection of types of dams, Selection of site for dam	02
2	Design of Gravity Dams: Criteria for stability analysis, design of Gravity dams by different methods, Principal stress, Foundation treatment and construction of gravity dams, Stress concentration at a gallery in gravity dams, Joints in gravity dam, design of penstocks and intake structures.	10
3	Design of Earth dams: Determination of Earthen dam section to suite available materials and foundation conditions, seepage through earthen dam, phreatic line, method to locate phreatic line, methods of controlling seepage, criteria for safe design of earthen dam, Criteria for design of filters, Relief wells, Stability of earthen dams.	10
4	Design of spillway and energy dissipation works: Detailed design of ogee spillway, design of chute spillway, design of stilling basin and its accessories.	08

Reference Books:

1 Design text books in Civil Engineering -Serge Leliavsky.
2 C.B.I. Publication No.12 of Government of India
3 Irrigation Engineering – Bharat singh
4 Relevant Indian standards

5 Irrigation Water Resources - Dr.P.N.Modi
6 Irrigation – Dr. B. C. Punamia
7 Irrigation and Hydraulic Structures – S. K. Garg
8 Theory and Design of Hydraulic Structures – Varshney & Gupta
9 Water Resources Engineering- Larry Mays
10 Hydraulic Structure -Novak
11 Irrigation Engineering –G. L. Asawa

Course Outcomes: At the end of the course, Student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Study different types of Hydraulic structures and their significance.	20
CO-2	Analyse stability of embankment dam and gravity dam under different loading conditions.	25
CO-3	Design an ogee spillway and a chute spillway.	20
CO-4	Suggest suitable energy dissipation measures.	25
CO-5	Design stilling basin.	10

Suggested Specification table with Marks (Theory): (For ME only)

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
10%	**20%**	**20%**	**20%**	**15%**	**15%**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

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List of Practical:

The practical may include study of different hydraulic structures, data Collection for design. Stability analysis, Study of various literatures of practice and implementation. The students will work in group for the design work based on syllabus such as;

1. Calculation of forces acting on gravity dam as per IS-6512
2. Stability analysis of gravity dam
3. Design of Gravity dam
4. Design of Spillway
5. Preliminary section of earth dam and design of earth dam
6. Filter design for earth dam
7. Stability analysis of earth dam
8. Location of phreatic line in earth dam section with horizontal filter and without filter
9. Design of Energy dissipators

List of Open Source Software/learning website:

1. http://www.nptel.iitm.ac.in/courses/