

# GUJARAT TECHNOLOGICAL UNIVERSITY

## CIVIL (WATER RESOURCES ENGINEERING) (33)

### DESIGN OF HYDRAULIC STRUCTURES

**SUBJECT CODE:** 2733301

M.E. 3<sup>rd</sup> SEMESTER

**Type of course:** Hydraulic design of water resources structures

**Prerequisite:** Knowledge of irrigation and water resources engineering

**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		Theory Marks		Practical Marks				
			ESE (E)	PA (M)	ESE (V)		PA (I)			
					ESE	OEP	PA	RP		
3	2#	2	5	70	30	20	10	10	10	150

#### Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Investigation for dam-site Different types of dams, selection of types of dams, Selection of site for dam	4	10
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.	14	30
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.	14	30
4	Design of spillway and energy dissipation works Detailed design of ogee spillway, design of chute spillway, design of stilling basin and its accessories	10	20

#### 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 Outcome:**

After learning the course the students should be able:

Students will be able to design various water resources structures viz; gravity dam, earthen dam, spillways etc. They will also be able to design the energy dissipation work.

**List of Experiments: Nil**

**Design based Problems (DP)/Open Ended Problem:**

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

**Major Equipment: - Nil -**

**Review Presentation (RP):** The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website.