GUJARAT TECHNOLOGICAL UNIVERSITY

BRANCH NAME: CIVIL ENGINEERING
SUBJECT NAME: DESIGN OF HYDRAULIC STRUCTURES
SUBJECT CODE: 2180601
B.E. 8th SEMESTER

Type of course: Civil Engineering

Prerequisite: Knowledge of Fluid Mechanics, Hydrology and Water Resources engineering and Irrigation Engineering

Rationale:
Develop understanding of principles of design of embankment dam, gravity dam, spillways and canal falls and regulation 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 (Viva)	PA (I)	
					PA	ALA			
3	1	0	4	70	20	10	30	20	150

Course Contents

Sr No	Contents	Total Hrs	% Weightage
1	**Module 1: Elements of dam engineering** Classification of dams, their merits and demerits, characteristics of concrete and embankment dams, site selection of dam and selection of type of dam	4	10
2	**Module 2: Embankment dam engineering:** Nature and classification of soil- engineering characteristics of soil, principles of design – Material and construction- Internal seepage – Stability analysis and stresses, Phreatic line in earth dam, Settlement and deformation in rock fill embankments	11	25
3	**Module 3: Concrete dam engineering:** Loading -Concepts and criteria, Gravity dam analysis design features and stability- Principal stress, elementary profile of gravity dam, practical profile of dam, low and high gravity dam, joints and galleries in dam- Concrete for dams –roller compacted concrete gravity dams	11	25
4	**Module 4: Dam outlet works:** Spillways – Ogee spillway - cavitation on spillway – design features- design principles and design of spillways Design of a Chute spillways –Energy dissipation – stilling basins – plunge pools	10	25
5	**Module 5: Drop structure** Design of a Sarda fall and Glacis fall, Design of Cross regulator and head regulator	9	15

Note: Term work shall be based on above mentioned syllabus.

Suggested Specification table with Marks (Theory):

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

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.

Reference Books:

1. Introduction To Water Resources And Waterpower Engineering, By Dr. P N Modi , Standard Publication, Delhi
2. Irrigation And Water Resources Engineering, By G L Asawa, Pub:- New Age Int. Ltd.
3. Irrigation Engineering and Hydraulic Structures by S.K. Garg, Khanna Publishers
4. Hydraulic Structures, By P. Novak, Pub. Unwin Hyman, London
   Handbook of Dam Engineering, By Golze', Pub:- Van Nostrand Reinhold
5. Engineering for Dams, By Creager WP, Justin J D and Hinds J, Weily Pub. New York

Course Outcome:

After learning the course the students should be able to:

1. Carry out stability analysis of embankment dam under sudden drawdown and steady seepage conditions.
2. Calculate normal stresses, principle stresses and shear stresses at heel and toe of dam and factor of safety of gravity dam against overturning, sliding and shear friction factor.
3. Design an ogee spillway and a chute spillway.
4. Suggest suitable energy dissipation measures
5. Design canal fall and regulation works

List of Open Source learning website:

www.nptel.ac.in

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should be submitted to GTU.