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SARVAJANIK UNIVERSITY
Sarvajanik College of Engineering and Technology
Bachelor of Technology
Civil Engineering

B. Tech. IV Semester VII

Subject Name : Design of Hydraulic Structure **Subject Code:** BTCL14703

Type of course : PEC - IV

Prerequisite : Fundamentals of Fluid Mechanics (BTCL13303), Hydrology and Water Resources Management (BTCL13504)

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				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	100
3	0	0	3	60	25	15	-	-	

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1.	**Module 1: Planning and investigations of reservoir and dam sites** Choice and site selection of dams and reservoirs, Forces acting on solid gravity dam, modes of failures, stability analysis, elementary and practical profile of gravity dam, internal stresses and stress concentrations in gravity dam, joints, seals, keys in gravity dams, galleries, dam safety and hazard mitigation.	09	21 %
2.	**Module 2: Homogeneous and zoned embankment dams** Factors influencing design of embankment dams, criteria for safe design of embankment dam, steps in design of embankment dam, seepage analysis and its control, classification of rock fill dams and their design consideration, causes and failure of earthen dam.	10	21 %

3.	**Module 3: Concrete Dam Engineering** Gravity dams, forces acting, modes of failure, elementary and practical profile, design of gravity dam, drainage gallery, Capacity of spillways, components and profile of different types of spillway, selection And design of energy dissipaters.	**10**	**21 %**
4.	**Module 4: Diversion head works** Components of diversion head works and their functions, weirs barrages, Bligh's Creep theory, Lanes weighed theory. Design of weirs and barrages on permeable foundations.	**10**	**21 %**
5.	**Module 5 : Canal structures** Canal outlets, types of cross-drainages works, codes of practice, design of canal drops, operation and maintenance of canals	**06**	**16 %**

Suggested Specification table with Marks (Theory/Practical):

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

Legends: R: Remembrance, **U:** Understanding; **A:** Application, **N:** Analyze, **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 Text Books:

Sr no	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1	Hydraulic Structures	P. Novak	Unwin Hyman, London	1990 ISBN 10: 0046270116 ISBN 13: 9780046270117	4th
2	Irrigation Engineering and Hydraulic Structures	S.K. Garg	Khanna Publishers	1976 ISBN :10 8174090479 ISBN-13 978-8174090478	1st

3	Handbook Of Dam Engineering	Golze	Van Nostrand Reinhold	1977 ISBN-10 0442227523 ISBN-13 978-0442227524	1st
4	Engineering For Dams	Creager WP, Justin J D and Hinds J	Weily Pub. New York	-	-

Course Outcome:

Sr. No.	CO Statement After learning this subject, students will be able to	Marks % weightage
CO-1	Classify the different types of hydraulic structures like dam, weir, barrage etc. (*R, U... Cognitive Level*)	20
CO-2	Analyze stability of embankment dam. (*U, A,E...Cognitive Level*)	20
CO-3	Compute normal stresses, principle stresses and shear stresses at heel and toe of dam. (*U, A...Cognitive Level*)	25
CO-4	Design outlet works like spillways, energy dissipation structures and drop Structures. (*U, A,C...Cognitive Level*)	20
CO-5	Compare and contrast suitable hydraulic structure in a particular Scenario. (*R, U...Cognitive Level*)	15

Mapping with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO-1	3	-	-	1	-	2	2	-	-	-	-	3	3	1	1
CO-2	3	3	2	2	-	-	-	3	2	3	-	3	-	2	-
CO-3	3	3	3	-	2	-	-	-	3	-	-	2	1	-	2
CO-4	3	3	3	3	1	-	-	3	2	2	-	2	-	1	-
CO-5	3	-	1	-	-	1	-	2	-	1	2	1	2	-	3
Rationale*	**15**	**9**	**9**	**6**	**3**	**3**	**2**	**8**	**7**	**6**	**2**	**11**	**6**	**4**	**6**

Rationale*: The subject will help to develop understanding of principles of design of embankment dam, gravity dam, spillways and canal falls and regulation works.

List of Open Source/learning website:

1. https://nptel.ac.in/courses/105/103/105103096/ (Hydraulics)
2. https://nptel.ac.in/courses/105/105/105105110/ (Hydraulic Structures for flow diversion and storage)