Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII EXAMINATION – SUMMER 2025

Subject Code:3170621 Date:27-05-2025

Subject Name:Design of hydraulic structures

Time:02:30 PM TO 05:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Draw the typical layout of a gravity dam showing its components.	**03**
	(b)	Discuss various factors which govern the selection of type of dam.	**04**
	(c)	Discuss various investigations required to be carried out to determine the most suitable site for a dam.	**07**
Q.2	**(a)**	Draw the uplift pressure diagram without drains and with drains for a gravity dam.	**03**
	(b)	What is gravity dam? Enumerate the various forces acting on a gravity dam.	**04**
	(c)	Prove that the base width b for an elementary profile of a low gravity dam is given by b = $h / \sqrt{s-1}$	**07**
		OR	
	(c)	Discuss various Contraction joints and horizontal joints to be provided in a dam.	**07**
Q.3	**(a)**	What are the various modes of failure of gravity dam? Discuss each of these briefly.	**03**
	(b)	Discuss various purposes for which galleries are provided in dams.	**04**
	(c)	Describe with neat sketch how top seepage line is drawn in a homogeneous dam without any arrangement for drainage.	**07**
		OR	
Q.3	**(a)**	What is a rockfill dam? Describe its salient features with a neat sketch.	**03**
	(b)	Describe with neat sketches various methods adopted for controlling seepage through the body of the dam and through the foundation.	**04**
	(c)	Discuss the stability of foundation of an earth dam against horizontal shear stress.	**07**
Q.4	**(a)**	Explain the terms (i) turfing, (ii) pitching, (iii) relief wells	**03**
	(b)	Describe briefly the different types of Spillways.	**04**
	(c)	Describe with neat sketches the various types of upstream impervious membranes used for Rockfill dams.	**07**
		OR	
Q.4	**(a)**	Explain different types of drainage arrangements in the downstream portion of the earth dam.	**03**

	(b)	Discuss the various factors on which the value of the coefficient of discharge of an ogee spillway depends.	**04**
	(c)	Describe with a neat sketch a chute spillway. Also discuss various design considerations of a chute spillway.	**07**
Q.5	**(a)**	Write the functions of chute blocks and baffle blocks in stilling basins.	**03**
	(b)	Discuss the advantages as well as the limitations of a siphon spillway.	**04**
	(c)	Derive an equation for the water surface profile developed in a side channel spillway.	**07**

OR

Q.5	**(a)**	Write a note on Ski-jump bucket.	**03**
	(b)	Write a note on a location of hydraulic jump.	**04**
	(c)	Describe with neat sketches the various types of bucket type energy dissipators.	**07**

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