Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– 3 (NEW) • EXAMINATION – WINTER - 2023

Subject Code:3733301 Date: 02 Dec 2023

Subject Name:Design of Hydraulic structures

Time:10:30 AM TO 01:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Why the position of the phreatic line is to be predicted in the dam section? Also, compute the seepage rate by using the flow net	**07**
	(b)	How the location of the canal fall should be decided? Also, discuss the design features of various components of the impervious floor of Sarda-type fall	**07**
Q.2	**(a)**	Explain various energy dissipation measures adopted below spillway for the relative up and down position of J.H.C & T.W.R.C. Also write a brief note on cavitation in the spillway	**07**
	(b)	Discuss normal stress and principal stress in the elementary profile under reservoir full condition. Also enumerate various loading combinations specified by USBR & IS, used for the design of gravity dam	**07**
		OR	
	(b)	Derive an expression to compute seepage discharge through the body of the dam with a horizontal drainage filter.	**07**
Q.3	**(a)**	Differentiate cross regulator and distributary head regulator. Why drainage gallery is provided within a dam section?	**07**
	(b)	What do you understand by the elementary profile and a practical profile of a gravity dam? How is the limiting height of a gravity dam calculated	**07**
		OR	
Q.3	**(a)**	Describe seepage and piping in an earthen dam. Also, discuss the methods of controlling seepage.	**07**
	(b)	Discuss the two-dimensional method for stability analysis of the gravity dam.	**07**
Q.4	**(a)**	Enlist various causes of failure of an earth dam. Discuss only structural failure causes in earth dam	**07**
	(b)	Explain the various modes of failure of a Concrete Gravity Dam.	**07**
		OR	
Q.4	**(a)**	Differentiate between low gravity dam and high gravity dam? Determine the dimensions of the practical profile of the low-gravity dam.	**07**
	(b)	What are the advantages and disadvantages of gravity dams over other dams	**07**
Q.5	**(a)**	Explain how the storage capacity of the reservoir and the height of the dam are determined.	**07**
	(b)	What are the factors considered for selecting a suitable site for the dam	**07**
		OR	
Q.5	**(a)**	Explain with a neat sketch the Swedish slip circle method for stability analysis of earth dam.	**07**
	(b)	Explain for an earth dam the function of (i) cut-off trench (ii) horizontal filter and (iii) riprap with neat sketches	**07**

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