Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – SUMMER • 2013

Subject code: 711203N **Date: 13-06-2013**

Subject Name: Design of Hydraulic Structures

Time: 10.30 am – 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)**	Discuss briefly the design principals that required in the design of an ogee spillway.	**07**
	(b)	Explain various factors affecting the coefficient of discharge. Also compute the discharge over the ogee spillway with coefficient of discharge C = 2.3 at a head of 4.0 m. The effective length of the spillway is 120 m. Neglect the velocity of approach.	**07**
Q.2	**(a)**	What is spillway gate and what are the merits and demerits of installing such gates?	**07**
	(b)	Discuss briefly the various energy dissipators under different relative positions of T.W.C. and J.H.C.	**07**
		OR	
	(b)	Explain various causes of failure of earthen dams in brief.	**07**
Q.3	**(a)**	Write criteria for safe design of earth dam.	**07**
	(b)	Describe seepage analysis of earth dam and derive an expression for calculating seepage discharge for isotropic soils and non isotropic soils.	**07**
		OR	
Q.3	**(a)**	Define phreatic line in earthen dams. A flow net is plotted for a homogeneous earthen dam of height 25 m and free board 2 m. The no. of potential drops are 10 and no. of flow channels are 4. The dam has a horizontal filter of 30 m. length at the d/s end and the coefficient of permeability of the dam material is $5*10^{-4}$ cm/sec. Calculate the discharge per m run of the dam.	**07**
	(b)	Discuss the seepage control through foundation of earth dam with neat sketches.	**07**
Q.4	**(a)**	Write short note on pore pressure and its significance to earthen dam construction.	**07**
	(b)	Discuss the geological and topological features which affect the selection of the types of dam.	**07**
		OR	
Q.4	**(a)**	What is meant by the elementary profile of a gravity dam? Derive equations to determine the base width B of he dam.	**07**
	(b)	Discuss the modes of failure of gravity dam.	**07**
Q.5	**(a)**	Derive equations of principal and shear stresses for gravity dam.	**07**
	(b)	Explain foundation treatment and construction of gravity dams.	**07**
		OR	
Q.5	**(a)**	Design a low concrete gravity dam portion for the following data :	**07**

Maximum allowable compressive stress in concrete = 30 kgf /cm^2
Free board = 3.0 m.
Maximum reservoir level = 210.0 m.
R.L. of bottom of dam = 100.0 m.
Specific gravity of concrete = 2.4

	(b)	Differentiate between two dimensional method and three dimensional method of stability analysis for gravity dam.	**07**

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