Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – SUMMER • 2014

Subject code: 711203N **Date: 19-06-2014**

Subject Name: Design of Hydraulic Structures

Time: 02:30 pm - 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.**

Q.1	**(a)**	What is Phreatic line? Explain its characteristics and uses.	**07**
	(b)	Enlist the various forces acting on Gravity dam as per IS-6512 and discuss in detail Water pressure and Uplift pressure.	**07**
Q.2	**(a)**	Discuss briefly various modes of failure of gravity dam.	**07**
	(b)	Discuss briefly various modes of failure of Earth dam.	**07**
		OR	
	(b)	Enlist the types of Gravity dam and distinguish clearly between them and derive an expression used for such a distinction.	**07**
Q.3	**(a)**	What is meant by pore water pressure? What is its significant in the design of earth dam?	**07**
	(b)	State the uses of Flownet. Derive the equation of discharge to determine through earth dam using flownet.	**07**
		OR	
Q.3	**(a)**	Explain Prevention of piping in the earth dam.	**07**
	(b)	Construct the base parabola for the earthen dam shown in figure. Determine the discharge through this earthen dam analytically when Ŭ< 30 ^{0} Assume K=2 × 10^{-6} m/sec and qpa/(a+qpa) = 0.36 for Ŭ=30^0	**07**
Q.4	**(a)**	What are the essential requirements of Spillway? How would you select a suitable site for the spillway?	**07**
	(b)	What are the different types of energy dissipating methods used below the spillway?	**07**
		OR	
Q.4	**(a)**	Explain the design of an Ogee shaped spillway. How would you fix the d/s and u/s profiles?	**07**
	(b)	What are the different types of spillway gates? Explain their functions in short.	**07**
Q.5	**(a)**	Enlist the various methods using for design of gravity dam and do the comparison of all the methods with its advantages and disadvantages.	**07**
	(b)	Explain: Swedish Slip Circle Method.	**07**
		OR	
Q.5	**(a)**	The following data were obtained from the stability analysis of a concrete gravity dam. (1) Total overturning moment about toe = 1× 10^6 kn.m (2) Total resisting moment about toe = 2× 10^6 kn.m (3) Total vertical force above base = 50,000 kN. (4) Base width of dam = 50 m (5) Slope of the d/s face = 0.8(H) : 1(V) Calculate the maximum and minimum vertical stresses at the base of dam. What is the maximum principle stress at toe? Assume there is no tail water.\	**07**
	(b)	Write the basic requirements of the filter in the earth dam. Also state the rule for the design of such a filter.	**07**

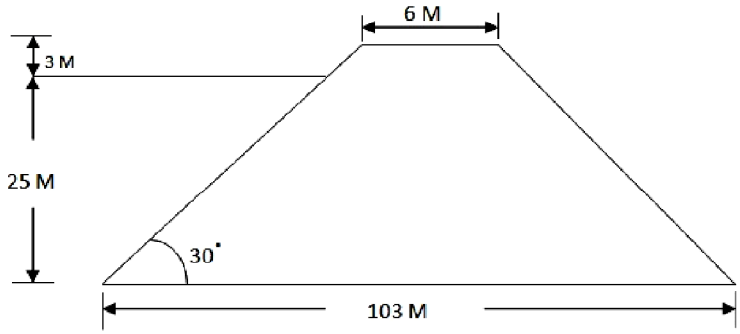

FIG:-1(Q.3 (a))

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