Enrolment No.\_\_\_\_\_

## GUJARAT TECHNOLOGICAL UNIVERSITY M. E. - SEMESTER – I • EXAMINATION – WINTER • 2013

Subject code: 711203N Date: 03-01-24 Subject Name: Design of Hydraulic Structures		code: 711203N Date: 03-01-2014 Name: Design of Hydraulic Structures	14
Ti In	me: 1 struc	0.30 am – 01.00 pm Total Marks: 70	
	1. 2. 3.	Attempt all questions. Make suitable assumptions wherever necessary. Figures to the right indicate full marks.	
Q.1	(a)	Draw a cross section of a zone type earth dam and explain the functions of its components.	07
	<b>(b)</b>	Explain the failures of Earthen dam.	07
Q.2	(a) (b)	Discuss the design criteria for safe design of Earthen dam. What do you understand by elementary profile of a gravity dam? Derive an expression for the base width of elementary profile for (i) no tension and (ii) no sliding condition.	07 07
	(b)	Discuss the function of 1) Horizontal drainage blanket 2) Chimney Drain 3) Rock Toe in control of seepage in an Earthen dam.	07
Q.3	(a) (b)	Describe zone method for design of gravity dam. Explain pressure relief well system as a measure for the control of seepage in the foundation of Earth dam.	07 07
0.2	(a)	OR Write short notes on: (i) Calleries in concrete dam	07
Q.3	(a)	(ii) Temperature control of concrete dam.	07
	<b>(b</b> )	Explain Swedish Slip Circle method for stability analysis of slope of an earth dam.	07
Q.4	(a)	What is a stilling basin? Explain the function of chute blocks and baffle blocks in stilling basin.	07
	(b)	Design a suitable blanket of uniform thickness for an earthen dam with the following available data. Also find the reduction in seepage. Depth of water u/s of dam=50 m, width of the central core of the dam at the base = 75 m, permeability of the foundation material= $1.5 \times 10^{-3}$ cm/s, depth of foundation= $55$ m, permeability of blanket material= $10^{-5}$ cm/s, thickness of blanket material=2 m.	07
Q.4	(a)	Differentiate tail water rating curve (TWRC) and jump height curve (JHC). What measure you will adopt for dissipation of energy when i) JHC & TWRC coincides ii) TWRC <ihc< td=""><td>07</td></ihc<>	07
	(b)	Derive an expression for limiting height of a gravity dam. Determine the height and base width of a solid gravity low dam for the following data: ultimate compressive strength of concrete (1:2:4) = $160 \text{ kg/cm}^2$ . Specific gravity of dam material=2.4, uplift intensity factor=0.67.Factor of safety=4.5	07
Q.5	(a) (b)	State the function of Intake structure. Explain Canal Intake with neat sketch. Describe the various mode of failure of gravity dam.	07 07
<b>Q.5</b>	(a)	Explain stability of earthen dam against head water pressure.	07
•	(b)	Calculate the maximum and minimum vertical stress at the foundation. Total overturning moment about Toe =1x $10^6$ KN/m, total resisting moment =2 X $10^6$ KN/m,	07

total vertical force above base= 55000 KN, Base width of the dam= 50 m.

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