

Seat No.: \_\_\_\_\_

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

# GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Sem-I Regular Examination January / February 2011

**Subject code: 711203N**

**Subject Name: Design of Hydraulic structures**

**Date: 02 /02 /2011**

**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) Discuss various modes of failure of a gravity dam. **07**  
(b) Explain the method of stability analysis of d/s slope during steady seepage. **07**

- Q.2** (a) Explain chute and side channel spillway. **07**  
(b) What do you understand by the elementary profile of a gravity dam? Derive expressions for determining base width of such a dam based on stress and sliding criterion. **07**

**OR**

- (b) Discuss zone method of design of a gravity dam. **07**

- Q.3** For the profile of the Gravity Dam as shown in following figure (1) check the stability for load combination B as per IS: 6512-1984 (Criteria for design of gravity dam). Calculate various forces acting on dam, calculate: **14**
- Factor of safety against over-turning
  - Factor of safety against sliding
  - Factor of safety against Shear friction
  - Factor of safety against crushing stress
  - Factor of safety against shear stress
- and find principal stresses at heel and toe.

**OR**

- Q.3** (a) Explain with the help of sketches various joints and water seals provided in gravity dams. **07**  
(b) What do you understand by construction pore pressure in earth dams, and how they determined? **07**

- Q.4** (a) Discuss the causes of failure of earth dams. **07**  
(b) Describe with neat sketches the various types of bucket type energy dissipater. **07**

**OR**

- Q.4** (a) Discuss the various factors on which the value of the co-efficient of discharge of an ogee spillway depends. **07**  
(b) Discuss various seepage control measures through the body of earth dams. **07**

- Q.5** (a) Design only d/s profile of an Ogee spillway for the following data. **07**
- |                                  |                         |
|----------------------------------|-------------------------|
| * Height of spillway crest = 60m | * Length of span = 10m  |
| * Thickness of piers = 2.5m      | * D/s slope = 0.7H : 1V |
| * Discharge = 4000 cum/sec       | * No. of spans = 7      |
| * $K_p = 0.01$                   | * $K_a = 0.10$          |

- (b) Describe with neat sketch how top seepage line is drawn in a homogeneous dam with arrangement for drainage. 07

OR

- Q.5 (a) What is a spillway? What are the essential requirements? Describe the various components of a spillway. 07
- (b) Discuss the various purposes for which galleries are provided in dams. 07

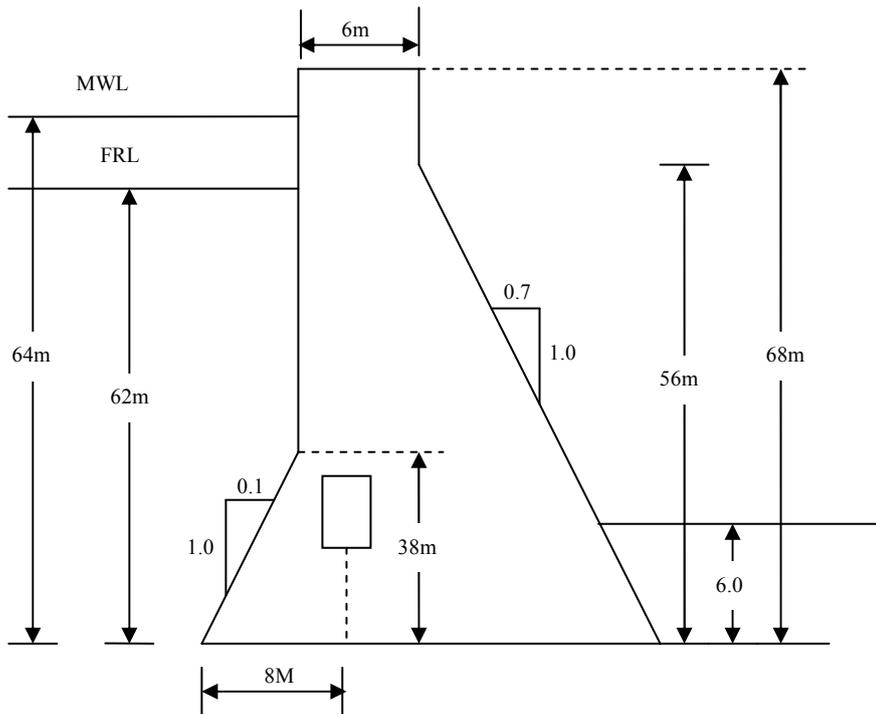


Figure (1)

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