

OR

- a) Explain the procedure for designing cross-regulator and head regulator. 7
- b) Explain the method of determining uplift pressure on the roof of a siphon aqueduct. 7

**Unit - V**

5. a) What are the different types of hydropower plants based on storage characteristics? Explain any one in detail with sketch. 7
- b) Write short notes on the following: 7
- Draft tube: its uses and types
  - Surge tank: its uses and types

OR

- a) Give the criterion for the selection of suitable type of turbines for hydroelectric scheme. 7
- b) The load on a hydel plant varies from a maximum 10 MW to a maximum of 35 MW. Two turbo generators of capacities 22 MW each have been installed. Determine the total installed capacity of the plant, plant factor, maximum demand, load factor and utilisation factor. 7

Roll No .....

**CE - 701****B.E. VII Semester**

Examination, December 2014

**Design of Hydraulic Structure***Time : Three Hours***Maximum Marks : 70**

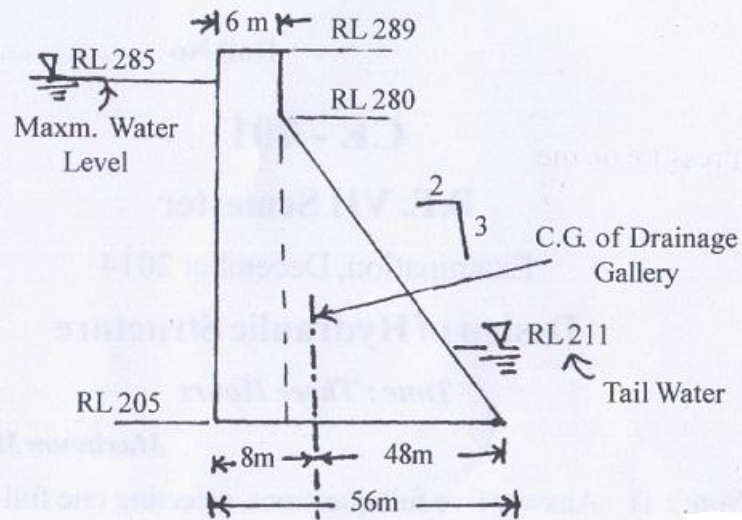
- Note :** i) Answer five full questions, selecting one full question from each unit.
- ii) Figures to the right indicate full marks.
- iii) Any missing data may be suitably assumed.

**Unit - I**

1. Check the stability of dam for reservoir full condition. By neglecting earthquake effect, calculate-
- The maximum vertical stresses at heel and toe of the dam.
  - The major principal stresses at heel and toe of the dam.
  - The intensity of shear stress on a horizontal plane near the toe.

Assume weight of concrete =  $2.4 \text{ t/m}^3$  and unit length of the dam. Coefficient of friction  $\mu = 0.7$  and shear strength of concrete,  $q = 14 \text{ kg(f)/cm}^2$ . All dimensions in meter.





OR

- a) Explain the various purposes and types of galleries provided in the gravity dam. 5
- b) Explain with help of diagrams, various joints and water seals provided in gravity dams. 5
- c) How do you control the cracking in a concrete gravity dam? 4

### Unit - II

2. a) Describe with neat sketches various methods adopted for controlling seepage through the body of an embankment dam and through foundation. 7
- b) For an earthen dam of homogenous section with a horizontal filter, upto a length of 30m from d/s end, draw the top phreatic line. The top width of the dam is 6m, u/s slope 3:1, d/s slope 2:1, total height of dam 20 m with free board of 2 m. If the coefficient of permeability of the soil material used in the dam is  $5 \times 10^{-4}$  cm/s, find the seepage flow per unit length of the dam. 7

OR

- a) Explain, with a sketch, the component parts and their function, of rock fill dam. Write the merits and demerits of rock fill dams over earthen dams. 7
- b) Explain different types of settlements in a rock fill dam. How can they be eliminated? 7

### Unit - III

3. A ogee type spillway has 20 crest gates each having 10 m clear span. Find the maximum flood that can be safely passed by lifting all the gates when the maximum reservoir level is 105 m and the crest level is 101 m. Take coefficient  $C = 2.16$ . Coefficient of end contractions for piers = 0.05. Coefficient of contractions for abutments = 0.1. Neglect velocity of approach. 14

Also design d/s profile of this spillway of gravity dam having d/s face slope 0.7H:1V. 14

OR

- a) Define spillway. What is the purpose to provide it? What are the essential requirements? Where the spillway is located? 7
- b) Discuss briefly the design principles that are involved in the design of a chute (trough) spillway. 7

### Unit - IV

4. a) Differentiate Jump Height Curve (JHC) and Tail Water Curve (TWC). What are the different possibilities of occurrence of J.H.C. and T.W.C? 7
- b) Write short notes on- 7
  - i) Automatic gates
  - ii) Vertical gates