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Roll No :

CE-701 (GS)

B.E. VII Semester

Examination, November 2018

Grading System (GS)

Design of Hydraulic Structure

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.

ii) All questions carry equal marks.

iii) Assume suitable data, if required.

1. a) How would you calculate the life of a reservoir?

   b) Describe the Swedish circle method of slope stability with neat sketch.

2. a) What do you understand by the seepage failure of an earth dam? How would you prevent piping failure in an earth dam?

   b) How the uplift pressure effects the gravity dam when

      i) No drainage provided.

      ii) Drainage gallery is provided.

      iii) Tension crack developed at heel? Discuss with neat sketch.

3. a) Check the stability of a gravity dam of 10 metre height, top width 3m, u/s batter 1:20 and d/s batter of 0.4:1. Neglect Free Board and no tail water. The foundation material is gravel and bearing capacity of 400 kN/m². Type equation here. Safe bearing capacity of 4000kN/m². $\mu = 0.50$.

   b) Discuss the various construction joints provided in gravity dam.

4. a) What is the purpose of providing spillway crest gate? Explain vertical lift gate with neat sketch.

   b) What are the protective works for high tail water under condition

      i) When Jump Height Curve (J.H.C.) coincides with tail water curve (T.W.C.) at all discharge?

      ii) When Jump Height Curve (J.H.C.) lies above the tail Water Curve (T.W.C.) at small discharge and lower at higher discharges?

5. a) What is priming and depriming of saddle siphon spillway? Describe the devices used for priming.

   b) A saddle siphon spillway has the following data: Full reservoir level = 200.00m; Level of centre of siphon outlet = 194m; High Flood Level = 200.50 m; High Flood Discharge = 600 cumecs; Bed level of river : 190.0, Base width of body wall = 8.0m

   Design the spillway. The siphon discharges freely in air. Take $C_d = 0.65$.

6. a) Discuss the bilgh's creep theory with their limitation.

   b) What are the main causes of failure of a weir in permeable foundation? What remedies would you suggest to prevent them?

7. For a hydro power plant, the designed capacity is 1.25×10^5 kW. If the generated power is 10×10^{14} kW, Determine the efficiency of the plant.

   a) If the peak discharge is 1.5 times the normal discharge, determine the plant capacity.

   b) Determine the plant factor.

   c) Determine the total energy produced in a year.

8. Write short notes on the following:

   a) Low gravity dam and high gravity dam

   b) Aqueduct and super passage

   c) Rating curve

   d) Weir and barrage

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