Paper Code: ECE-052

Roll No. ☐☐☐☐☐☐☐☐☐☐☐

B.Tech.
(SEM VIII) EVEN SEMESTER EXAMINATION, 2015-16
ANALYSIS & DESIGN OF HYDRAULIC STRUCTURES

[Time: 3 hrs.] **[Max. Marks: 100]**

Note:-Attempt all questions. All questions carry equal marks.

1. Attempt any two of the following:- **[10x2=20]**

(a) How does Khosla's Theory differ from Bligh's Theory with regard to the design of weirs on permeable foundations? Explain the criteria in the designing of weir on permeable foundation using Khosla's Theory.

(b) What do you understand by "Canal Escapes"? How do they help in protecting the adjoining areas against flooding due to some breach in the canal embankment?

(c) Differentiate in between distributaries head regulator and Cross regulator. What are the design principles of these two regulators. Discuss in brief

2. Attempt any two of the following:- **[10x2=20]**

(a) Differentiate in between the following:-
   (i) Barrage and Wier
   (ii) Surplus weir and storage weir
   (iii) Silt excluder and Silt ejector
   (iv) River regulator and Canal regulator
   (v) Gravity and Non-gravity weirs

(b) What do you understand by Canal Head work? Explain in brief layout of Canal Head Works. And function of Divide wall, under sluice, head regulator, and fish ladder in Canal Head Works.

(c) What are the different types of Cross Drainage works that are necessary on a canal alignment? State briefly the conditions under which each one is used.

3. Attempt any four of the following:- **[5x4=20]**

(a) Classify earthen dam on the basis of section. Explain their advantages.

(b) Describe with neat sketches various methods adopted for controlling seepage through the body of dam.

(c) What are different classifications of dams? What are the main points to be considered while selecting a site for a gravity dam construction?

(d) Explain how construction operation is carried out in earthen dam.

(e) What do you understand by Reservoir sedimentation? Explain density current and Trap Efficiency. And how will you control Reservoir sedimentation?

4. Attempt any two of the following:- **[10x2=20]**

    (a) What is an elementary profile of a gravity dam? Derive an expression for the base width for
        (i) no tension criterion
        (ii) no sliding criterion

    (b) Explain the different forces that may act on a gravity dam with sketches. Indicate their magnitude and locations on the body of Gravity Dam.

    (c) Design a concrete gravity dam for the following data:
        Maximum allowable compressive stress in concrete = 3000 kN/m^2
        Maximum reservoir level = 200.00 m
        R.L of bottom of dam = 100.00 m
        Specific gravity of concrete = 2.4
        Unit weight of water = 10 kN/m^3

5. Attempt any four of the following:- **[5x4=20]**

    (a) What are the different types of spillway gates? Explain their functions.

    (b) What are the different types of energy dissipating methods used below the spillway?

    (c) How do you classify a hydro-electric scheme on the basis of its operating head?

    (d) What are the factors that affect the spillway capacity? And what are different types of Spillways. Explain

        (i) Chute Spillway
        (ii) Ogee Spillway
        (iii) Drop Spillway with neat sketches.

    (e) What are the principal components of hydro-electric scheme? Discuss the utility of each component.

    (f) A run-off river plant with an installed capacity of 15,000 kW operates at 28% load factor when it serves as a peak station. What should be the minimum discharge in the steam, so it may serve as a base load station? The plant efficiency may be assumed to be 80% when working under a head of 20 m.