

**SEVENTH SEMESTER B.TECH. (ENGINEERING) DEGREE
EXAMINATION, JUNE 2010**

CE 04-702—DESIGN OF HYDRAULIC STRUCTURES

Time : Three Hours

Maximum : 100 Marks

Answer all questions.

Part A

1. (a) Discuss the modes of failure of a gravity dam.
 - (b) Derive the expression for the thickness of an arch dam using thin cylinder theory.
 - (c) Differentiate between surplus weir surplus escape and flush escape.
 - (d) Briefly explain modular, semimodular and non-modular outlets.
 - (e) Discuss the various factors in the site selection of weirs and barrages.
 - (f) Explain how a suitable type of fall is selected at a particular location.
 - (g) Discuss the conditions favourable for the selection of a syphon aqueduct.
 - (h) Discuss various factors in selecting a suitable type of cross drainage work.
- (8 × 5 = 40 marks)

Part B

2. (a) Design a suitable surplus work of a tank whose estimated flood discharge is 30 m³/s. It is decided to store water in the tank to a level of +22.00 m. above M.S.L. The maximum water level is +22.60 m. The general ground level at the proposed site is +21.00 m. and the ground level below the proposed work slopes off till it reaches +20.00 m. in about 6 m. distance.
Top width of tank bund is 2.00 m. at level + 24.00 m., with 2 : 1 side slopes on either side. Provision may be made to store water upto MWL at times of necessity. Good soil for foundation is available at +19.00 m.

Design :

- | | |
|----------------------------------------|------------|
| (a) Length and cross-section of weir. | (10 marks) |
| (b) Abutments, wing walls and returns. | (10 marks) |
| (c) U/s and downstream aprons. | (10 marks) |
- and draw to a suitable scale :
- | | |
|---------------------------------------------------------|------------|
| (i) Half plan at foundation level and half plan at top. | (15 marks) |
| (ii) Section across weir. | (15 marks) |

Or

Turn over

(b) Design a cross drainage work to suit the following hydraulic data :—

Canal :

Discharge	= 20 cumecs
Bed level	= + 15.00
Bed width	= 18 m.
F.S.L.	= + 17.00 m.
Ultimate bed level	= + 14.75 m.
Ultimate FSL	= + 17.75 m.
Velocity of flow	= 0.5 m/s
Canal bank top width	= 2 m. on both sides
Top bund level	= + 18.50 m.

Drain :

Catchment area	= 5 sq.km.
B.L. of drain	= + 13.00 m.
MFL	= + 14.00
Hard soil at	= + 12.00 m.

Assume Ryve's coefficient as 15. Design :

- The waterway for aqueduct.
- Barrel roof.
- Transition and bank connections.

Draw to a suitable scale :

- Longitudinal section along the canal.
- Half plan at top and half at foundation.

(60 marks)