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 usign 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.

   $(8 \times 5 = 40 \text{ marks})$

Part B

2. (a) Design a suitable surplus work of a tank whose estimated flood discharge is 30 m.³/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

(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 :

(a) The waterway for aqueduct.

(b) Barrel roof.

(c) Transition and bank connections.

Draw to a suitable scale :

(i) Longitudinal section along the canal.

(ii) Half plan at top and half at foundation.

(60 marks)