SEVENTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION JUNE 2012

CE 04 702—DESIGN OF HYDRAULIC STRUCTURES

Time : Three Hours   Maximum : 100 Marks

*Answer **all** questions.*
Assume any required data suitably.

Part A

1. (a) What are the forces acting on a dam ?

   (b) Differentiate between a high and low dam.

   (c) Explain with sketches a weir with shutters and weir without shutters.

   (d) Write a short note in different types of outlets.

   (e) Explain the factors to be considered in the selection of a type of fall at a location.

   (f) With the help of a sketch explain the various components of a syphon well drop.

   (g) What is meant by a cross drainage work ? Explain their types.

   (h) Discuss various factors in selecting suitable type of cross drainage works.

   (8 × 5 = 40 marks)

Part B

2. (a) Design a surplus work of a tank forming part of a chain of tanks for which following data are available.

Combined catchment area	=	26 sq.km.
Intercepted catchment area	=	21 sq. km.
Ryve's coefficient	=	10
Full tank level.	=	+ 12.00 m.
Maximum water level	=	+ 12. 75 m
Top bund level	=	+ 14. 50 m
Top width	=	3.0 m

   Side slopes 2 H : IV for both u/s and d/s. General ground level at site is + 11.00 m and the ground slopes d/s of proposed site to 10.00m. in about 6m. distance. Hard soil is available at + 9.00 m. Bligh's constant is 5.

   Design :

   (i) The length and section of the weir with suitable provision to store water up to maximum water level during off monsoon season.

   (ii) Suitable abutment wing walls and return.

   (iii) Downstream stepped solid apron.

   (3 × 10 = 30 marks)

   Turn over

Draw to a suitable scale :

    (i)   Section weir showing details of wing wall and solid apron.

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

                                                             (2 × 15 = 30 marks)

Or

(b)   A canal regulator Cam bridge is to be designed with the following data :

Hydraulic particulars of canal u/s.

Full supply discharge	=	24m³/s.
Bed width	=	16 m
Bed level	=	+ 52.00
Full supply depth	=	2 m
Top level of bank	=	55 m with 3m top width.

Hydraulic particulars canal d/s

Full supply discharge	=	20 m³/s.
Bed width	=	16 m
Bed level	=	+ 52.00
F.S. depth	=	1.75 m
Top level of bank	=	54.70 m.

Top width of banks are the same as those on the u/s side. The regulator carries a roadway single lane designed to IRC class A. Provide clear free board of 1m above F.S.L to the road bridge. Good soil is available at + 51.00 m. Assume ground level at site is + 54.00m Canal bank side slopes u/s and d/s 1H : 2V inside, 1.5 H : 1V outside

Design :

    (i)   Waterway, number of vents. With 1m thick piers.

    (ii)   Suitable abutments, wing walls and returns.

    (iii)   Length and thickness of solid apron using Bligh's creep constant of 8.

                                                              (3 × 10 = 30 marks)

Draw to a suitable scale :

    (i)   Half longitudinal elevation an half section looking from d/s side.   (12 marks)

    (ii)   Half plan at top and half plan at foundation level.   (18 marks)