[Total No. of Questions - 9] [Total No. of Printed Pages - 4] (2125)

15237

B. Tech 7th Semester Examination

Design of Hydraulic Structures (OS)

CE-7002

Time : 3 Hours **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all selecting one question from each section A, B, C and D and all subparts of section E are compulsory.

SECTION - A

1. (a) Discuss the causes of failure of weir on permeable foundation. Also describe the remedial measures for the same. (10)

   (b) An impervious floor of a weir on permeable soil is 16 m long and has sheet piles at both the ends. The upstream pile is 4 m deep and the downstream pile is 5 m deep. The weir creates a net head of 2.5 m. Neglecting the thickness of the weir floor; calculate the uplift pressures at the junction of the inner faces of the pile with the weir floor, by using Khosla's theory. (10)

2. (a) Differentiate between a weir and a barrage. Describe the design procedure for designing a head regulator for a distributary. (10)

   (b) Discuss the necessity of surplus water escape and describe its type with neat sketches (10)

[P.T.O.]

SECTION - B

3. (a) Explain the important features for the design of Cross Drainage Works. (10)

   (b) Design a suitable cross drainage work for the following:

   Discharge of canal = 40 cumecs

   Bed width of canal = 30 m

   Bed level of canal = 206.40 m

   Full supply depth of canal = 1.6 m

   Side slopes of canal = 1.5 H: IV

   High flood discharge of drainage = 450 cumecs

   High flood level of drainage = 207.0 m

   Bed level of drainage = 204.5 m

   General ground level = 206.50 m (10)

4. (a) Discuss the classification of falls and design aspects of cistern of fall. (10)

   (b) Explain briefly any five types of falls, with sketches. (10)

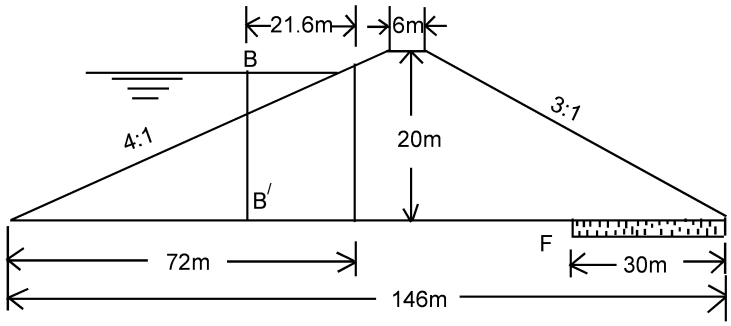
SECTION - C

5. (a) Describe the different types of reservoir and investigations involved in reservoir planning. (10)

   (b) Explain the various purposes and types of galleries provided in the gravity dam in details. (10)

6. (a) Discuss the different types of earthen dams. Explain the procedure for design of earthen dam. (10)

(b) For the earth dam of homogeneous section with a horizontal filter as shown in figure below, draw the top flow line. If the coefficient of permeability of the soil material used in the dam is $5x10^4$ cm./sec, find the seepage flow per unit length of the dam. (10)



SECTION - D

7. (a) Write design principles of four major parts of an ogee spillway with governing equations. (10)

(b) Compute the discharge over an ogee wear with coefficient of discharge equal to 2.4 at a head of 2 m. The length of the spillway is 100 m. The crest width is 8 m Above the bottom of the approach channel having the same width as that of the spillway. (10)

8. (a) Discuss the advantages and limitations of siphon spillway. Derive the expression for the head loss in siphon spillway. (10)

(b) Define the term 'Energy dissipators'. Discuss Bucket types of energy dissipators with neat sketches. (10)

[P.T.O.]

SECTION - E

9. Attempt all questions:

(a) Draw a neat sketch of elementary profile of dam.

(b) Describe the reservoir losses and its remedial measures.

(c) Define the term 'joint' and 'keys' in the context of gravity dam.

(d) Explain the term flownet in the context of earthen dam.

(e) Explain Mitra's method of hyperbolic transition in the context of cross drainage Work.

(f) Define the term 'weir'. How it differs from the barrage?

(g) Discuss briefly the necessity of fall in the canal

(h) Draw the neat sketch of Super passage.

(i) Define the function of silt excluder.

(j) How do you control the cracking in a concrete gravity dam? (2×10=20)