[Total No. of Questions - 9] [Total No. of Pri. d Pages - 4]
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B. Tech 7th Semester Examination

Design of Hydraulic Structures (NS)

CE-413

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 : All the questions in section E are compulsory and attempt any one question (along with its sub-parts) from sections A, B, C and D.

SECTION - A

1. (a) Describe with a neat sketch the layout of main canal, branch canal, distributaries and minors in a canal network. (10)

   (b) Explain the functions of the distributary head regulator and the cross regulator. (10)

2. Discuss in brief Khosla's method of independent variables. How would you apply the corrections for the mutual interference of piles. (20)

SECTION - B

3. What are canal falls and why are they constructed? Explain the procedure for the design of straight glacis fall. (20)

4. Design a suitable cross drainage work, given the following data at the crossing of a canal and drainage.

   Canal: (i) Full supply discharge = 32 cumecs (ii) Full supply level = 213.5 m (iii) Canal bed level = 212.0 m (iv) Canal bed width = 20 m (v) Side slope = 1.5:1 (vi) Canal water depth = 1.5 m.

Drainage: (i) High flood discharge = 300 cumecs (ii) High flood level = 210.0 m (iii) High flood depth = 2.5 m (iv) Natural ground level = 212.5 m.

Assume logical data, if required. (20)

SECTION - C

5. (a) Discuss with neat sketch, the various storage zone of a dam reservoir. (10)

   (b) What are different types of dams based on the functions served? Describe briefly. (10)

6. (a) What is drainage filters. Why filters are required in dam. Describe the procedure for designing the filters in earthen dam. (14)

   (b) What are the relative advantages and disadvantages of gravity dam over earthen dams? (6)

SECTION - D

7. (a) Enumerate the types of Buttress dams. What are the functions of these dams? Draw a section of a buttress dam indicating the various parts. (10)

   (b) What are different types of arch dams? Discuss the salient features. (10)

8. (a) Enumerate the various types of spillways which are used in dam construction. Briefly describe about various types of energy dissipating methods used below the spillways. (15)

   (b) Compute the discharge over an ogee spillway with coefficient of discharge equals to 2.3 at a head of 3.8 m. The effective length of the spillway is 110 m. Neglect the velocity of approach. (5)

SECTION - E

9. Select one correct answer from the given option for the given statements:

(i) The silt exclusion device, constructed on the bed of the main canal, taking off from a headworks, is called:

(a) Silt excluder (b) Silt ejector

(c) Both (a) and (b) (d) None of them

(ii) A fish ladder is provided in a canal project:

(a) To catch the fish for commercial development

(b) To enable the fish to move freely in the river

(c) Both (a) and (b)

(d) None of these

(iii) Hydraulic jump involves:

(a) Subcritical flow (b) Critical flow

(d) Super critical flow (d) All of these

(iv) An irrigation canal, freely flowing under a drainage channel, is specifically called:

(a) An aqueduct (b) A super passage

(c) A level crossing (d) None of them

(v) A cross drainage work is called a siphon, when is carries the canal water:

(a) Below the drainage under pressure

(b) Below the drainage under atmospheric pressure

(c) Above the drainage under atmospheric pressure

(d) None of them

(vi) Tehri dam of our country is located in the state of:

(a) Himachal Pradesh (b) Uttarakhand

(c) Punjab (d) Kerala

(vii) When seepage takes through body of an earthen dam, it leads to:

(a) Development of pore pressure in the dam body

(b) Reduction in the shear strength of the dam

(c) Reduction in the developed shear stresses in the dam

(d) Both (a) and (b)

(viii) The phreatic line is defined as the line at the upper surface of the seepage flow at which the pressure is:

(a) Hydrostatic (b) Atmospheric

(c) Both (a) and (b) (d) None of these

(ix) Which one of the following spillways is least suited to earthen dams?

(a) Ogee spillway (b) Side channel spillway

(c) Chute spillway (d) Shaft spillway

(x) The safety valve of a dam is its:

(a) Drainage gallery (b) Inspection gallery

(b) Spillway (d) Outlet sluices

(10×2=20)