

Roll No.

24514

**B.Tech. Vth Sem. (Civil Engg.)
Elective Examination-May, 2013**

IRRIGATION ENGG-II

Paper CE-407-F

Time : 3 hours

Max. Marks : 100

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard will be entertained after the examination.

Note : Attempt any five questions in all.

Question No. 1 is compulsory. Attempt one question from each Section. Each question carries equal marks.

1. (i) Name the various components of Weir. 2
- (ii) What is the purpose of providing launching apron ? 2

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(1)

[Turn Over

- (iii) Explain the phenomenon of piping in hydraulic structures. 2
- (iv) What is the length and depth of cistern in a Sarda type fall ? 2
- (v) Write discharge formula for the ogee spillway. 2
- (vi) The base width of a soil gravity dam is 25 m. The material of dam has a specific gravity of 2.56 and the dam is designed as an elementary profile ignoring uplift. What is the approximate allowable height of the dam ? 2
- (vii) What is the equation for the design of channel transition when water depth remains constant as per Chaturvedi's ? 2
- (viii) How would you decide whether the dam is low or high ? 2

(ix) What is the function of drainage gallery in a dam ? 2

(x) What is syphon aqueduct. 2

SECTION - A

2. (a) Draw a neat sectional view of a weir showing the various parts. What is exit gradient ? How does it affect the design of a weir ? 10

(b) Following data refer to a weir :

Total number of vertical gates = 51

Span of each gate = 10 m

Full reservoir level (U/s) = 110 m

Crest level = 106 m

Coefficient of end contraction for piers = 0.02

coefficient of discharge = $1.70 \text{ m}^{1/2}/\text{sec.}$
(in Francis formula) cd

Compute the max. flood discharge which can safely pass over the weir without exceeding the full reservoir level. Neglect velocity of approach.

10

3. The following hydraulic data pertains to a bridge site of a river :

Maximum discharge = 6000 cumecs

Highest flood level = 104.00 m

River bed level = 100.00 m

Average diameter of river bed material = 0.10 m

Design and sketch Bell's Baffle including the launching apron to train the river. Assume plentiful availability of boulders near the site.

20

Q. 2(a) What is meant by 'flood routing through reservoir' ? 10

(b) Explain the procedure that you will adopt for flood routing computations required for reservoirs under 'step by step method' (any one). 10

5. Explain how will you determine the following in design of siphon barrel :

(a) Waterway of the drain and cross-sectional area of the barrel.

(b) Head Loss through siphon barrel.

(c) Uplift pressure due to seepage flow.

20

SECTION C

6. Design the following components of a 1.5 m Sarda type fall using the data given : 20

- (i) Crest
- (ii) Cistern
- (iii) Upstream and downstream wing walls
- (iv) Upstream and downstream protection

Discharge = 40 cumecs

Bed level upstream = 103.5 m

side slopes of channel = 1 vertical to 1 horizontal

Full supply level upstream = 106.8 m

Full supply level downstream = 105.3 m

Berm level, U/s = 107.4 m

Bed width u/s and d/s = 30 m

Safe exit gradient for Khosla's theory = $1/5$

7. How would you proceed to determine the phreatic line through homogeneous earthen dams provided with a horizontal filter. 20

SECTION - D

8. Discuss the steps involved in designing of crest of Ogee spillway. Make sketch where necessary. 20
9. (a) What are the general design criteria of earthen dams? 10
- (b) Mention, how a suitable preliminary section for an earthen dam is selected? 10