

Time allowed : 3 hours] [Maximum marks : 75

Note: Question No. 1 is compulsory. Attempt total five questions, selecting one question from each unit.

1. Write short note on the following : $6 \times 2\frac{1}{2} = 15$

- (a) Discharge formula for Ogee Spillway
- (b) Requirements of spillway
- (c) Types of corss-drainage work
- (d) Seepage line and its importance
- (e) Canal falls
- (f) Components of guide bank

Unit - I

2. What is the importance of River tranining works? What are the factors on which meandering of rivers depends?

15

3. (a) What is flood routing? Discuss the different methods for flood routing. $7\frac{1}{2}$

(b) Explain the graphical method of flood routing. $7\frac{1}{2}$

Unit - II

4. (a) What are the factors which affects the selection of suitable type of cross-drainage works? $7\frac{1}{2}$

(b) Design a syphon aqueduct with the following data: $7\frac{1}{2}$

For canal

Discharge = 55 cumecs

Bed width = 30 m

F.S. depth = 2 m

R.L. of bed = 267.00 m

For drainage

High flood discharge = 400 cumecs

HFL = 266.2 m

General bed level = 263.5 m

General ground level = 26.2 m

5. What is hydraulic design of Weir? Explain the desgin of the following components of Weir: 15

(i) U/S cutoff

(ii) Floor

(iii) Protection works- Make sketch where necessary.

Unit - III

6. Design a 1.5 m Sarda type fall for a canal carrying a discharge of 40 cumecs with the following data: 15
- Bed level upstream = 105 m
 - Bed level downstream = 102 m
 - Side slopes of channel = 1:1
 - F.S.L upstream = 106.8 m
 - F.S.L downstream = 103.3 m
 - Berm level upstream = 107.5 m
 - Bed width u/s and d/s = 30 m
 - Safe Exit gradient for Khosla's theory = 1/5
7. Which are the main types of spillways? Briefly discuss about each spillway with neat sketches where required. 15

Unit - IV

8. Which forces are considered on gravity dam? Discuss different modes of failure in gravity dam. 15
9. An earthen dam made of a homogeneous material have the following data: <https://www.mdustudy.com>. 15
- Coefficient of permeability = $5 * 10^{-4}$ cm/sec
of dam material
- Level of top of dam = 200 m
- Level of deepest river bed = 178 m

HFL of reservoir = 197.5 m

Width of the top dam = 4.5 m

Upstream slope = 3 : 1

Downstream slope = 2 : 1

Determine the phreatic line for this dam section & the discharge passing through the dam.