

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

9. What is meant by gravity dam ? Draw a neat typical cross-section of such a dam mentioning all the components of a dam. 15

Roll No.

3523

**B. Tech. 7th Semester (Civil)
Examination – February, 2022**

DESIGN OF HYDRAULIC STRUCTURES

Paper : PCC-CE-405-G

Time : Three hours]

[Maximum Marks : 75

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 examination.

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

1. Write short note on : 2.5 × 6 = 15

(a) Economic height of dam

(b) River Cut-offs

(c) Types of spillways

(d) Stilling basin

(e) Use of flood routing

(f) Factors governing the design of a weir

UNIT - I

2. Sketch a suitable cross-section of a guide banks as used in river training works. Explain the process of launching aprons in such works. 15
3. What is the basic equation of flood routing? Describe step by step procedure that you will adopt for flood routing computations required for reservoirs under 'trial and error method'. 15

UNIT - II

4. (a) Differentiate between : 7.5
- (i) Syphon aqueduct and canal syphon
 - (ii) Aqueduct and super passage
- (b) Explain how will you determine the following in design of a Syphon aqueduct : 7.5
- (i) Waterway of the drain & cross-sectional area of drain
 - (ii) Head loss through syphon barrel
 - (iii) Uplift pressure due to seepage flow
5. (a) Distinguish between a weir and a barrage. What are the limitations of Bligh's Theory? 7.5
- (b) What is hydraulic design of a weir? Explain the design for different components of a weir. 7.5

UNIT - III

6. (a) What is a canal fall? Why is it necessary to provide a fall? 7.5
- (b) Discuss the merits and demerits of Notch type fall and Sarda type fall. 7.5
7. Describe an ogee spillway from the following data : 15
- Height of spillway crest above bed = 100 m
 - Design of discharge = 10,000 m³/sec
 - Number of spans = 10
 - Clear distance between piers = 20 m
 - Thickness of piers = 5m
 - Slope of d/s for face of overflow section = 1: 1.25
 - Assume C = 2
- Draw the cross section of the designed spillway.

UNIT - IV

8. An earthen dam made of a homogeneous material have the following data : 15
- Coefficient of permeability of dam material = 5×10^{-4} cm/sec
 - Level of top of dam = 200 m
 - Level of deepest river bed = 178 m
 - HFL of reservoir = 197.5 m