CBCS SCHEME

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18CV744

Seventh Semester B.E. Degree Examination, June/July 2024
Design of Hydraulic Structures

Time: 3 hrs. Max. Marks: 100

Note: 1. ***Answer any FIVE full questions, choosing ONE full question from each module.***
2. ***Any assumptions considered for design need to be justified with reasons.***

Module-1

1 a. What do you understand by Gravity Dam? Explain various forces that act on gravity dam (any four). **(10 Marks)**

b. Discuss in brief various modes of failure of gravity dam. **(10 Marks)**

OR

2 a. What do you understand by Elementary profile of gravity Dam? Derive an expression for determining the base width of such a dam on :
i) no tension criterion ii) no sliding criterion. **(10 Marks)**

b. Write note on : Galleries" and "Joints" in gravity dam. **(10 Marks)**

Module-2

3 a. What are the various causes of failure of earthdam? Discuss with the relevant sketches. **(10 Marks)**

b. Explain how to determine phreatic line with filter using 'Casagrande's method'. **(10 Marks)**

OR

4 a. Define "Earth Dam". Mention the advantages and limitations of earth dam over other dams. **(10 Marks)**

b. An earth dam made of a homogeneous material has a horizontal filter and other parameters as mentioned below. Determine the phreatic line and seepage quantity through body of the dam.

Parameter of Earth dam :

Top level of dam	=	180.000m
Deepest river bed level	=	158.000m
HFL of river	=	177.500m
Top width	=	4.5m
u/s slope	=	3:1
d/s slope	=	2:1

Horizontal filter from d/s toe of dam = 25m
Coefficient of permeability of dam material $K = 5 \times 10^{-4}$ cm/s **(10 Marks)**

Module-3

5 a. What is Spillway? What are its functions? Enumerate various types of spillways. **(10 Marks)**

b. Draw neat diagram of 'ogee spillway' and explain it design criteria. **(10 Marks)**

OR

6 a. Explain Bligh's Creep theory and list the limitation of Bligh's creep theory. **(10 Marks)**

b. The c/s of a weir is shown in Fig Q6(b)
Calculate : i) Average hydraulic gradient
ii) UP lift pressure at points A, B and C
iii) Thickness of concrete apron at points A, B and C.

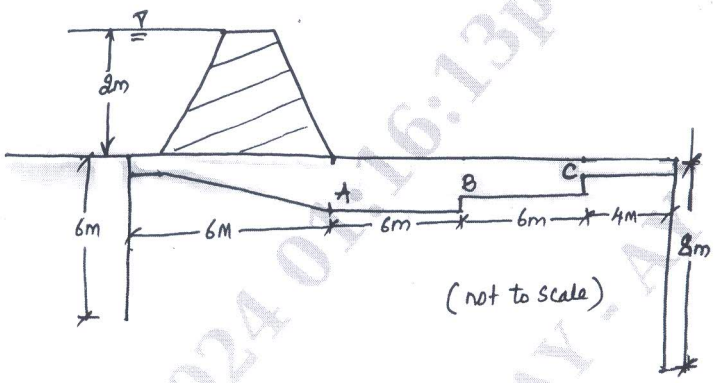

Fig Q6(b) **(10 Marks)**

Module-4

7 a. Describe the necessity of Cross-Drainage Works (CDW). Outline the different types of CDW. **(10 Marks)**

b. Explain the following :
   i) Level crossing
   ii) Syphom Aqueduct **(10 Marks)**

OR

8 Design the suitable CDW for the data given below :

CANAL		
Flow rate	=	$30m^3/s$
FSL	=	251.500m
CBL	=	250.000m
Canal bed width	=	20m
Side slope	=	1½ : 1
Manning's constant (n)	=	0.016

DRAINAGE		
High flood discharge	=	$250m^3/s$
HFL	=	247.500m
High flood depth	=	2.5m
General G.L	=	251.1000m

(20 Marks)

Module-5

9 a. What do you by Canal Regulation works? Discuss the functions of head regulation and cross regulators. **(10 Marks)**

b. With the help of neat sketch, describe the different types of canal fall (any four). **(10 Marks)**

OR

10 a. What is Canal outlet? Write down the requirements that an out let should fulfill. **(06 Marks)**

b. How do you remove surplus water from an irrigation channel? Explain. **(06 Marks)**

c. Distinguish clearly between non-modular and semi-modular outlets. Give examples. **(08 Marks)**

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