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Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
Sixth Semester B.Tech Degree Examination June 2022 (2019 Scheme)

Course Code: CET306

Course Name: DESIGN OF HYDRAULIC STRUCTURES

Max. Marks: 100   Duration: 3 Hours

- **Use of Khosla's Chart, Blench Curves and Montague Curves are permitted in the Examination Hall**
  - **Assume suitable design data whichever necessary**

PART A
Answer one full question from each module, each carries 15 marks.   Marks

Module I

1	a)	Sketch the layout of a diversion headworks and mark the components	(4)
	b)	Explain different types of weirs with neat sketches	(6)
	c)	Briefly explain Khosla's method of independent variables. Mention the various corrections to be used	(5)

OR

2	a)	What are the causes of failure of hydraulic structures on pervious foundation? What remedies would you suggest to prevent them?	(9)
	b)	Obtain an expression for computation of floor thickness based on Bligh's creep theory	(3)
	c)	Define a weir and barrage with the help of a neat sketch.	(3)

Module II

3	a)	What is a canal fall? Explain its necessity.	(3)
	b)	What are the factors that affect the alignment of a canal?	(3)
	c)	Explain different types of aqueducts based on the canal cross section at the crossing. Where will you adopt each type?	(9)

OR

4	a)	Draw the cross section of canal in partly cutting and partly filling and mark the components	(4)
	b)	What are the different regime conditions in Lacey's theory?	(3)
	c)	Design an irrigation channel by Kennedy's theory to carry a discharge of 5 cumecs. Take m=1, N=0.0225 and B/D ratio = 4.40.?	(8)

PART B
Answer any one full question
Module III

5 a) Design a suitable cross drainage work for the following hydraulic particulars: (25)

Canal

Full supply discharge = 25 cumecs

Bed level = 112.00

Full supply level = 113.50

Bed width = 18.0m

Side slope =1.5 H :1 V

Left bank is 3.0m wide. Right bank is 4.5m wide and the cross drainage work carries a roadway of 4.5m over it.

Drainage

Catchment area = 175 sq.km

Ryve's coefficient =10

Bed level = 106.80

High flood depth = 3.2 m

General ground level = 113.20

b) Prepare the following drawings (not to scale)   (25)

i. Half sectional plan at the foundation level. (15 marks)

ii. Section along the centre line of the canal. (10 marks)

OR

6 a) Design a Sarda type fall for the following data: (25)

Full supply discharge $\dfrac{u/s}{d/s}$ = 40 cumecs

Full supply level $\dfrac{u./s}{d/s} = \dfrac{218.30m}{216.80m}$

Full supply depth $\dfrac{u/s}{d/s} = \dfrac{1.8m}{1.8m}$

Bed Width $\dfrac{u/s}{d/s} = \dfrac{26m}{26m}$

Bed level $\dfrac{u/s}{d/s} = \dfrac{216.50m}{215.0m}$

Design the floor by Khosla's theory. Take safe exit gradient = 1/5

b) Prepare the following drawings (not to scale)   (25)

     i. Half plan at top and half at the foundation level. (15 marks)

     ii. The Section along the centre line of the canal   (10 marks)

PART C

Answer one full question from each module, each question carries 10 marks

Module IV

7 a) The following Figure shows the profile of a gravity dam with reservoir levels as   (8) shown. Find the principal and shear stresses at toe of the dam (reservoir full condition). Assume unit weight of concrete as 24 kN/m³. Consider only water pressure, self weight and uplift
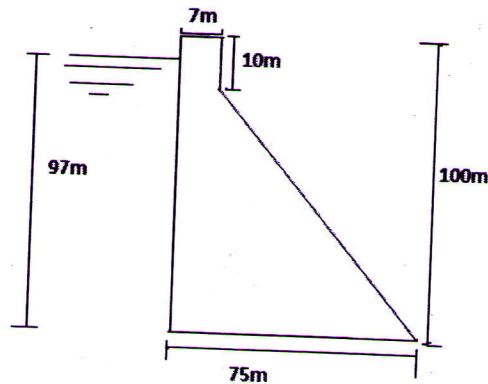
   b) Draw and explain the practical profile of a gravity dam   (2)

OR

8 a) Explain the failure of gravity dam by means of overturning   (5)

   b) Explain galleries and their functions in gravity dam.   (5)

Module V

9 a) List the types of spillways. Explain any one in detail with neat sketch.   (6)

   b) Explain energy dissipation below spillways.   (4)

OR

10 a) Derive the expression for thickness of an arch dam using thin cylinder theory.   (5)

   b) Write in detail the design criteria of earth dam.   (5)

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