

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)
- Half sectional plan at the foundation level. (15 marks)
 - Section along the centre line of the canal. (10 marks)

OR

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

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

$$\text{Full supply level } \frac{u/s}{d/s} = \frac{218.30m}{216.80m}$$

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

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

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

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

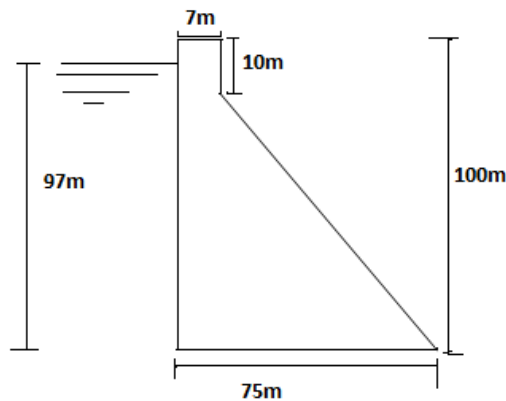
- b) Prepare the following drawings (not to scale) (25)
- i. Half plan at top and half at the foundation level. (15 marks)
 - ii. The Section along the centre line of the canal (10 marks)

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 shown. Find the principal and shear stresses at toe of the dam (reservoir full condition). Assume unit weight of concrete as 24 kN/m^3 . Consider only water pressure, self weight and uplift (8)



- 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)
