

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Sixth Semester B.Tech Degree Regular and Supplementary Examination July 2021

Course Code: CE302**Course Name: DESIGN OF HYDRAULIC STRUCTURES**

Max. Marks: 100

Duration: 4 Hours

Use of Khosla's charts are permitted in the exam hall**Assume suitable data wherever necessary****PART A***Answer any two full questions, each carries 15 marks.*

Marks

- 1 a) What are the differences between a weir and a barrage? (2)
- b) What are the corrections made to uplift pressures obtained at key points in Khosla's theory of independent variables? (5)
- c) Draw a neat layout of diversion headworks and describe the functions of its components. (8)
- 2 a) Describe various types of cross drainage works with the help of sketches. (6)
- b) Why are canal falls constructed in a channel? List different types of canal falls. (3)
- c) Design an irrigation channel to carry a discharge of 55 cumecs. Use Rugosity coefficient = 0.023. Critical velocity ratio = 1. Bed slope = 1 in 5000. (6)
- 3 a) What are the general considerations for canal alignment? (5)
- b) What are the limitations in the Bligh's theory for design of impermeable foundations? (3)
- c) An impervious floor of a weir on permeable soil is 17 m long and has sheet piles at both the ends. The upstream pile is 4 m deep and downstream pile is 5 m deep. The weir creates a net head of 2.5 m. Neglecting thickness of the weir floor, calculate uplift pressures at the junctions of the inner faces of piles with the floor, by using Khosla's theory. (7)

PART B*Answer any one full question, each carries 50 marks.*

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

Canal

Full supply discharge = 25 cumecs

Full supply level = 113.50 m

Canal bed level = 112.00 m

Canal bed width = 18 m

Canal water depth = 1.50 m.

Trapezoidal canal section with 1.5 H: 1 V slopes

Drainage

High flood discharge = 320 cumecs.

High flood level = 110.00 m

High flood depth = 3.20 m.

General ground level = 113.10 m.

- b) Prepare the following drawings (not to scale) (25)
- i) Half plan at top and half at foundation level.
 - ii) Section through the centre line of the drain.

- 5 a) Design a 2 metre trapezoidal notch fall for the following data: (25)

Details of the canal above drop

Full supply discharge = 4 cumecs

Bed width = 6.00 m

Bed level = 12.00 m

Full supply depth = 1.50 m

Full supply level = 13.50 m

Top of bank 2.00 m wide at level 14.50 m

Half supply depth = 1.00 m

Details of the canal below drop

Full supply discharge = 4 cumecs

Bed width = 6.00 m

Bed level = 10.00 m

Full supply depth = 1.50 m

Full supply level = 11.50 m

Top of bank 2.00 m wide at level 12.50 m

Good soil for foundation is available at 9.50 m

Assume any other required data suitably.

- b) Prepare the following drawings (not to scale) (25)
- i) Half plan at top and half at the foundation level.
 - ii) Section across the channel through the notch fall.

PART C

Answer any two full questions, each carries 10 marks.

- 6 a) Differentiate between a low dam and a high dam. (3)
- b) What are the forces acting on a gravity dam? (2)
- c) Derive the most economical central angle of an arch dam. (5)
- 7 a) What are the causes of failure of an earth dam? (5)
- b) What are the limitations of thin cylinder theory? (3)
- c) What are the purposes for which galleries are provided in dams? (2)
- 8 a) What is meant by a spillway? Explain Ogee type of spillway. (5)
- b) What are the functions of water stops in gravity dam? (2)
- c) Sketch and explain the practical profile of a gravity dam. (3)
