C

1200CET306052301

Pages: 3

Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Sixth Semester B.Tech Degree Supplementary Examination May 2023 (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) Define a weir and barrage with the help of neat sketches. (6)

b) A barrage built on fine sand has the following details: Total length of the floor = 35 m, a gate at 7 m from u/s end, effective head of water 5 m, sheet pile at u/s end 6 m deep, sheet pile at d/s end 8 m deep, intermediate piles of 4 m depth at 20 m from u/s end. Determine: a) Average hydraulic gradient, b) Uplift pressures at points 10 m and 25 m from upstream end and corresponding thicknesses of floor using Bligh's theory. Specific gravity of floor material is 2.24. (9)

OR

2 a) What are the functions of under sluice, silt excluder and silt ejector in a diversion headwork? (6)

b) Explain Khosla's method of independent variable. How do you apply corrections for (i) thickness of floor, (ii) inclination of floor and (iii) interference of piles? (9)

Module II

3 a) Why Lacey's silt theory is more reliable than Kennedy's theory for the design of alluvial channels? (5)

b) Explain various types of cross drainage works with neat sketches. (10)

OR

4 a) What are the various types of irrigation canals? What are the circumstances, under which each one is suitable. (6)

b) Using Lacey's theory, design a regime channel for a discharge of 50 cumecs, side slopes = ½: 1 and silt factor = 1. (9)

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 = 40 cumecs

Bed width = 30.0m

Bed level = 200.00

Full supply depth = 1.75m

Side slope =1.5 H :1 V

Left bank is 3.0 m wide. Right bank is 5m wide and the cross drainage work carries a roadway of 5m over it.

Drainage

Maximum flood discharge = 400 cumecs

Bed level = 198.00

High flood level = 200.50m

General ground level = 200.00m

Lacey's silt factor = 1

Rugosity coefficient N = 0.016

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

i. Half sectional plan at top and foundation level.

ii. Section along the centre line of the drain.

OR

6 a) Design a 1.75 m Sarda fall for a canal having a discharge of 20 cumecs for the following data (25)

Bed level upstream = 108.0 m

Side slopes of channel = 1:1

Bed level downstream = 106.25 m

Full supply level upstream = 109.5 m

Bed width u/s and d/s = 10 m

Khosla's safe exit gradient = 1/6

b) Prepare the following drawings (not to scale)

i) Half sectional plan at top and foundation level (15)

ii) Longitudinal sectional view through centre line of the channel (10)

PART C

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

Module IV

7 a) Explain various modes of failure of a gravity dam. (5)

b) What is an elementary profile of a gravity dam? How the practical profile of dam can be obtained from elementary profile? (5)

OR

8 a) How do you fix the suitable site for a dam? (4)

b) Derive the equation for Principal and shear stresses in gravity dam. (6)

Module V

9 a) Draw the cross-sections of the diaphragm type embankment for earth dam resting on impervious soil. (5)

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

OR

10 a) Explain side channel spillways and syphon spillways with neat sketches. (5)

b) Explain the components provided in a stilling basin for energy dissipation. (5)

****