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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S6 (S, FE) / S6 (PT) (S) Examination January 2024 (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) Explain the causes of failures of weirs on permeable foundation and the remedies. (10)

b) What are the limitations of Bligh's theory of design of impermeable foundation? (5)

OR

2 a) Explain the functions of silt excluder and silt extractor with neat sketches. (5)

b) An impervious floor of a weir on permeable soil is 20 m long and has sheet piles at both the ends. The upstream pile is 5 m deep and the downstream pile is 6 m deep. The weir creates a net head of 3 m. Calculate the uplift pressures at the junction of the inner faces of the pile with 1 m thick weir floor, by using Khosla's theory. (10)

Module II

3 a) What is the necessity of canal falls ? Explain the features of any three types of canal falls with sketches (7)

b) Write a short note on alignment of irrigation canals. Classify the canals based on alignment. (8)

OR

4 a) Explain in brief Lacey's regime theory. What are the regime conditions? (6)

b) Design an irrigation channel to carry a discharge of 30 cumecs by Kennedy's theory. Take B/D ratio as 8, N = 0.0225 and m = 1. (9)

PART B

Answer any one full question

Module III

5 a) Design a suitable cross drainage work, for the following data at the crossing of a canal and a drainage. (25)

Canal:

Full supply discharge = 50 cumecs

Full supply level = 192.5 m

Canal bed level = 191.0 m

Canal bed width = 24 m

Trapezoidal canal section with 1.5 H: 1 V slopes

Canal water depth = 1.5 m.

Drainage:

High flood discharge = 380 cumecs.

High flood level = 189.0 m

High flood depth = 2.5 m.

General ground level = 191.5 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

OR

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

Full supply discharge = 3 cumecs

Full supply depth =1m

Half supply depth = 0.6m

Bed width = 6m

At the proposed site a fall of 1.6m is available. Good foundation is available 1m below natural surface level. The canal section and flow conditions are same below the fall. Assume any other data if required.

b) Prepare the following drawings (not to scale)

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

ii. Section along the centre line of the channel. (10)

PART C

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

Module IV

7 a) List the various forces acting on gravity dam. (3)

b) Design the practical profile of a gravity dam of stone masonry for the following data. (7)
R.L of base of the dam = 1380m

R.L of H.F.L = 1350m

Specific gravity of masonry = 2.4

Safe compressive stress for masonry of dam = 125t/m^2

Height of wave = 1 m

OR

8 a) Explain the functions of shafts, keys and water stops in gravity dam. (3)

b) Derive the expression for determining base width of the elementary profile of gravity dam based on stress criterion and sliding criterion. (7)

Module V

9 a) Explain the types of Arch dams. (5)

b) Derive the most economical central angle of an arch dam. (5)

OR

10 a) What is a Spillway? Explain Ogee type of spillway with a neat sketch. (5)

b) What is a Stilling basin? Explain Type I stilling basin with figure. (5)

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