Register No.:   ………………………………   Name: ………………………………………………………………

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SIXTH SEMESTER B.TECH DEGREE EXAMINATION (R), MAY 2023
CIVIL ENGINEERING
(2020 SCHEME)

Course Code :   **20CET306**

Course Name: **Design of Hydraulic Structures**

Max. Marks :   **100**   **Duration: 4 Hours**

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

PART A
(Answer any one full question from each module. Each question carries 15 marks)

MODULE I

1.   a)   Draw a neat layout of a Diversion headwork and explain the functions of any five components.   (10)

    b)   Explain the criteria for design of impervious floor by Bligh's theory.   (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)   Briefly explain Khosla's method of independent variables. Mention the various corrections to be used.   (6)

MODULE II

3.   a)   Explain different types of cross drainage works with the help of sketches. Where will you adopt each type?   (10)

    b)   Compare Kennedy's theory and Lacey's silt theory.   (5)

OR

4.   a)   Design an irrigation channel to carry a discharge of 55 cumecs. Assume Rugosity coefficient = 0.023, Critical velocity ratio = 1, Bed slope = 1 in 5000.   (8)

    b)   Why are canal falls constructed in a channel? List the different types of canal falls.   (7)

PART B
(Answer any one full question. Question carries 50 marks with 25 marks for design and 25 marks for drawing)

MODULE III

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

Canal
Full supply discharge = 30 cumecs
Bed width = 24.0 m
Bed level = 200.00 m
Full supply depth = 1.25 m
Side slope = 1.5 H : 1V
Left bank is 3.0 m wide. Right bank is 4.5 m wide and the cross-drainage work carries a roadway of 4.5 m over it.

Drainage
Maximum flood discharge = 500 cumecs
Bed level = 198.00 m
High flood level = 200.50 m
General ground level = 200.00 m
Lacey's silt factor = 1
Rugosity coefficient, N = 0.016

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

OR

6.   a)   Design a 1.5 m Sarda type fall for the following data: (25)

Full supply discharge u/s and d/s = 40 cumecs
Full supply level u/s and d/s = 218.30 m / 216.80 m
Full supply depth at u/s and d/s = 1.80 m
Bed width u/s and d/s = 26.0 m
Bed level at u/s and d/s = 216.50 m / 215.00 m

Design the floor using Bligh's theory taking coefficient of creep = 8. Check the design by Khosla's theory and make changes if necessary. Safe exit gradient may be taken as 1/5.

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

PART C
(Answer any one full question from each module. Each question carries 10 marks)

MODULE IV

7. a) Discuss in brief the modes of failure of a gravity dam.   (5)
    b) Explain the various types of joints present in a gravity dam.   (5)

OR

8. a) What is meant by elementary profile of a gravity dam?   (5)
    b) Obtain the condition for no-tension criteria in a gravity dam.   (5)

MODULE V

9. a) Derive an expression for the thickness of an arch dam using thin cylinder theory.   (5)
    b) Draw the cross-sections of the zoned earth dam you would select if the materials available are gravel and clayey silt.   (5)

OR

10. a) What is meant by a spillway? Differentiate between a chute spillway and side channel spillway.   (5)
    b) What are the causes of failure of an earth dam?   (5)

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