

Register No:

Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SIXTH SEMESTER B.TECH. DEGREE EXAMINATION(R,S), MAY 2024**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 one full question from each module. Each question carries 15 marks)***MODULE I**

1. a) Two sheet piles of length 6 m and 8 m are provided below an impervious floor of 25 m length. Total head created on the floor is 5 m. Calculate the average hydraulic gradient. Also find the uplift pressure at points 6, 12 and 18 m from the upstream end of the floor and find the thickness of the floor at these points using Bligh's creep theory. Take specific gravity of concrete as 2.25. 10
- b) What are the limitations of Bligh's theory of design of impermeable foundation? 5

OR

2. a) Explain the functions of divide wall and canal head regulator with neat sketches. 8
- b) Differentiate between weir and barrage. 7

MODULE II

3. Enumerate the reasons for the construction of canal falls in a channel. Also, explain the different types of canal falls with neat sketches. 15

OR

4. a) Draw the section and explain the parts of an unlined canal partly in cutting and partly in filling. 5
- b) A channel section has to be designed for the given data: discharge- 300 cumecs, silt factor- 1, side slope- 0.5H:1V. Also find the longitudinal slope. 10

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 = 25 cumecs
 Bed level = 112.00 m
 Full supply level = 113.50 m
 Bed width = 18.0 m
 Side slope = 1.5 H : 1 V
 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**

Catchment area = 175 sq.km
 Ryve's coefficient = 10
 Bed level = 106.80 m
 High flood depth = 3.2 m
 General ground level = 113.20 m

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

OR

6. a) Design a Sarda type fall with a drop of 1.5 m for the following data 25

Upstream

Discharge = 55 m³/s
 Bed width = 28 m
 Bed level = RL 218.00 m
 Full supply depth = 1.5 m
 Full supply level = RL 219.50 m

Downstream

Discharge = 55 m³/s
 Bed width = 28 m
 Bed level = RL 216.50 m
 Full supply depth = 1.5 m
 Full supply level = RL 218.00 m

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

PART C

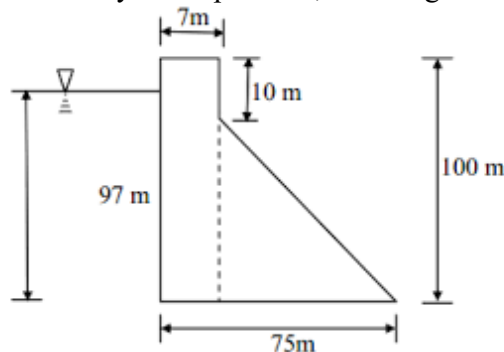
(Answer any one full question from each module. Each question carries 10 marks)

MODULE IV

7. a) Describe the elementary profile of a gravity dam. 5
 b) Explain the joints in gravity dam. 5

OR

8. The following figure shows the profile of a gravity dam with reservoir levels. Find the principal and shear stresses at the toe of the dam (reservoir full condition). Assume the unit weight of concrete as 24 kN/m³. Consider only water pressure, self weight and uplift. 10



MODULE V

9. a) Explain chute spillway and side channel spillway. 4
 b) What is a stilling basin? Describe Type I and Type II classification of stilling basin. 6

OR

10. a) Summarize thin cylinder method of design of arch dam and list the assumptions. 5
 b) Describe the design criteria for an earth dam. 5
