

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S6 (S,FE) (FT/WP/PT) Examination December 2025 (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 functions of a diversion headwork with a neat sketch. (9)
- b) Explain the major causes of subsurface failure of hydraulic structures and state its remedial measures. (6)

OR

- 2 a) An impervious floor of a weir on permeable soil is 24 m long and has sheet piles at both ends. The upstream pile is 4 m deep and the downstream pile is 5 m deep. The weir creates a net head of 4 m. Calculate uplift pressures at points 8 m and 16 m from the upstream end and the corresponding thicknesses of the floor using Bligh's theory. The specific gravity of floor material is 2.24. (9)
- b) Explain the corrections that need to be incorporated in the design of impervious floors of hydraulic structures using Khosla's theory. (6)

Module II

- 3 a) Explain the different types of cross-drainage works with neat sketches. (12)
- b) Sketch the cross-section of a canal and mark its components. (3)

OR

- 4 a) Design a regime channel using Lacey's theory, for a discharge of 25 cumecs, side slopes = $\frac{1}{2}H: 1V$ and silt factor = 1 (10)
- b) Discuss the drawbacks of Kennedy's theory. (5)

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 canal and drainage. (25)

Canal

Full supply discharge = 40 cumecs

Full supply level = 185.5m

Canal bed level = 184m

Canal bed width = 20 m

Trapezoidal canal section with 1.5H:1V slopes

Canal water depth = 1.5 m

Drainage

High flood discharge = 400 cumecs

High flood level = 182m

High flood depth = 2 m

General ground level = 184.5

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

OR

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

Bed level of the canal above the drop = 100 m

Full supply discharge = 4 cumecs

No of notches = 2

Full supply depth = 1.2 m

Half supply depth = 0.9 m

Bed width = 6.5 m

At the proposed site a fall of 1.6m is available. A good foundation is available 1m below the natural surface level. The canal section and flow conditions are the same below

the fall. Assume any other data if required.

- b) Prepare the following drawings (not to scale) (25)
- iii. Half sectional plan at top and foundation level.
 - ii. Section along the center line of the channel.

PART C

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

Module IV

- 7 Check the stability of the gravity dam for the following data. Top width = 8m, Freeboard = 2m, u/s FRL depth = 43m, d/s remains vertical up to 10m from the top, and then batters with a slope = 0.9H to 1V, u/s remains vertical. Assume g as 9.81m/s^2 and the density of the gravity dam as 24.5kN/m^3 . There is no tail water and silt. (10)

OR

- 8 a) Explain various forces acting on the gravity dam. (6)
b) Discuss the relevance of the limiting height of the gravity dams. (4)

Module V

- 9 a) Which is the most common type of spillway used in our country? Explain. (5)
b) Explain the design criteria of an earthen dam. (5)

OR

- 10 a) Derive an expression for the thickness of an arch dam using the thin cylinder theory. (5)
b) Explain the arrangements provided below the spillway for energy dissipation. (5)
