Reg No.: __________________ Name: ____________________________

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SIXTH SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2018

Course Code: CE 302
Course Name: DESIGN OF HYDRAULIC STRUCTURES (CE)

Max. Marks: 100
Duration: 4 Hours

Use of Khosla's Chart, Blench Curves and Montague Curves (signed by the concerned faculty member) may be permitted.

Two answer books may be used if required.

PART A

Answer any two full questions, each carries 15 marks.

1. a) What are the general considerations for Canal alignment? (5)
   b) What are the assumptions of Khosla’s theory for design of impermeable foundation? (5)
   c) What is a Cross Drainage work? Explain the types of Cross drainage work. (5)

2. a) Draw a neat sketch of layout of a Diversion headwork and explain the functions of components. (10)
   b) What are the limitations of Bligh’s theory of design of impermeable foundation? (3)
   c) What is a Canal regulator? (2)

3. a) Design an irrigation channel to carry a discharge of 65 cumecs. Assume Rugosity coefficient = 0.0215. Critical velocity ratio = 1. Channel has a bed slope of 0.15 m/km (8)
   b) Using Khosla’s theory, determine the pressure at C1 with interference correction (Use Khosla’s curves) (5)

![Diagram of Diversion Headwork](image)
c) What is the difference between weir and barrage? (2)

PART B

Answer any one full question, each carry 50 marks.

4 Design a suitable cross drainage work for the following data at the crossing of a canal and a drainage

**CANAL**
- Full supply discharge = 45 cumecs
- Full Supply level = RL 217.00
- Canal bed level = RL 213.00
- Canal bed width = 20 m
- Canal water depth = 1.7 m
- Trapezoidal canal section with 1.5 H : 1V slope (50)

**DRAIN**
- High flood discharge = 280 cumecs
- High flood level = RL 210
- High flood depth = 2.5 m
- General ground level = RL 214.00

Prepare the following drawings (not to scale)
- i) Half sectional plan at foundation level
- ii) Section through the centre line of the drain

5 Design a Sarda type fall with a drop of 1.5 m for the following data

**Upstream**
- Discharge = $55 \text{ m}^3/\text{s}$
- Bed width = 28 m
- Bed level = RL 218.00
- Full supply depth = 2 m
- Full supply level = RL 219.50 (50)

**Downstream**
- Discharge = $55 \text{ m}^3/\text{s}$
- Bed width = 28 m
- Bed level = RL 216.50
- Full supply depth = 2 m
Full supply level = RL 218.00

Prepare the following drawings (not to scale)

i) Half plan at top and at foundation level

ii) Longitudinal Section through the centre line of the canal

PART C

Answer any two full questions, each carries 10 marks.

6 a) What is a Spillway? Explain Ogee type of spillway. (6)
    b) What is meant by Elementary profile of a gravity dam? (2)
    c) What are the functions of Water stops in gravity dam? (2)

7 a) What is a Stilling basin? Explain Type I and Type II stilling basins (6)
    b) Explain thin cylinder method of design of Arch dam (2)
    c) What are the functions of gallery in a gravity dam? (2)

8 Determine the maximum and minimum vertical stresses at heel and toe, major principal stress at toe and intensity of shear stress on a horizontal plane near toe of the dam.

Weight of concrete = 23.5 kN/m$^3$. Top width of dam = 8m, Bottom width = 24 m

Allowable stress in concrete = 2500 kN/m$^2$ (10)