

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SIXTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY 2019

Course Code: CE304
Course Name: DESIGN OF CONCRETE STRUCTURES - II

Max. Marks: 100

Duration: 3 Hours

Use of IS 456, IS 875, IS 1343, IS 3370, SP 16 and SP 34 are permitted.

Assume any missing data suitably

PART A*Answer any two full questions, each carries 15 marks.*

Marks

- 1 a) A short column 300 mm x 600 mm is carrying an axial working load of 700 kN and a moment of 150 kNm at an axis bisecting the depth. Design the reinforcement required if $F_y = 250 \text{ N/mm}^2$ and $f_{ck} = 20 \text{ N/mm}^2$. Also sketch the reinforcement. (10)
- b) Explain the design procedure of a slender column (5)
- 2 a) Design and detail a column under biaxial bending with the following data: (15)
 Size of column = 40 x 60cm
 The column is effectively held in position at both ends but not restrained against rotation. The unsupported length of column is 3.5m
 Concrete grade = M20
 Grade of Steel = Fe 415
 Factored load $P_u = 1900 \text{ kN}$
 Factored Moment $M_{ux} = 150 \text{ kNm}$
 $M_{uy} = 110 \text{ kNm}$
- 3 a) Design and detail an isolated rectangular footing for a column 400 mm x 600 mm to carry a load of 2000 kN. The SBC of the soil is 180 kN/m^2 . Use M20 concrete and Fe 415 grade steel (15)

PART B*Answer any two full questions, each carries 15 marks.*

- 4 a) A cantilever retaining wall is designed to retain earth for a height of 4.4 m. The safe bearing capacity of soil is 200 kN/m^2 and unit weight of soil is 17.5 kN/m^3 . Coefficient of friction between soil and concrete is 0.55. Proportion the retaining wall and check for stability. Also design and detail the heel and toe slab of the retaining wall. (15)
- 5 a) Under what circumstances the counterfort retaining wall is preferred? Give briefly the design procedure of a counterfort retaining wall. Also sketch the reinforcement detail (10)

- b) Explain the design procedure for spherical dome. 5
- 6 a) A circular slab is 5m inside diameter and is fixed at the edges. It is loaded with a live load of 3 kN/m^2 . Design the reinforcement for the slab and sketch the details. Assume M 20 concrete and Fe 415 steel. (15)

PART C

Answer any two full questions, each carries 20 marks.

- 7 a) Design and detail a circular tank for a capacity of 500000 litres. The depth of water is to be 5m including freeboard of 30cm. The tank is supported on ground. Design using M20 concrete and 415 grade steel. (20)
- 8 a) Discuss in detail the losses involved in prestressing (5)
- b) A post-tensioned cable of a beam 9 m long initially tensioned to a stress of 1000 N/mm^2 at one end. If the tendons are curved so that the slope is 1 in 24 at each end with an area of 600 mm^2 . Calculate the loss of prestress due to the following data 15
- Coefficient of friction between duct and cable – 0.25
Friction coefficient for wave effect - 0.0091/m
During anchorages if there is a slip of 3 mm at the jacking end, calculate the final force in the cable and the percentage of loss due to friction and slip.
 $E_s = 210 \times 10^3 \text{ N/mm}^2$
- 9 a) Explain the principle of prestressing 4
- b) Explain the reasons for using high strength materials in prestressed concrete 6
- c) A rectangular concrete beam 250 mm wide and 550 mm deep is prestressed by means of 4 numbers 12 mm diameter high tensile bars located at 200 mm from the soffit of the beam. If the effective stress in the wire is 700 N/mm^2 , what is the maximum bending moment that can be applied at the soffit of the beam 10
