

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SIXTH SEMESTER B.TECH DEGREE EXAMINATION(S), DECEMBER 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 34 and SP 16 are permitted.

Assume any missing data suitably.

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

Marks

- 1 a) Design a RCC rectangular column to carry an axial load of 1200 kN and a moment of 70 kNm, The length of the column is 3.5m. The one end is fixed and the other end is hinged. The width of the column is restricted to the wall thickness of 24 cm. (10)
- b) Discuss the analysis of a trapezoidal combined footing and sketch the plan and elevation. (5)
- 2 a) Design a slender braced circular column under uniaxial bending with the following data: 15
- Size of column = 40 cm
Concrete grade = M20
Steel grade = Fe 415
Effective length ratio = 0.85
Unsupported length = 7m
Factored load $P_u = 1000$ kN
Factored Moment $M_{ux} = 60$ kNm at Top
= 30 kNm at Bottom
- 3 a) Design and detail an isolated footing for a square column 400 mm x 400 mm carrying a load of 2100 kN. The SBC of the soil is 280 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 m. Assume good soil for foundation is at a depth of 1m below the ground level. The safe bearing capacity of soil is 180 kN/m^2 and unit weight of soil is 16.5 kN/m^3 . Coefficient of friction between soil and concrete is 0.5 and angle of shearing resistance of 30° . Proportion the retaining wall and check for stability. Also design and detail the stem slab and toe slab of the retaining wall. (15)
- 5 a) Explain the different types of retaining wall. Discuss the design procedure in detail of a counterfort retaining wall. Also sketch the reinforcement detail (10)

- b) Briefly explain the use and design of ring beam in dome structure. 5
- 6 a) A circular slab is 6 m diameter and is simply supported at the edges. It is loaded with a live load of 4 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 with fixed base for a capacity of 6 lakh litres. (20)
The depth of water is to be 5m including freeboard of 250mm. The tank is supported on ground. Design using M20 concrete and 415 grade steel.
- 8 a) Differentiate between pre-tensioning and post-tensioning. (5)
- b) Determine the extreme fibre stresses developed at the mid span section of a simply supported prestressed concrete beam of rectangular section $250 \text{ mm} \times 600 \text{ mm}$ prestressed using high tensile steel of cross sectional area 1000 mm^2 stressed to 1500 N/mm^2 . The center of gravity of the steel is 150 mm above the soffit of the beam. The superimposed load is 16 kN/m . Span of the beam is 12 m. Draw the stress diagram at mid span. 15
- 9 a) Explain the various losses of prestress. 5
- b) A prestressed concrete beam 250mm wide and 350 mm deep is prestressed by 12 wires of 6mm diameter located at an eccentricity of 40 mm and carrying a initial stress of 1500 N/mm^2 . The span of the beam is 8m. Calculate the percentage of losses in wires if it is pretensioned $E_s = 210 \text{ KPa}$ and $E_c = 35 \text{ Kpa}$, relaxation of steel stress = 5% of the initial stress, total shrinkage strain is 200×10^{-6} . 15
