

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

Sixth Semester B.Tech Degree (S,FE) Examination May 2022 (2015 Scheme)

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

Max. Marks: 100

Duration: 3 Hours

*Use of IS 456, IS 1343, IS 3370 and design charts of SP 16 is permitted.**Assume any missing data suitably.***PART A***Answer any two full questions, each carries 15 marks.*

Marks

- 1 a) Design a short column subjected to an axial load of 900kN and a moment of 130kN-m about its major axis. Use M20 concrete and Fe415 grade steel (10)
- b) Under what circumstances a trapezoidal shape is preferred to a rectangular shape for a two column combined footing. (5)
- 2 a) Design a column for the following data. (15)  
Factored axial load 1500kN, Factored moments  $M_{ux}$  200kNm,  $M_{uy}$  100 kNm.  
Size of column 400 x 500mm. The unsupported length of the column is 3.5m.  
Use M25 concrete and Fe415 grade steel.
- 3 a) Illustrate the design and detailing of an isolated footing of uniform thickness for a rectangular column 300 x 450mm supporting an axial service load of 800kN. Safe bearing capacity of the soil is 200kN/m<sup>2</sup>. Use M20 concrete and Fe415 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. The safe bearing capacity of soil is 180kN/m<sup>2</sup> and unit weight of soil is 18kN/m<sup>3</sup>. Coefficient of friction between soil and concrete is 0.6 and the angle of internal friction is 30° Use M20 and Fe415 steel. Assume good soil for foundation at a depth of 1.5m below the ground level. Proportion the retaining wall and check for its stability. Also design and detail the stem of the retaining wall (15)

- 5 a) Design a circular slab for a room of inside diameter 5m, simply supported on brick walls of 230 mm thickness. Superimposed udl is  $4 \text{ kN/m}^2$  and weight of finishes  $1 \text{ kN/m}^2$ . Use M20 concrete and Fe415 steel (12)
- b) Explain the action of shear key in retaining walls (3)
- 6 a) Design and detail a spherical dome of span 12m and rise 3m. Live load= $1.5 \text{ kN/m}^2$ . Use M20 concrete and Fe 415. Design ring beam at base also. (15)

**PART C**

*Answer any two full questions, each carries 20 marks.*

- 7 a) Design a circular water tank of capacity 2,00,000 liters resting on the ground and having a fixed base and free at top. Depth of water is 3m including a free board of 0.25m. Use M25 concrete and Fe415 steel. Draw the cross section of water tank showing reinforcement details. (20)
- 8 a) Determine the extreme fibre stresses developed at the mid span section of a simply supported prestressed concrete beam of rectangular section 300 mm x 600 mm prestressed using high tensile steel of cross sectional area  $900 \text{ mm}^2$  stressed to  $1200 \text{ N/mm}^2$ . The CG of the steel is 200 mm above the bottom edge of the beam. The superimposed load is 15 KN/m. Span of the beam is 10 m and loss of prestress is 20%. Draw the stress diagrams at different stages of loading. (20)
- 9 a) Explain the different types of joints between water tank walls and floor slab with sketches (5)
- b) Explain the different losses in pre-tensioning and post-tensioning (10)
- c) Explain the principle of prestressing (5)

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