

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

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

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

Sixth semester B.Tech examinations (S), September 2020

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

Max. Marks: 100

Duration: 3 Hours

**Use of IS 456 ,IS 1343,IS 3370 & Column interaction curves of SP16 are permitted.  
Assume missing data ,if any,suitably.**

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

Marks

- 1 a) Design an uniaxially eccentrically loaded rectangular column section for the following data : $P_u=2500\text{kN}$  ,  $M_u =125\text{kNm}$  about major axis.Unsupported length = 3.2m , $L_{ex}=3\text{m}$  , $L_{ey}=2.75\text{m}$ , $f_{ck}=20\text{N/mm}^2$  , $f_y=415\text{N/mm}^2$ ,Use M20 concrete,Fe415 steel. Sketch reinforcement details. (10)
- b) Explain the interaction diagram of columns (5)
- 2 Design a braced column 400x600mm size with factored load of 1700kN & biaxial moments  $M_{ux1}=220\text{kNm}$  at top,  $M_{ux2}=125\text{kNm}$  at bottom about major axis;  $M_{uy1}=120\text{kNm}$  at top, $M_{uy2}=70\text{kNm}$  at bottom about minor axis. Unsupported length of column=9m,  $l_{ex}=8.5\text{m}$ ,  $l_{ey}=6.5\text{m}$ , Column bends in double curvature. Adopt M25 concrete,Fe415 steel. Show reinforcement details. (15)
- 3 Design a rectangular footing for an axial loaded column carrying 1200kN load ,Size of the column is 300mmx500mm.Safe bearing Capacity of soil is  $180\text{ kN/m}^2$ .Use M25 Concrete and Fe 415 Steel.Sketch reinforcement details of footing in section & plan (15)

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

- 4 Design & detail stem and heel portion of a cantilever retaining wall for retaining an earth fill of 3.5 m height above the ground. The safe bearing capacity of soil is  $150\text{kN/m}^2$  and unit weight of earth fill is  $18\text{kN/m}^3$ .the angle of friction is 30 deg and coefficient of friction between soil and concrete is 0.50. Use M25 and Fe415 steel. (15)

- 5 Design & detail a spherical dome for a circular water tank of diameter 10m. Rise of dome is 2m. Liveload= $2.5\text{kN/m}^2$ .  $f_{ck}=20\text{N/mm}^2$  and  $f_y=415\text{N/mm}^2$  (15)
- 6 Design a circular slab for a room of inside diameter 5m, simply supported on brick wall of 230mm thickness, superimposed u.d.l is  $3.5\text{kN/m}^2$  and weight finishes  $1\text{kN/m}^2$ . Use M20 and Fe415 steel. Sketch reinforcement details in plan & section of slab. (15)

**PART C**

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

- 7 Design a circular tank with flexible base resting on ground for capacity of 4 lakhs litres. The depth of tank is to be 4m including freeboard of 200mm. Use M30 Concrete & Fe415 Steel. Draw the reinforcement details in sectional elevation & plan through tank wall. (20)
- 8 An unsymmetrical I section is used to support an imposed load  $10\text{kN/m}$  over a span of 8m. Section details are Top flange= $300\times 60\text{mm}$ : Bottom Flange= $100\text{mm}\times 60\text{mm}$ : Overall depth of the beam = $400\text{mm}$ : thickness of web= $80\text{mm}$ . Initial prestressing force of  $300\text{kN}$  is applied at  $100\text{mm}$  above soffit of the beam. Estimate the stresses at the centre of span section of the beam for the following condition. 1) Prestress+self weight 2) Prestress, self weight, liveload. Assume total loss as 20%. Show stress diagrams. (20)
- 9 A Prestressed concrete pile  $300\text{mm}\times 300\text{mm}$  and is provided with 40 wires of 3mm diameter distributed uniformly over the section, Initially the wires are tensioned in the bed with total pull of  $200\text{ kN}$ . Determine the final stress in the section and the percentage loss of stress in wires. Relaxation loss of stress in steel= $4.5\%$  of initial stress.  $E_c=35\text{kN/mm}^2$ ,  $E_s = 210\text{kN/mm}^2$ , Creep coefficient 1.6; Shrinkage strain= $3\times 10^{-4}$  (20)

\*\*\*\*