C **Reg. No. :** | | | | | | | | | | |

Question Paper Code: 51U02

M.E. DEGREE EXAMINATION, NOV 2019

First Semester

Structural Engineering

15PSE102 - CONCRETE STRUCTURES

(Regulation 2015)

(IS456-2000, IS875 (1-5) 1987, SP (16) - 1980 and IS13920- 1993 are permitted)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART - A (5 x 1= 5 Marks)

1. The ratio of ultimate load to working load is CO1- R

   (a) 2 (b) 1.5 (c) 1 (d) 3

2. For a RC wall, minimum vertical reinforcement is CO2 -R

   (a) 0.4% (b) 0.12% (c) 0.15% (d) 0.8%

3. Spandrel beams are also called as CO3- R

   (a) Edge beams (b) Continuous Beam (c) Deep beams (d) Flanged beam

4. The maximum value of compressive stress in concrete is reached at a strain of about CO4 -R

   (a) 0.002 (b) 0.0035 (c) 0.003 (d) 0.02

5. In ductile detailing, when a column terminates into a footing, special confining reinforcement shall extend into the footing at least CO5- R

   (a) 200 mm (b) 2d (c) L_d (d) 300 mm

PART – B (5 x 3= 15 Marks)

6. What are the factors affecting long term deflection? Explain them. CO1-U
7. What is a Grid floor? Describe with a diagram. CO2-U
8. Distinguish flat slab and flat plate. CO3-U
9. Distinguish between normal ductility steel and high ductility steel. CO4-U
10. Draw the ductile detailing of a beam. CO5-U

PART – C (5 x 16= 80 Marks)

11.	(a)	Design a one-way slab with a clear span of 4 m simply supported on 230 mm thick masonry walls and subjected to a live load of 4 kN/m2 and a surface finish of 1 kN/m2. Assume M15 concrete and Fe415 steel.	CO1- App	(16)
		Or		
	(b)	An RC column of unsupported length 3 m is to be designed for a factored axial load of 2500 kN. Determine the cross-sectional dimensions of the column and the reinforcement required. Use M20 concrete nad Fe415 steel.	CO1- App	(16)
12.	(a)	Design a suitable RC section of a column of effective height 2.85 m to resist a factored axial load of 250 kN along with factored moments of 35 kNm about both major and minor axes. The effective cover is 40 mm on all four sides. Use M20 and Fe 415.	CO2- Ana	(16)
		Or		
	(b)	Design a corbel to carry a factored load of 500 kN at a distance of 200 mm from the face of a 300 x 300 mm column. Assume M30 concrete and Fe415 steel.	CO2- App	(16)
13.	(a)	Design a rectangular slab 5 m x 4 m in size and simply supported at the edges to support a service load of 4 kN/m^2. Assume coefficient of orthotropy as 0.7. Adopt M 20 concrete and Fe 415 steel.	CO3-App	(16)
		Or		
	(b)	Design a simply supported rectangular slab of size 4m x 3m using yield line theory. The slab is subjected to a live load of 3.5 kN/m^2 and floor finish of 1 kN/m^2. Use M20 grade of concrete and Fe 415 grade of steel.	CO3-App	(16)
14.	(a)	An RC slab is 105 mm thick with 20 mm cover to center to centre of steel. If the positive steel reinforcement is 424 mm^2/m determine the ductility factor assuming M 25 concrete and Fe250 steel.	CO4 -App	(16)
		Or		
	(b)	A reinforced concrete section is 200 mm x 550 mm. If the applied moment is 140 kNm determine the instantaneous curvature assuming a tensile stress in concrete at level of steel as 1 N/mm^2. Assume E_c = 28,000 N/mm^2 and E_s = 200,000 N/mm^2, f_{ck} = 20 N/mm^2 and A_s = 1968 mm^2.	CO4 -App	(16)

15. (a) In a multi-storeyed RC frame building located at Chennai, a typical column of 3.4m clear height carries an axial load of 3500 kN and a bending moment of 780kN-m under gravity and seismic load conditions. Design the column section with adequate ductility. Assume M25 grade of concrete and Fe415 grade of steel. CO5-App (16)

Or

(b) A block of ten storeyed flats in Chennai has its lowermost columns 500 x 700mm in size. In order to use the ground floor for car parking, the lower columns are made free standing. Comment on the considerations to be given for detailing of these freestanding columns. Assume M20 grade of concrete and Fe415 grade of steel and height of free bay is 4m. CO5-App (16)