Reg. No. : | | | | | | | | | | |

Question Paper Code: 41263

M.E. DEGREE EXAMINATION, DECEMBER 2014.

First Semester

Structural Engineering

14PSE102 – CONCRETE STRUCTURES

(Regulation 2014)

(IS456, IS13920, IS1641, IS1642, IS3370 are permitted)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions.

PART A - (5 x 1 = 5 Marks)

1. The allowable crack width for a building in normal exposure condition as per IS456 is
   (a) 0.4 (b) 0.5 (c) 0.3 (d) 0.2

2. The shear wall in which the deflection and strength are controlled by shear is known as
   (a) Ductile moment shear wall (b) Ordinary moment shear wall
   (c) Shear shear wall (d) Lateral shear wall

3. The part of the slab bounded on each of its four sides by the centre line of a column or centre lines of adjacent span is known as
   (a) Middle strip (b) Column Strip (c) Panel (d) Drop

4. The allowable rotation at the plastic hinge does not depends on
   (a) Neutral axis (b) Type of steel (c) Cover (d) Reinforcement index

5. According to the anchorage requirements for joints, the ratio of the total depth of the column to diameter of the beam bar should be equal to or greater than
   (a) 25 (b) 26 (c) 20 (d) 18

PART - B (5 x 3 = 15 Marks)

6. List the factors affecting crack width in beams.

7. Write down the limit for slenderness ratios in RC walls.

8. Give the importance of middle strip.

9. Draw the moment-curvature diagram for an under-reinforced beam.

10. Discuss about frequency distribution curve.

PART - C (5 x 16 = 80 Marks)

11. (a) Estimate the deflection of a cantilever beam of breadth 300mm, total depth of 600mm, span 4m, subjected to a maximum bending moment due to the sum of characteristic dead and live loads of 210kNm, of which 60% is due to permanent loads. Assume tension steel is 1.17%, compression steel is 0.418%, cover to Centre of steel is 37.5mm, Creep factor is 1.6, Shrinkage strain is 0.0003, Grade of concrete is M15 and grade of steel is Fe 415.

(16)

Or

(b) A beam of width 450mm, depth 750mm and cover 40mm is reinforced with 3 rods of 40mm diameter (3780 mm^2). Calculate the crack width when the selection is subjected to BM of 490 kNm at the following points.

i. At a point on the side of the beam 250mm below the NA
ii. At a point midway between bars at the tension face
iii. At the bottom corner
iv. At the tension face directly under the belt

Assume f_{ck} = 25N/mm^2, f_y = 415N/mm^2. Use IS:456 method. E_s = 200kN/mm^2.

(16)

12. (a) Design a corbel to carry a factored load of 500 kN at a distance of 200mm from the face of a 300 X 300mm column. Assume that grade M30 concrete is used for construction. (16)

Or

(b) Design a shear wall of length 4.16m and thickness 250mm subject to the following forces. Assume f_{ck} = 15 N/mm^2, f_y= 250 N/mm^2 and the wall is a high wall with the following loadings.

Loading	Axial force (kN)	Moment (kNm)	Shear (kN)
DL + LL	1500	500	80
Seismic load	200	4000	500

(16)

13. (a) Design the interior panel of a flat slab floor system for a warehouse 24m x 24m divided into 4 panels each of 6m x 6m. The live load is 5 kN/m^2 and the column size is 400mm diameter. Use M20 grade of concrete and Fe415 grade of steel bars. Sketch the reinforcement details in the interior panel of the flat slab. (16)

Or

(b) A flat plate with 7.5 x 6m panels on 500mm X 500mm columns has a slab thickness of 185mm, designed for a total characteristic load (DL+LL) of 9.3kN/m^2. Check the safety of the slab in shear if grade M25 concrete and grade Fe 415 steel are used for its construction. How can we increase the shear capacity of the slab? (16)

14. (a) A reinforced concrete slab is 150mm thick with 20mm cover to center of steel. If the positive steel reinforcement is 500mm^2/m. Determine the approximate moment curvature. Determine the ductility factor assuming M30 concrete and Fe250 steel for reinforcements. (16)

Or

(b) Draw the moment rotation curves for a RC section and give the curvature values at different points. (16)

15. (a) The following are the details of an internal beam column of type 1 joint, subjected to reversals which are not due to earthquakes. Column 600 x 600mm with 8 no's of 28mm bars, column factored load is 1500 kN, storey height is 4m, beams on either side are 400 x 500 with 3 bars of 28mm (1846 mm^2) on the top and 3 bars of 25mm (1473 mm^2) at the bottom. Assume f_{ck} = 30 N/mm^2 and f_y = 415 N/mm^2. Design the joint. (16)

Or

(b) Describe about the fire resistance of reinforced concrete members. (16)

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