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Question Paper Code: 51U02

M.E. DEGREE EXAMINATION, NOV 2018

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. What is the Characteristic strength of M20 grade concrete? CO1- R
(a) $0.7 \sqrt{20}$ (b) $5000\sqrt{20}$ (c) $20/1.15$ (d) 20
2. Minimum thickness for a shear wall is CO2 -R
(a) 230 mm (b) 100 mm (c) 150 mm (d) 90 mm
3. Minimum thickness of a Flat slab shall be CO3- R
(a) 125 mm (b) 150 mm (c) 200 mm (d) Eff. span/35
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. State the stipulations of IS 456 regarding the control of deflection. CO1-U
7. Mention three methods of analysis of grid floors. CO2-U
8. State the assumptions made in yield line theory. CO3-U

9. List out the various methods for analysis of RC structures. CO4-U
10. Define the term ductility.. CO5-U

PART – C (5 x 16= 80 Marks)

11. (a) A rectangular RC beam is simply supported on two masonry walls 230 mm thick and 6 m apart c/c. The beam has to carry, in addition to its own weight, a distributed LL of 10 kN/m and a DL of 5 kN/m. Design the beam section for maximum moment at mid-span. Assume M20 concrete and Fe 415 steel. CO1- App (16)

Or

- (b) An RC beam of cross section 300 x 600 mm overall is reinforced on the tension side with 3 bars of 20 mm dia. of Fe 415 grade steel at an effective cover of 50 mm. Compute the short-term deflection of the beam at the mid-span under service loads consisting of a udl of 20 kN/m and a concentrated load of 25 kN at the centre, over a simply supported span of 5 m. Assume M20 concrete. CO1- App (16)

12. (a) 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- Ana (16)

Or

- (b) Design a bi-axially loaded braced column with the section of size 400 x 500 mm subjected to a factored axial load of 2000 kN and factored moments about major and minor axes of 170 kNm and 65 kNm at the top, and 215 kNm and 125 kNm at the bottom. The unsupported length of the column (bent in single curvature) is 7 m with effective length about major and minor axes are 6 m and 5.75 m respectively. The grades of concrete mix and reinforcing steel are M25 and Fe415. Consider the reinforcement to be equally distributed on all four sides. CO2- App (16)

13. (a) Design the interior panel of a flat slab with drops for an office floor to suit the following data: Size of the office floor – 25 m x 25 m, size of the panels – 5 m x 5 m, loading clause – 4 kN/m². Use M20 concrete and Fe415 steel. CO3-App (16)

Or

(b) The factored moment capacities of a one-way continuous slab are $M_A = 32 \text{ kNm}$, $M_B = 36 \text{ kNm}$ and $M_C = 30 \text{ kNm}$. The span of the slab is 5 m. Determine the location of the yield line and the collapse load. CO3-App (16)

14. (a) A continuous beam has two spans of each 8m. The characteristic dead load is 15 kN/m and the characteristic live load is 25kN/m. Draw the bending moment envelopes after maximum redistribution. CO4 -U (16)

Or

(b) Explain the procedure for the inelastic analysis of a two-span continuous reinforced concrete beam with relevant sketches. CO4 -U (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 circular column is 350mm in diameter. Find the diameter and spacing of hoop to be used for confinement. What will be the lateral ties if the column is rectangular in cross section 550mm x 650mm. Use M20 grade of concrete and Fe 415 grade of steel. CO5-App (16)

