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

Question Paper Code: 91062

M.E. DEGREE EXAMINATION, OCTOBER 2014.

First Semester

Structural Engineering

01PSE101 - ADVANCED REINFORCED CONCRETE DESIGN

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

(Use of IS 456 - 2000, IS 13920, IS1893 (Part I) and SP16 are permitted, Missing data if any can be suitably assumed.)

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. What is mean by cracked section?
2. Write any two significance of deflection and crack width control.
3. Explain how the stiffness of shear wall can be calculated.
4. What is the function of horizontal steel in a corbel?
5. State the assumptions made in the analysis of yield line theory of slabs.
6. Differentiate voided slab and grid floor.
7. What is meant by moment redistribution?
8. List the assumptions made in Baker's method of plastic design.
9. What are factors to improve ductility performance of a RC member for seismic loading?
10. What is the importance of fire resistance of structural members?

PART - B (5 x 14 = 70 Marks)

11. (a) A rectangular simply supported beam 230 mm x 350 mm has been designed to carry a mid span bending moment of 25 kN-m to support a span of 3 m. Tensile reinforcement of 2 Nos. of 16 mm diameter is provided at the bottom. Age at loading is 28 days. Use M20 grade concrete and Fe 415 steel. Calculate total deflection and whether it meets the requirements as per code. (14)

Or

(b) A simply supported beam of span 8 m is with a flange of width 800 mm of depth 300 mm. The width of the web is 230 mm and overall depth is 600 mm. The beam is reinforced with 3 bars of 20 mm diameter on the tension side at an effective depth of 550 mm. The beam is subjected to service load moment 200 kN-m. Calculate crack width of the beam. (14)

12. (a) Design a shear wall of length 5.16m and thickness 250mm subject to the following forces. Assume f_{ck} = 20 and f_y = 415N/mm^2 and the wall is a high wall with the following loadings (14)

S. No	Loading	Axial force (kN)	Moment (kNm)	Shear (kN)
1	Dl +LL	1950	600	20
2	Seismic load	250	4800	700

Or

(b) Design a corbel to carry a girder section of 300kN at a distance of 200mm from the face of the column of size 300 x 300mm. Use M 20 grade concrete and Fe415 steel. (14)

13. (a) Design a flat slab for the interior panel to suit the floor size of 20 m x 30 m with the column intervals at 5 m centre to centre. Live load on the slab is 5 kN/m$^{2.}$ The column size of 500 diameters is used. Provide suitable drop. Use M25 Grade of concrete and Fe415 grade steel. (14)

Or

(b) A reinforced concrete spandrel beam floor is to be designed to cover a floor area of size 12 m x 16 m. The spacing of beams in a mutually perpendicular directions being 2 m centre to centre live load of 2 kN/sq.m. Use M20 and HYSD bars. (14)

14. (a) (i) Explain the moment – curvature relationship with the following terms:
Elastic stage, Elasto plastic stage and fully plastic stage. (7)

(ii) Design a 8m RC rectangular beam fixed at supports, subjected to service loads of 20 kN/m dead load and 60kN concentrated load at its centre by Baker's method. Use M20 concrete and Fe250 steel. Take $E_s = 2 \times 10^5$ N/mm^2. (7)

Or

(b) Design a rectangular slab 8m in the X direction and 5m in the Y direction has fixed edges and carries a factored load of 20 kN/m^2. Use Hillerbreg's strip method. (14)

15. (a) Explain the design philoshphy of earth quake resistant design of structures and its applications. (14)

Or

(b) Write about fire resistances of structural members and quality of control of concrete. (14)

PART - C (1 x 10 = 10 Marks)

16. (a) Explain ductile detailing of beams and columns as per IS 13920. (10)

Or

(b) A reinforced concrete grid floor is to be designed to cover a floor area of size 12 m x 16 m. The spacing of ribs in a mutually perpendicular directions being 2 m centre to centre live load of 2 kN/sq.m. Use M20 and HYSD bars. (10)

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