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

C 3146

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2008.

Sixth Semester

(Regulation 2004)

Civil Engineering

CE 1354 – DESIGN OF R.C ELEMENTS

(Common to BE (Part-Time) Fifth Semester Regulation 2005)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

Uses of IS 456 : 2000 and SP 16 are permitted.

Adopt limit state design unless otherwise stated.

Missing data if any may suitably be assumed.

PART A — ($10 \times 2 = 20$ marks)

1. State the assumptions made for design of R.C. members in working stress method.

2. What are the advantages in limit state method?

3. Calculate the area of reinforcement required for a balanced beam of cross sectional area 2400 mm^2 .Use M 25 grade concrete and Fe 415 grade steel.

4. What is the difference between one way and two way slabs?

5. What do you mean by equilibrium torsion?

6. Name the locations in beam where the development lengths of tension bars should be checked.

7. What are the specifications for pitch of lateral ties in columns?

8. Draw an interaction diagram and mark the salient points.

9. What are the governing factors to decide the depth of footings?

10. Under what circumstances combined footings are necessary.

PART B — (5 ×16 = 80 marks)

11. (a) From first principles, derive an expression for moment of resistance of a RC cross section by limit state method.

Or

(b) Determine the position of neutral axis and the moment resistance of a beam 300 mm wide and 550 mm effective depth. It is reinforced with 3 bars of 16 mm diameter. Use M 20 grade concrete and Fe 415 grade steel. Adopt working stress method.

12. (a) Determine the ultimate number of resistance of a T beam section with the following details.

Effective width of flange = 1500 mm

Depth of flange = 150 mm

Width of web = 300 mm

Effective depth = 600 mm

Area of tensile reinforcement = 5450 mm^2

Use M 20 grade concrete and Fe 415 grade steel

Or

(b) Design a RC slab of effective dimension 6 m × 4 m simply supported on all sides. It has to carry a characteristic live load of 10 kN/m^2. Assume M 20 grade concrete and FE 415 grade steel.

13. (a) Calculate the reinforcement of a rectangular sections of beam 350 mm wide, 800 mm depth subject of an ultimate bending moment of 185 kNm, ultimate shear of 50kN/m and an ultimate torsional moment of 120 kNm. Use M 20 grade concrete and Fe 415 grade steel.

Or

(b) A Simply supported beam of 200 mm width and 600 mm overall depth is designed to supported a UDL of 50 kN/m over a span of 5 m. If it is proposed to use 20mm bars as main bars, check it is adequacy for development length. Use M 20 grade concrete and Fe415 grade steel.

14. (a) A short circular column 6 m long is to carry a characteristic load of 250 kN. Assuming from the ends of the column are filly restrained, design the column if it is to be made as a spirally reinforced column. Use M 20 grade concrete and Fe 415 grade steel.

Or

(b) Design an uniaxially eccentrically loaded braced rectangular column for the following data.

Factored axial load P_u=1500 kN

Factoral Uniaxial moment M_{ux} = 250 kNm

Unsupported length L = 3.5 m

Effective length L_{ex} = 3.0 m and L_{cy} = 2.75 m

Column size :300 mm × 500 mm

Use M 25 grade concrete and Fe 415 grade steel

15. (a) Design a R.C. square footing for a column of section 400 mm × 400 mm which is subjected to a load of 1200 kN at service state Assume safe bearing capacity of soil as 150 kN/m^2. Use M 20 grade concrete and Fe 415 grade steel

Or

(b) Write a step to by step procedure for the design of rectangular combined footing.
