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

Question Paper Code : 91009

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Sixth Semester

Civil Engineering

080100035 – DESIGN OF RC ELEMENTS

(Regulations 2008)

Time : Three Hours **Maximum : 100 Marks**

(Use of IS 456 – 2000 and SP 16 is permitted)
Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. What is meant by modular ratio ?

2. Write down the advantages of limit state method over other methods.

3. What is the importance of doubly reinforced beam sections ?

4. Write any two various boundary conditions in the two way slab acting UDL.

5. Enumerate shear reinforcement in concrete.

6. What are the stresses produced by torsion ?

7. Enumerate the function of the transverse reinforcements in a reinforced concrete column.

8. When you provide eccentrically loaded columns ?

9. Write a short note on overturning and sliding.

10. What is the importance of plain concrete footings ?

PART – B (5 × 16 = 80 marks)

11. (a) (i) Explain the concept of elastic method. **(8)**

(ii) Explain the limit state philosophy as detailed in current IS code. **(8)**

OR

(b) Design a reinforced concrete beam having an effective simply supported span of 5.50 m. The beam is required to support live and super imposed loads of 15 kN/m and 10 kN/m respectively. Use M 20 grade and HYSD bars. Draw the reinforcement details. **(16)**

12. (a) Design a T-beam section with a flange width of 1250 mm, a flange depth of 100 mm. a web width of 250 mm and an effective depth of 500 mm which is subjected to a factored moment of 560 kNm. The concrete mix to be used is of grade M20 and steel is of Fe 415. Draw the reinforcement details. **(16)**

OR

(b) Design a one-way slab, with a clear span of 1.0 m. simply supported on 230 mm thick masonry walls and subjected to a live load of 4 kN/m^2 and a surface finish of 1 kN/m^2. Assume Fe 415 steel and also assume that the slab is subjected to moderate exposure conditions.

13. (a) Under what situations do the following modes of cracking occur in R.C. beams. **(16)**

(i) Flexural cracks

(ii) Diagonal tension cracks

(iii) Flexural shear cracks

(iv) Splitting cracks

OR

(b) Design the torsional reinforcement in a rectangular beam 350 mm wide and 750 mm deep. Subjected to an ultimate twisting moment of 140 kNm. Combined with an ultimate (hogging) bending moment of 200 kNm and an ultimate shear force of 110 kN. Use M_{25} grade concrete and Fe_{415} grade steel. **(16)**

14. (a) A rectangular column of effective height of 4m is subjected to a characteristic axial load of 800 kN and bending moment of 100 kNm about the major axis of the column. Design a suitable section for the column and the reinforcements required. Assume $f_y = 415$ N/mm^2, $f_{ek} = 20$ N/mm^2. **(16)**

OR

(b) A column 350 mm × 350 mm has an unsupported length of 8 m and equivalent length of 5 m about both the axes. It is loaded with characteristic loads P = 50T, M_{xx} (top) = 40 kNm, M_{xx} (bottom) = –25 kNm. Assuming the column to be bent in double curvature, design the steel required of f_{ck} = 30 N/mm^2 and $f_y = 415$ N/mm^2. **(16)**

15. (a) A square column of size 400 mm carries a service load of 600 kN. Design an isolated footing for the column by limit state method, if the safe bearing capacity of the soil is 250 kN/m^2. Use M 20 concrete and Fe 415 steel. **(16)**

OR

(b) A rectangular column of size 300 mm × 450 mm transmits a limit state load of 600 kN at an eccentricity of 150 mm about the major axis. Design a suitable isolated footing for the column by the limit state concept. Safe capacity of soil is 200 kN/M^2.

Use M 30 concrete and Fe 415 steel. **(16)**
