B.E. (Civil Engineering) Fifth Semester (C.B.S.)

Reinforced Cement Concrete (RCC) Structures

P. Pages : 2 **NJR/KS/18/4459**

Time : Four Hours * 0 0 3 3 * Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.
10. Illustrate your answers whenever necessary with the help of neat sketches.
11. Use of non programmable calculator is permitted.
12. IS 456-2000 is permitted.

1. a) Derive design constant [k, j & R] for neutral axis, lever arm and moment of resistances constant for singly reinforced beam. Also calculate the values of k, j & R for M20 grade concrete and Fe415 grade of steel. [By WSM]. **6**

b) RCC beam 230 mm x 520 mm overall is reinforced with 4 bars of 20 mm diameter. The beam has to carry a super imposed land of 55 KN/m including self-weight of the beam over an effective span of 5m. Find the actual stresses developed in steel and concrete. The effective cover is 40 mm. Take modular ratio m = 13.33. Also find the compressive stress in concrete at 50 mm from top of the beam and draw bending stress diagram. **7**

OR

2. a) Design a beam subjected to a bending moment of 50kNm by working stress design. Adopt width of beam equal to half the effective depth. Assume the permissible stresses in the concrete and steel are not to exceed 7 N/mm^2 and 140 N/mm^2, take m = 13.33. **7**

b) Explain under reinforced, over reinforced and balance section in WSM by deriving the equation of moment of Resistances. **6**

3. a) Explain Pre-tensioning and post tensioning. **4**

b) What are the various systems of prestressing and explain briefly. **10**

OR

4. a) Explain the advantage of prestressed concrete over RCC. **8**

b) Explain different types of losses in prestressed concrete. **6**

5. a) Explain. **7**
i) Stress strain relationship for concrete.
ii) Stress stain relationship for steel in LSM.

b) A rectangular beam is 23 cm wide and 40 cm deep up to the centre of reinforcement. Find the area of reinforcement required if it has to resist a moment of 50 kNm. Use M 20 concrete mix and Fe 415 steel. **6**

OR

6. a) A singly reinforced beam 300 mm X 600 mm is reinforced with 4 bars of 20 mm diameter with an effective cover of 50mm. effective span is 4.5m. Assuming M20 concrete & Fe415 steel, find the value of central load P that can be carried by the beam. **7**

b) Derive Equation for limiting depth of neutral axis and moment of resistances for balanced, under reinforced and over reinforced section by using LSM. **6**

7. a) Design a circular column of diameter 540 mm subjected to a load of 1450 KN. The column is having spiral ties. The column is 3.25 m long and is effectively held in position at both ends but not restrained against rotation. Use M20 concrete and Fe 415 steel. Also Design a rectangular footing of uniform thickness for an axial loaded column of 1250 KN. Safe bearing capacity of soil is 220 kN/m^2. Use M20 concrete and Fe 415 grade of steel. **13**

OR

8. a) A simply supported T beam has flange width of 2500mm and flange thickness of 120 mm. The effective span of beam is 4m. The effective depth of beam is 600 mm and its width 300 mm. It is reinforced with 8 – 20 mm diameter, Fe415 grade steel. Determine the moment of resistances of the section. Use M20 grade of concrete. **8**

b) Explain in brief the various measure for deflection control as per IS 456:2000. **5**

9. a) Explain causes and control of cracking in concrete due to loading temperature and Shrinkage. **6**

b) A RCC beam 230 x 500 mm has a clear span of 4.5m. The beam has 2 x 22 mm bars going into the support, factored shear force is 120 kN. Check for development length of Fe 415 and M20 grade of concrete is used. **7**

OR

10. Design a simply supported beam subjected to a uniformly distributed load of 80kN/m over an effective span of 5m. Design the shear reinforcement for the beam. Use M 20 grade concrete and Fe 415 steel. **13**

11. A simply supported slab of a corridor of a college building has a clear span 3m and is supported on beams 300 mm width. Design the slab carrying live load of 3 kN/m^2 and floor furnish load 1.5 kN/m^2. Use M20 concrete and HYSD Fe415 steel. **14**

OR

12. Design a R.C Slab for a room measuring 6.5m X 6m. The slab is cast monolithically over the beams with corners held down. The width of the supporting beam is 300 mm. The slab carries superimposed load of 4.5 kN/m^2. Use M-20 concrete and Fe-500 Steel. **14**

****