B.E. Fifth Semester (Civil Engineering) (C.B.S.)
Reinforced Cement Concrete (RCC) Structures

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Notes : 1. All questions carry marks as indicated.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data whenever necessary.
4. Illustrate your answers whenever necessary with the help of neat sketches.
5. IS 456 (Revised), IS 875 may be consulted. IS3370

1. a) Explain Under Reinforced, Balanced and Over Reinforced Section with help of stress strain Diagram in working stress method. **6**

b) Explain the advantages and limitation of working stress method over limit state method. **7**

OR

2. A R.C. beam of rectangular section 230 mm x 400 mm is reinforced with 4 x 12 mm dia. bars provided with an effective cover of 35 mm. Calculate Moment of Resistance of the Section and the maximum uniformly distributed super imposed load excluding self - weight of beam, this beam can carry if it is simply supported over a span of 3.5 m. Use M 20 concrete and Fe 415 steel. (use W.S.M.) **13**

3. a) Explain application of prestressed concrete and its advantages over RCC. **6**

b) Explain different types of losses in prestressing system. **7**

OR

4. a) Explain Pre - tensioning and Post tensioning. **6**

b) Explain with the help of neat sketches Gifford - Udall System and Freyssinet system. **7**

5. Design a singly reinforced rectangular beam for a effective span of 5 m subjected to live load of 12 kN/m over entire span. Calculate main reinforcement and shear reinforcement. Give all necessary checks as per the IS 456. Draw neat reinforcement sketch. **13**

OR

6. A doubly reinforced beam 250 mm x 600 mm size is required to resist an ultimate moment of 310 kNm and ultimate shear force of 70 kN. Using M20 concrete and Fe415 steel, calculate the quantity of steel required and shear reinforcement. The effective cover to tension steel is 55 mm and for compression steel is 40 mm. **13**

7. a) Determine Moment of Resistance of a T-Beam with following data. **6**
Flange Width = 1200 mm, Depth of Flange = 110 mm,
Effective Depth = 600 mm, Width of Web = 300 mm,
Area of Steel in Tension = 6 x 20 mm dia.
Use M20 grade concrete and Fe415 steel.

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b)   Design a short rectangular column with one dimension restricted to 350 mm for an axial load of 700 kN. The unsupported length of column is 3 m. Use M20 grade concrete and Fe415 steel. Draw neat reinforcement sketch.   **7**

OR

8.   Design a isolated slopped footing for a square column of size 400 mm x 400 mm carrying an axial load of 600 kN. SBC of soil is $200 kN/m^2$. Use M20 concrete and Fe415 steel. Give all necessary checks as per IS 456 with neat reinforcement sketch.   **13**

9.   a)   Explain moment curvature relationship and deflection control of beams.   **7**

      b)   Write a note on causes and control of cracks in concrete.   **7**

OR

10.   Design a rectangular beam section of size 300 x 500 mm size subjected to bending moment of 40 kNm, shear force of 50kN and torsional moment of 30 kNm at service condition. Use M20 Grade of Concrete and Fe415 steel.   **14**

11.   Design the main reinforcement for a continuous SLAB for following details :
No. of span = 3,
Each span length = 3.5 mc/c, Live Load = 3.0
kN/m^2 Concrete = M20, Steel = Fe415, Draw sketch.   **14**

OR

12.   Design a RCC slab for a room size 3m x 4m. center to center of support. The corners of the slab is held down. Use Live load on the slab as $4 kN/m^2$, M20 grade concrete and Fe415 steel. Draw neat reinforcement sketch.   **14**

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