B.E. Civil Engineering (Model Curriculum) Semester-VII
PCC-3 - Design of RCC Structures-II

P. Pages : 2   **GUG/W/23/14288**

Time : Four Hours   *7842*   Max. Marks : 80

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Notes : 1. All questions are compulsory.
2. All questions carry equal marks.
3. Due credit will be given to neatness and adequate dimensions.
4. Assume suitable data wherever necessary.
5. Illustrate your answers wherever necessary with the help of neat sketches.
6.   I.S.456 (Revised), I.S. 875 may be consulted.

1.   Design a beam of the size $230\,\text{mm} \times 700\,\text{mm}$ deep subjected to ultimate twisting moment of   **13**
      700 kN-m, combined with bending moment of 360 kN-m and ultimate shear force of 210
      kN. Assume M25 grade of concrete and Fe500 steel.

                                            OR

2.   Find the moment of resistance of 'T' beam having following data.   **13**
      i)   Effective width of flange = 750mm
      ii) Effective depth of beam = 430 mm
      iii) Width of beam = 230 mm
      iv) Depth of flange = 110 mm
      v)   Compression reinforcement 3 nos. 25mm dia. and cover to Compression steel is
           25mm.
      vi) Tension reinforcement 6 nos. 25mm dia.
      vii) Use M20 grade of concrete and Fe 415 steel.

STRAIN RELATIONSHIP STRESS FOR Fe 415		
Stress Lvl.	Total Strain	Stress N/sq.mm
0.80 fyd	0.00144	288.7
0.8 fyd	0.00163	306.7
0.90 fyd	0.00192	324.8
0.95 fyd	00241	342.8
0.97 fyd	0.00276	351.8
1.00 fyd	0.00380	360.9

3.   Design a pad footing for $230\,\text{mm} \times 450\,\text{mm}$ column carries an axial load of 600KN.   **13**

      SBC $= 100\text{KN}/\text{M}^2$ use M25 Concrete & fe 500 steel.

                                            OR

4.   A column of the size $300\,\text{mm} \times 500\,\text{mm}$ and bends in single curvature.   **13**
      The unsupported Length of column is 7m and effective length along major axis is 5.5 m and
      along minor Axis is 6m. It is subjected to axial factored load of 1200 kN. It is subjected to
      Factored Moments as below, At top Mxx = 150 kN-m At top Myy = 150 kN-m At bottom
      Mxx = 150 kN-m At bottom Myy = 120 kN-m. Design the column using M20 concrete and
      Fe500 steel Sketch details.

5. a) Write notes on plastic hinge and redistribution of moments. **6**

   b) A reinforced concrete fixed beam has a span of 5m and carries two concentrated loads of 70 kN each from left and right support. Draw maximum bending moment envelope after 30% redistribution of moments. **8**

OR

6. A reinforced concrete fixed beam of span 6.0 m is carrying an U.D.L. of 15.0 kN/m (Excluding self-weight) over entire span. Analyzes & design the beam using 25% Redistribution of moments. Draw the reinforcement detail. Use M20 grade of concrete & Fe500 steel. **14**

7. Design a cantilever wall to retain earth with a backfill slope at 20° to the horizontal. The top of the wall is 5.5m. Above the ground level and foundation depth is 1.2m. Below ground level. The safe bearing capacity is 150kN/sq.m. Assume that the backfill has a unit weight of $17kN/m^3$ and angle of shearing resistance at 35o. Further assume coefficient of friction Between soil and concrete as 0.55. Use M20 concrete and Fe415 steel. **20**

OR

8. Design a single bay frame having 3m height and 5m width. For a single storey building. Take live load $2KN/M^2$ Use M20 concrete and Fe 500 Steel. **20**

9. Design a R.C. slab for a Room measuring $3m \times 5m$ size. The slab has two adjacent edges Discontinuous & carries a superimposed load of 2 kN/m2 & F. F. of 1.0 kN/m2.
Use M20 & Fe500 grade of concrete & steel provide all the checks as per I.S. code Sketch the reinforcement details.

OR

10. Design a combined footing for two column A & B spaced 5.2 m centre to concrete column A is $230mm \times 300mm$ in size & transmit a load of 600 kN column B is $(230mm \times 400mm)$ size & carries a load of 850 kN. The width of the footing is restricted to 2m only. The SBC of soil may be taken as 130 kN/m2. Use M20 concrete & Fe415 grade of steel. **20**

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