

B.E. / B.Tech. (Civil Engineering) Model Curriculum Semester-V
PCC-CE506 - Design of RCC Structure-I

P. Pages : 2

Time : Four Hours



GUG/W/24/13729

Max. Marks : 80

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- Notes :
1. All questions carry equal marks.
 2. Due credit will be given to neatness and adequate dimensions.
 3. Assume suitable data wherever necessary.
 4. I.S. Hand Book for structural steel sections. I.S. Code 8000/1962 or 1964, I.S. 456 (Revised), I.S. 875 May be consulted.

1. a) Define neutral axis, moment of resistance, Lever arm in WSM, with neat diagram. 6
- b) The cross section of a single reinforced Concrete beam is 300mm wide and 400mm deep to the centre of the reinforcement which consists of three bars of 12mm diameters. If the stresses in concrete and steel not to exceed 7 N/mm^2 and 230 N/mm^2 . Determine the M.R. of the section Take $m = 18-33$. 7

OR

2. a) Derive design constant (k, j and R) use M20 grade of concrete and Fe415 grade of steel for finding K, j and R and also for M20 grade of concrete and Fe500 grade of steel. 7
- b) Calculate the moment of resistance of the Singly reinforced beam by WSM. The width and effective depth are 450mm and 700mm. It is reinforced with 6 No. of 18mm dia mild steel bars. Assuming M25 grade of concrete. 6
3. Design a simply supported rectangular beam 250mm wide to carry a live load of 26000N/m. The clear span of the beam is 4m. The bearing at each end is 300mm use M20 concrete and Fe415 Steel. 13

OR

4. a) Explain the various types of section by LSM approach. 6
- i) Under reinforced Section.
- ii) Over reinforced Section.
- iii) Balanced Section.
- Explain which is best for construction.
- b) Calculate the moment of resistance of a doubly reinforced rectangular beam with size 230mmx450mm, reinforced with 5-20mm dia on Tension side and 3-20mm dia on compression side, at an effective cover of 50mm on either side use M25 concrete and Fe415 steel. 7

5. Design a T beam for a following data. 14
- i) Effective span 6m for a simply supported beam. Spacing of beams is 3.3m.c/c, thickness of slab = 100mm
 - ii) Width of rib = 320mm
 - iii) Live load = 3.3 kN/m^2
 - iv) Floor finish load = 0.78 kN/m^2
- Use M20, and Fe415 steel Draw neat reinforcement details.

OR

6. Design axially loaded short column having both ends hinged in both direction to carry axial load of 1000kN and bending moment of 100kNm about major axis and 60 kNm about minor axis. Use rectangular cross section with 1.5 aspect ratio. Unsupported lengths with respect to major and minor axes are 6m and 5m respectively $f_{ck} = 20 \text{ MPa}$, $f_y = 415 \text{ MPa}$, $\gamma = 1.5$ sketch reinforcement details. 14
7. The circular water tank of capacity 350000 litres is resting ground having rigid joint at the base. Depth of tank is 3.5m with free board of 0.5m. Design the following 20
- i) Top dome
 - ii) Ring beam
 - iii) Circular wall
- Use M20 concrete and mild Steel. Draw reinforcement.

OR

8. a) Explain pre-stressed concrete and its importance also explain pre tensioning and post tensioning. 10
- b) Differentiate between pre tensioning and post tensioning and also explain types of losses in prestressing system. 10
9. Design a simply supported roof slab for a room 9x4m live load is 4.3 kN/m^2 and floor finish is 0.85 kN/m^2 . Concrete grade of M15 mild Steer bars are used for reinforcement width of support is 300mm. 20

OR

10. Design a dog legged staircase in room 2.2x4.5m to raise floor to floor height of 3.6m width of staircase is 1.1m $f_{ck} = 20 \text{ MPa}$. $F_y = 415 \text{ MPa}$, $\gamma = 1.5$. Sketch reinforcement details. 20
