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

P. Pages : 2

GUG/S/25/13729

Time : Four Hours

4761

Max. Marks : 80

Notes : 1. Due credit will be given to neatness and adequate dimensions.
2. Assume suitable data wherever necessary.
3. Illustrate your answers wherever necessary with the help of neat sketches.
4. Use of slide rule, Logarithmic tables, Steam tables, Mollier's chart, Drawing instruments, Thermodynamic tables for moist air, Psychrometric charts and Refrigeration charts is permitted.
5. I.S.I. Hand Book for structural steel section, I.S. Code 8000/1962 or 1964, I.S. 456 (Revised), I.S. 875 may be consulted.

1. a) Explain WSM, and states its applications and drawbacks. **6**

b) Calculate moment of resistance of rectangular beam of size 400 x 600 mm overall depth. Area of steel is provided (1) 4 bars of $16\,mm\phi$ (2) 6 bars of $25\,mm\phi$ (3) Calculate Ast. Required for balanced section. Use M25 grade of concrete and Fe415 grade of steel solve by WSM. Use 50 mm effective cover. **7**

OR

2. Design a singly reinforced beam to carry a live load of 14.5 kN/m. The clear span beam is 5.5 m. The bearing at end is 300 mm. Use M20 concrete and Fe250 grade of steel. **13**

3. Design a singly reinforced simply supported beam for a span of 4.2 m the beam is subjected to superimposed load of 20 kN/m. Use M20 and Fe415 steel. Check for all necessary checks and draw reinforcement detail. **13**

OR

4. Find the reinforcement required for doubly reinforced beam section to following particular. **13**
   i) Width of beam 250 mm
   ii) Depth of beam to the centre of tensile r/f depth = 500 mm.
   iii) Effective cover of compression and tension reinforcement = 50 mm.
   iv) Maximum loading occur a working bending moment of 160 kNm.
   v) Factor of safety 1.5
   vi) Use M20 and Fe415

5. Determine the safe working UDL which can be supported by a T beam from the following detail bf = 1000 mm, DF = 100 mm, steel consists of 6 bars of 20 mm dia of Fe 500, bw = 250 mm, d = 500 mm. Use M20 effective span of beam is 4.2 m. **14**

OR

6.	Design a short column uniaxially loaded having both end hinge about major axis and top end hinge and bottom fixed about minor axis. To carry axial load of 1200 kN and Bending moment of 100 kNm about major axis and 80 kN about minor axis use rectangular cross section with 1.5 aspect ratio unsupported length with respect to major and minor axis 5 m and 6.5 m resp. fck = 25 MPa, fy = 415 MPa.	**14**

7. Design a circular water tank to hold 300000 litres of water. The depth of water in tank is restricted of 4.6 m and the joint between floor and wall of the tank is to rigid. Take free board as 0.4 m and the joint between floor and wall of the tank is to rigid. Take free board as 0.4 m. Adopt IS code method. Design Top dome, Top ring beam at the junction of wall, base slab. Use M20 grade of concrete and Fe415 grade of steel. **20**

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OR

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8. a) Explain prestressed concrete and its importance. **10**

b) Explain different types of losses in prestressing system. **10**

9. Design a simply supported roof slab for a room 8x4 m live load is $4.0 \text{kN}/\text{m}^2$ and floor finish is $0.78 \text{kN}/\text{m}^2$ concrete grade of M20. Fe415 grade of steel width of support is 300 mm. **20**

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OR

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10. Design a dog legged staircase in room 2.4 m x 5.5 m for clear storey height of 3.60 m to carry LL $4 \text{kN}/\text{m}^2$ & floor finish load $1 \text{kN}/\text{m}^2$ width of stair is 1:20 m landing is 1.20 m wide. Thickness of floor slab is 120 mm. width of supporting wall is 230 mm fck = 20 MPa, fy = 415 MPa, y = 1.5. Sketch reinforcement details. **20**

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