Structural Design & Drawing - III
(New) (1280)

P. Pages : 2

Time : Four Hours   **Max. Marks : 100**

Instructions to Candidates :
1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Solve **any one** question from each unit.
5. Use of IS - 456, IS - 875, IS 3370 and IS - 1343 is allowed.
6. Assume suitable data if necessary.
7. Figures to right indicate full marks.

UNIT - I

1. Design an interior panel of a flat slab with 4mx6m panel. It is subjected to live load 5 kN/m². Use M20 and Fe415. Sketch details of reinforcement.   **25**

2. a) Explain web reinforcement of beam in details with diagrams as per IS 13920.   **5**

   b) Design a combined rectangular footing for two columns A and B carrying loads of 350kN and 600 kN respectively. Column A is 300mmx300mm in size and column B is 450 mm x 450 mm is size. The centre to centre spacing of columns is 5.0m. The safe bearing capacity of soil may be taken as 150 kN/m². Use M20 and Fe 415.   **20**

UNIT - II

3. Design a cantilever retaining wall 4.8m high stem. It retains earth with its level top. The unit weight of soil is 16 kN/m³ and angle of repose is 29⁰. The safe bearing capacity of the soil is 100 kN/m². Take μ = 0.6 between base slab and soil use M20 and Fe 500 steel.   **25**

4. Design a circular tank with fixed base for a capacity of 60,000 litres by using IS - 3370. The depth of water is to be 3m, including free board of 0.25m. Use m20 and Fe 415. The tank is free at top. Take unit weight of water 9.8 kN/m³.   **25**

UNIT - III

5. a) Differentiate between prestressing and R. C. C. members. **5**

b) A post tensioned beam 100mm wide and depth is 300mm is prestressed by 3 cables each with area 50mm^2. Initial prestress = 1200 N/mm^2. All cables are straight and 100mm above the soffit of the beam. If m=6, Calculate loss due to elastic shortening of concrete when successive tensioning is done. **20**

6. a) Enumerate various losses of prestressed concrete members in detail. **7**

b) Determine extreme stresses at mid span of beam 300 mm x 450 mm has a span of 12m simply supported. The effective prestresssing force is 1000 kN at a eccentricity of 100mm. Total live load is 8 kN/m. **10**

c) Write short note on full prestressing and partial prestressing. **8**

UNIT - IV

7. a) Explain lower kern and upper kern point. **9**

b) In detail explain load balancing concept. **8**

c) Explain design of end block in detail. **8**

8. Design a simply supported post - tensioned beam for following data. (Only flexure & shear). **25**

a) span of beam = 22m

b) Live load = 12 kN/m

c) Grade of concrete, fck = 40 N/mm^2.

d) Ultimate strength of 12/7 fressinet system = 1600 N/mm^2.

e) Loss ratio = 0.85.

f) Modular ratio m = 6.

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