Subject: - Design of RCC structure *(CE702)*

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt **All** questions.
✓ The figures in the margin indicate **Full Marks**.
✓ Use of IS 456, IS 13920 are allowed. IS 456 SP-16 is allowed to design column only.
✓ Assume suitable data if necessary.

1. a) Explain how would you design shear reinforcements for flanged beam sections. [5]

   b) A beam of rectangular section is 300mm wide and 500mm deep to the centre of tensile reinforcement. It has to carry a dead load of 45 kN/m excluding its self weight. Find the steel reinforcement required for the mid span section. The beam has a span of 7m. Use M20 concrete and Fe 415 steel. Effective cover to compression steel = 40 mm. Use limit state method. [15]

2. a) Explain briefly ductile detailing requirements for beam and column with neat sketches. [6]

   b) Design a short RC column with following datas: [14]

   Unsupported length = 3.0 m

   Factored load, p_u = 1550 kN

   Factored moments: M_{ux} = 130 kN.m

   : M_{uy} = 90 kN.m

   Size of column = 300×450 mm

   Do ductile detailing for transverse steel.

3. a) Differentiate between working stress and limit state methods. [5]

   b) Design a restrained floor slab for a room 4m×5m in size to support a live load of 5 kN/m^2, with two adjacent sides discontinuous. Use M20 concrete and Fe415 grade steel. Sketch the details of reinforcements. [15]

4. a) Design an isolated footing to support a square column of 400×400 mm. The column (400×400mm) carries a service load of 1200 kN. The allowable soil pressure is 150 kN/m^2. Use M20 concrete and Fe415 grade steel. Unit weight of soil above footing base = 18 kN/m^3. Necessary missing data assume suitably. [10]

   b) A L-beam of effective and flange width as 925 mm, effective depth as 450 mm, depth of flange as 100 mm, breadth of rib as 250 mm is reinforced with 4-20 mm bars as tension reinforcement and 3-16 mm dia bars as compression reinforcement. Find the ultimate moment of resistance of the section at limit state of collapse. Use M20 grade concrete mix and Fe415 grade steel. [10]

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