

6E3033

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B. Tech. VI Sem. (Main & Back) Exam. May/June-2014

Civil Engineering

6CE2 Concrete Structures-II

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks: 24

Instructions to Candidates:-

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly.

Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1. IS : 456
3. IS : 1343
5. IRC : 6

2. IS : 3370 (Part II & IV)
4. IS : 875
6. IRC : 21

UNIT-I

- Q.1 (a) What is the difference between pre tensioning and post tensioning? Describe any six advantages of pre-stressed concrete members over reinforced concrete members. [2+6=8]

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[8620]

- (b) Calculate the extreme fiber stresses at the mid span of the beam of Fig.-1. The beam is having parabolic profile with a pre stressing force of 1000 kN. It is carrying a uniformly distributed load of 40 kN/m including its self weight over a span of 5.0 m. The cross-section of rectangular beam is 300 mm X 600 mm. [8]

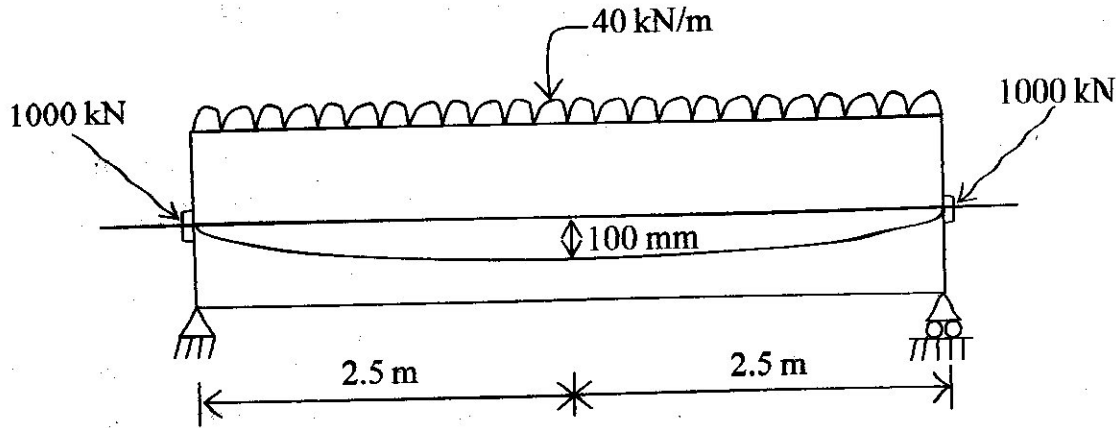


Fig. -1

OR

- Q.1 (a) Describe the freyssinet system of post tensioning. [4]
- (b) A pre-stressed concrete pile is 300 x 300 mm in section and is provided with 28 wires of 5 mm diameter distributed uniformly over the section. The wires are tensioned with a pre stressing force of 500 kN. Determine the percentage loss of stress in wires. Take modulus of elasticity of steel = 2.1×10^5 N/mm²; modulus of elasticity in concrete = 3.2×10^4 N/mm²; creep shortening = 3.1×10^{-5} mm per mm per N/mm²; shrinkage strain = 0.00025; relaxation loss of stress in steel wires = 4% of initial stress. [12]

UNIT-II

- Q.2 (a) Find the reinforcement of a ring beam of rectangular section 450 mm wide and 800 mm deep with an effective cover of 50 mm. It is subjected to a bending moment of 70 kN-m, torsional moment of 60 kN-m and shear force of 65 kN at working load. Assume grade of concrete M-25 and steel Fe-415. [10]

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- (b) Explain the concept of redistribution of moment. Also describe any two advantages of redistribution of moment in the design of statically indeterminate structures.

[4+2=6]

OR

- Q.2 Design a continuous beam of a multi story building of three spans, each of 8m centre to centre. The characteristic superimposed dead load including self wt. is 15 kN/m and characteristic live load is 13 kN/m. Design the critical section of rectangular beam by Limit State method of design by assuming M-20 and Fe-415. Adopt width of beam 300mm. Also design shear reinforcement using 8mm diameter, two legged vertical stirrups. Also apply check for deflection.

[10+4+2=16]

UNIT-III

- Design a circular dome over a circular room of diameter 9m to carry a uniformly distributed live load of 1.5 kN/m². The dome has to support a lantern of 18 kN as point load from a circular opening of diameter 1.8 m at its crown. The rise of circular dome is 1.8 m. Assume M-20 grade of concrete & Fe-415 steel. Also design ring beams at opening and bottom of dome.

[10+6=16]

OR

- (a) Derive the expression for collapse load of a square slab fixed on all edges under yield line theory. [8]
- (b) A R.C. Slab 5m X 5m is simply supported along the four edges and is reinforced with 10mm diameter of Fe-415 grade bars at 150mm c/c both ways. The average effective depth of the slab is 100mm with overall depth of 130mm. The slab carries a flooring of 50mm thick with unit weight 22 kN/m². Determine the maximum permissible service load for the slab if M-20 grade concrete is used.

[8]

UNIT-IV

- Q.4 Design a rectangular water tank resting on ground having base area of 4m x 6m. The height of water tank is 3.75m and keep a free board of 0.15m. Assume M-25 grade of concrete and Fe-415 steel. Assume appropriate data and clearly state the assumptions. [16]

OR

- Q.4 Design an Intze water tank for a capacity of 900m³ by using M-25 and Fe-415. Assume density of water 9.8 kN/m³ and keep diameter of cylindrical portion 14m. Take rise of top circular dome and bottom circular dome as 1.8m & 1.6m respectively. Design top circular dome, top ring beam and cylindrical wall of the tank. Take height of conical dome as 2m with angle 45° with vertical. [16]

UNIT-V

- Q.5 Design a reinforced concrete deck slab culvert or two lane carriageway with the following data:

Effective span = 5.4 m; Clear span = 5.0 m; Width of culvert = 12 m; Width of bearing = 400 mm; Width of foot path = 1.5 m on both side; Thickness of wearing course = 75 mm; Asphaltic concrete with unit weight 22 kN/m³; Materials : M-25 and Fe-415; Overall depth of deck slab = 470 mm; Effective cover = 50 mm; Carriageway width = 7.5 m. Consider IRC Class AA Tracked loading. [16]

OR

- Q.5 Design the stem and heel slab of an R.C. cantilever retaining wall supporting an earth embankment of 3.5 m high. The top surface of embankment is horizontal. Also show the reinforcement with a neat sketch. Assume the following data:

Unit wt. of soil = 18 kN/m³

Angle of internal friction = 30°

Safe bearing capacity of soil = 150 kN/m³

Grade of concrete = M – 20

Grade of steel = Fe – 415

Assume all other data and clearly state your assumptions. [16]