09ENG75

Seventh Semester B.Arch. Degree Examination, Aug./Sept. 2020
Structures - VII

Time: 3 hrs.

Max. Marks:100

Note: 1. *Answer any FIVE full questions.*
2. *Use of IS:1343 code book is permitted.*
3. *Missing data if any may assumed suitably.*

1. a. List the advantages of prestressed concrete. **(05 Marks)**
   b. A prestressed concrete beam of rectangular section 300mm wide and 600mm deep has a span of 12m. The effective prestressing force is 980kN at an eccentricity of 120mm. The dead load of the beam is 4.5kN/m and the beam has to carry a live load of 7.5kN/m. Determine the extreme fibre stresses.
      (i) at the end section
      (ii) at the mid section without the action of live load
      (iii) at the mid section with the action of live load. **(15 Marks)**

2. a. Briefly discuss the load balancing concept in prestressed concrete. **(06 Marks)**
   b. Briefly explain the different types of losses that occur in the prestressed concrete. **(14 Marks)**

3. A concrete beam of size 500mm × 750mm supports a uniformly distributed load of 45kN/m, which includes self weight, over a simply supported span of 7.3m. The prestressing force applied is 1620kN. It has a parabolic tendon having an eccentricity of 145mm at the mid span and zero eccentricity at the ends. Calculate the extreme fibre stresses at the mid span by applying the three concepts. Draw the stress distribution across the section at mid span. **(20 Marks)**

4. A prestressed concrete pile 250mm × 250mm contains 60 pretensioned wires, each of 2mm diameter, uniformly distributed over the section. The wires are initially tensioned with a total force of 300kN. Calculate the final stress in the concrete and the percentage loss in stress in steel after all losses. The following data is given :
   $E_s = 210$ kN/mm^2
   $E_c = 32$ kN/mm^2.
   Shortening due to creep = $30 × 10^{-6}$ mm/mm per N/mm^2 of stress
   Total Shrinkage = $200 × 10^{-6}$ per unit length
   Relaxation of stress in steel = 5% of initial stress. **(20 Marks)**

5. a. Explain the types of shells with neat sketches. **(10 Marks)**
   b. What are Pneumatic structures? Explain their behavior. **(10 Marks)**

6. a. What is a flat slab? What are its advantages? **(10 Marks)**
   b. What is a grid floor? Mention its advantages. **(10 Marks)**

7. a. Give the detailing of typical one way slab, simply supported on the walls. Sketch the plan and cross section. **(10 Marks)**
   b. Give a typical detailing of a square column supported on a square footing. Sketch the plan and cross section. **(10 Marks)**

8. Write short note on the following :
   (i) Tensile structure
   (ii) Geodesic domes
   (iii) Concepts of thrust line or pressure line
   (iv) Pretensioning and post tensioning. **(20 Marks)**

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