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09ENG75

Seventh Semester B.Arch. Degree Examination, July/August 2022
Structures – VII

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions.*
2. Use of IS–1343-1980 permitted.
3. Missing data, if any, may be suitably assumed.

1 a. What are the advantages of PSC? **(08 Marks)**

b. A rectangular concrete beam, 250mm wide and 600mm deep, is prestressed by means of four 14mm ϕ diameter high – tensile bars located 200mm from the soffit of the beam. If the effective stress in the wires is 700N/mm^2, what is the maximum bending moment that can be applied to the section without causing tension @ the soffit of the beam? **(12 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. What are the types of losses in PSC beam and how do you calculate each loss stating with an expression? **(06 Marks)**

b. A prestressed concrete beam 100mm × 300mm is prestressed by straight wires carrying an initial force of 150 kN at an eccentricity of 50 mm. Estimate the percentage loss of stress in steel due to elastic deformation of concrete if the area of the steel wires is 188 mm^2. Take $E_S = 210$ kN/mm^2 and $E_C = 35$ kN/mm^2. **(14 Marks)**

4 A pre-stressed concrete beam, 200mm wide and 300mm deep, is pre-stressed with wires (area = 320mm^2) located at a constant centricity of 50mm and carrying an initial stress of 1000N/mm^2. The span of the beam is 10m. Calculate the percentage loss of stress in wires if:

i) The beam is pre-tensioned

ii) The beam is post-tensioned using the following data :

$E_S = 210$kN/mm^2

$E_C = 35$kN/mm^2

Relaxation of steel stress = 5% of initial stress

Shrinkage of concrete = 300×10^{-6} for pre tensioning

= 200×10^{-6} for post tensioned

Creep coefficient = 1.6

Slip @ anchorage = 1mm

Frictional co-efficient for wave effect = 0.0015/m. **(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 grid structures? Explain. **(10 Marks)**

b. What are space frames? What are the advantages and applications of the same? Explain. **(10 Marks)**

7 Two way slab of size 5m × 4m internal simply supported on 230mm thick wall, thickness of slab = 150mm.
Steel along short span = 10mm ϕ 250 @ 150 c/c
Steel along long span = 8mm ϕ @ 250mm c/c.
Draw neatly :
i) Plan showing reinforcement
ii) c/s along short span. **(20 Marks)**

8 Write short note on the following :
a. Tensile structure
b. Geodesic domes
c. Concepts of thrust line or pressure line
d. Pretensioning and post tensioning. **(20 Marks)**

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