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09ENG75

Seventh Semester B.Arch. Degree Examination, Jan./Feb. 2021
Structure – VII

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions.*
2. 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. What is pressure line in PSC? **(06 Marks)**

b. A rectangular concrete beam 250mm wide by 300mm deep is prestressed by a four of 540kN at an constant eccentrity of 60mm. The beam supports a concentrated load of 68kN @ the centre of a span of 3m. Determine the location of the pressure line @ the centre, quarter span and support sections of the beam. Neglect the self – weight of the beam. **(14 Marks)**

3 a. Briefly explain the concept of load balancing. **(06 Marks)**

b. A pre-stressed concrete beam supports an imposed load of 4kN/m over an effective span of 10m. The beam has a rectangular section with a width of 200mm and depth of 600mm. Find the effective pre-stressing force in the cable if it is parabolic with an eccentricity of 100mm at the centre and zero at the ends for the following conditions.

i) If the bending effect of PSF is nullified by the imposed load for the mid–span section (neglect self weight of beam).

ii) If the resultant stress due to self-weight imposed load and pre stressing force is zero at the soffit of the beam for the mid-span section (D_C = 24kN/m^3). **(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 = 210kN/mm^2

E_C = 35kN/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. What is grid floor? Mention its advantages. **(10 Marks)**

b. What are pneumatic structures? Explain their behavior. **(10 Marks)**

6 a. What is flat slab? What are its advantages and disadvantages? **(10 Marks)**

b. Write note on :

i) Space structures

ii) Tensile structures. **(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 notes on :
a. Geodesic domes
b. Folded plates
c. Application of pre-stressed concrete
d. Pre-tensioning and post tensioning. **(20 Marks)**

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