Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (CE) / CIVIL (PIT) (Sem.–6)

PRE-STRESSED STRUCTURES

Subject Code : PECE-603E-18

M.Code : 79404

Date of Examination : 07-07-22

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Write briefly :

a) Differentiate between pre-tensioning and post-tensioning.

b) Define electrical pre-stressing.

c) Write a note on C.C.L standard system.

d) What are the assumptions in the design of pre-stressed concrete members?

e) What is role of high strength concrete in pre-stressed concrete?

f) What is pre-stressing?

g) Write down two applications of pre-stressed concrete.

h) What are the different materials required for pre-stressed concrete members?

i) What are the types of pre-stressing?

j) Explain the concept of pressure line

SECTION-B

2. A pre-stressed concrete beam 400mm × 600mm in section has a span of 6m and is subjected to a uniformly distributed load of 16kN/m including self-wt. The pre-stressing tendons are located at the lower third point and provide an effective pre-stressing force of 960kN. Determine the extreme fibre stresses in concrete at the mid span section.

3. A pr-stressed concrete beam is 300mm wide and 600mm deep. The tendons are provided at a height of 200mm above the soffit. The initially applied pre-stressing force is 1500kN which reduces to 1350kN after losses. The live load on the beam consists of two point loads 35kN each placed at distance of 4.5m and 10.5m from one end. Determine the extreme stresses in concrete for the mid span section (a) under the initial full pre-stress and no live load (b) under the final condition after all losses and full live load.

4. A post-tensioned beam 400mm × 600mm and 10m long is provided with straight tendons which are tensioned to 1050N/mm^2 at the jacking end. Find the loss of pre-stress due to wobbling effecta) at mid span (b) at the end remote from the jack. Take k = 0.30 per 100m.

5. Write down design steps of pre-stressed I- Section beam.

6. Write down classification of losses of pre-stress.

SECTION-C

7. A pre-stressed concrete beam of span 10m is of rectangular section 120mm wide and 300mm deep and is prestressed by parabolic cable, the initial pre-stressing force being 280kN. The eccentricity of the cable at the centre is 50mm and the cable is concentric at the ends. The beam carries a live load of 2.20kN/m. Calculate the short time deflection at the centre of the span. Ec= 40kNn/mm^2 and creep coefficient = 2.0. Loss of pre-stress = 18% of the initial stress after a duration of 6 months. Find the long time deflection at the centre. Assume that the beam is subjected to dead load and live load simultaneously when the pre-stress is applied.

8. Design a simply supported prestressed concrete slab to the following conditions:

   Span of the slab: 12m, Safe stress in concrete = 14N/mm^2, Safe stress in steel = 900N/mm^2, Superimposed load = 20kN/mm^2, Weight of PSC = 24kN/mm^2

9. Design a pre-stressed concrete beam to the following requirements:

   Span = 15m, Superimposed load = 34kN/m, Cube strength of concrete at 28 days = 35N/mm^2, Safe stress in concrete at transfer of pre-stress = $f_r = 0.5f_{ck}$, Safe stress in concrete due to final pre-stress= $fc = 0.4f_{ck}$, Total loss of pre-stress = 20%, Allowable tensile stress in concrete = $0.219f_{ck}^{1/2}$, Ultimate stress in steel = 1500N/mm^2, Safe stress in steel = 60% of ultimate stress

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.