R18

Code No: 156CN

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year II Semester Examinations, January/February - 2025

PRESTRESSED CONCRETE

(Civil Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.
iv) Use of only IS 1343 is allowed.

PART – A

(25 Marks)

1.a)	Define Electrical pre-stressing.	[2]
b)	What is full Pre-stressing and partial Pre-stressing?	[3]
c)	What is loss due to Anchorage slip?	[2]
d)	Explain how the short term losses can be eliminated.	[3]
e)	Mention different cracks occurred in PSC beams due to shear.	[2]
f)	Explain the effect of straight and parabolic cable profile in PSC.	[3]
g)	Define Transmission length of pre-tensioned member.	[2]
h)	Explain why anchorage zone reinforcement is required?	[3]
i)	What is short term deflection in PSC members?	[2]
j)	Draw the sketches of composite PSC sections.	[3]

PART – B

(50 Marks)

2. What is pre-stressed concrete, mention the advantages and disadvantages of pre-stressed concrete in comparison with reinforced concrete. [10]

OR

3. Distinguish about pre-tensioning and post tensioning. Explain with sketches. [10]

4.a) Explain about any two losses occurs in pretressed concrete members.
b) A simply supported post-tensioned concrete beam of span 10 m has section 250 mm × 450 mm is subjected to an initial pre-stressing force of 300kN applied at an eccentricity of 100 mm by tendons of 350 mm^2. Find the total loss of prestress in the tendons using the following data: $E_S = 2\times10^5$ N/mm^2, $E_C = 35$ kN/mm^2, anchorage slip = 3 mm, creep coefficient of concrete = 1.5. [4+6]

OR

5.a) Discuss about loss due to friction in post-tensioned members.
b) A pre-stressed concrete beam of span 10m is post-tensioned using a cable eccentricity 300 at center and zero at supports. The initial force in the cable is 400kN at the jacking end. Determine the loss of pre-stress in the cable due to friction and effective force in the cable at the farther end. Assume co-efficient of friction = 0.3 and co-efficient for wave effect is= 0.0043/m. [3+7]

6. The horizontal pre-stress at the centroid of a concrete beam of size 120mm×250mm is 7MPa and the maximum shear force on the beam is 80kN, calculate the maximum principal tensile stress. What is the minimum vertical pre-stress required to eliminate this principal tensile stress? [10]

OR

7. PSC beam of section 150mm wide and 250mm deep is used over an effective span of 6m to support a UDL of 8 kN/m including self weight. The beam is pre-stressed by a straight cable with a force of 250kN and located at an eccentricity of 50mm. Determine the location of thrust line in the beam and plot its position. [10]

8. The end block of a post tensioned concrete beam 450mm × 450mm is subjected to a concentric anchorage force of 1200kN by a Freyssinet anchorage system of area 1100mm^2. Design and detail the anchorage reinforcement for the end block. Take Fck = 40Mpa. [10]

OR

9. A Freyssinet anchorage (125mm diameter) carrying 12mm wires of 7mm diameter stressed to 1000 MPa is embedded concentrically in the web of I-section at the ends. The thickness of the web is 200mm. Evaluate the maximum tensile stress and bursting tensile force in the end block using Rowe's method. Design the reinforcement for the end block. [10]

10. A concrete beam with cross sectional area of 32000mm^2 and radious of gyration of 72mm is prestressed by a parabolic cable carrying an effective stress of 1000 N/mm^2. The span of the beam is 8m. The cable composed of 6 wires of 7mm diameter, has an eccentricity of 50mm at the centre and zero at the supports. Neglecting all losses, find the central deflection of the beam due to
a) Self wiight + prestress
b) Self wiight + prestress + live load. [5+5]

OR

11. Explain the design procedure of Pre-stressed composite sections for propped and unpropped conditions. [10]

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