Code No: **RT41012**



Set No. 1

IV B.Tech I Semester Supplementary Examinations, July/Aug - 2021 PRESTRESSED CONCRETE

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A Answer any THEE questions from Part-B *****

PART-A (22 Marks)

1.	a)	Explain durability, fire resistance and cover requirements for PSC members	[4]
	b)	Write the advantages of prestressing systems.	[4]
	c)	Write the formulas for calculating various losses in a pre tensioned member.	[4]
	d)	List the factors influencing the short term and long term deflections of prestressed concrete members.	[4]
	e)	Explain the ways by which shear resistance of structural concrete members can be	[.]
	f)	Give the line of transfer of prestressing force over an end block of a post tensioned members.	[3]
$\underline{\mathbf{PART}} - \underline{\mathbf{B}} \ (3x16 = 48 \ Marks)$			
2.	a)	Discuss why high grade concrete and high strength steel are basic requirements for a PSC member.	[8]
	b)	What is meant by partial pre stressing? Discuss the advantages and disadvantages when partial pre stressing is done.	[8]
3.	a)	Discuss about different types of post tensioning anchorage systems with neat	

sketches.
b) A concrete beam of rectangular section of 200x 400mm spanning 8 m, is pre stressed by a parabolic cable with an eccentricity of 65mm at the centre and zero at the supports with an effective force of 100 kN. The live load on the beam is 2 kN/m.

Draw the stress distribution diagram at the central section for:

i) Prestress + Self-weight (density of concrete = 24 kN/m^3) and

- ii) Prestress + Self-weight + live load
- 4. A prestressed concrete pile 250 mm square, contains 60 pre-tensioned wires, each of 3mm diameter, uniformly distributed over the section. The wires are initially tensioned on the prestressing bed with a total force f_0 500 kN. Calculate the final stress in concrete and the percentage loss of stress in steel after all losses, given the following data :

 $E_s = 210 \text{ kN/mm}^2 \& E_c = 32 \text{ kN/mm}^2$ Shortening due to creep = 30 x 10-6 mm/mm per N/mm² of stress
Total shrinkage = 200 x 10⁻⁶ per unit length
Relaxation of steel stress = 5 % of initial stress
Prestressing force, P = 400 kN

1 of 2

[8]

[16]

[8]

R13

- 5. a) Develop an expression for the minimum section modulus of a pre stressed concrete section in terms of the minimum and maximum moments, loss ratio and permissible stresses in concrete at transfer and at working loads.
 - b) A prestressed beam of rectangular section, 230 mm wide and 450mm deep, has a straight duct 25mm x 40mm with centre located at 50mm from the soffit of the beam which is prestressed by 14 wires of 7 mm diameter stressed to 800N/mm². The beam supports an imposed load of 6kN/m over a span of 6m. The modulus of elasticity of concrete is 38kN/mm². Estimate the central deflection of the beam under the action of prestress, self-weight and Live load.
- 6. a) Explain different types of shear failures in pre stressed concrete beams
 - b) Explain in detail the step by step procedure of designing a PSC member subjected to Combined bending, shear and torsion.
- 7. A post tensioned beam has an end block of size 300mm X 600mm deep. The beam is provided with two cables each cable transferring the effective pre stressing force of 500KN.One cable is located at 150mm from the bottom. The transfer takes place through anchor plates of diameter 110mm each. Loss=20%. Design the end block for bearing and bursting tension. Transfer takes place after 28 days.

[8]

[8]

[8]