Course Code: 1960144 **Roll No:** **MLRS-R19**

MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
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III B.Tech II Sem Regular End Examination, June 2022

Prestressed Concrete
(Civil Engineering)

Time: 3 Hours. **Max. Marks: 70**

Note: 1. Question paper consists: Part-A and Part-B.
2. In Part – A, answer all questions which carries 20 marks.
3. In Part – B, answer any one question from each unit.
Each question carries 10 marks and may have a, b as sub questions.
4. Use of IS:1343 code is permitted.

PART- A

(10*2 Marks = 20 Marks)

1.	a)	What is meant by 'Pretensioning' and 'Post-tensioning'?	2M	CO1	BL1
	b)	What are the minimum grades of concrete required for 'Pretensioning' and 'Post-tensioning' as per IS 1343-2012?	2M	CO1	BL1
	c)	How is the loss due to elastic shortening in Prestressed Concrete beams estimated?	2M	CO2	BL1
	d)	List the various losses of Prestress in Post-tensioned beams.	2M	CO2	BL1
	e)	Write the expressions for finding stresses developed at top and bottom fibres of simply supported beam with constant eccentric Prestressing force.	2M	CO3	BL1
	f)	Explain with sketches the modes of failure due to shear.	2M	CO3	BL4
	g)	What is meant by Transmission Length?	2M	CO4	BL1
	h)	Sketch the distribution of Stresses in the Anchorage zone.	2M	CO4	BL1
	i)	List any two factors that influence deflection of Prestressed beams.	2M	CO5	BL1
	j)	How are flexural stresses computed in Propped Construction?	2M	CO5	BL1

PART- B

(10*5 Marks = 50 Marks)

2	a)	Explain the basic principles of Prestressed Concrete.	5M	CO1	BL4
	b)	Briefly explain about Circular Prestressing.	5M	CO1	BL4
		OR			
3		Describe about types of Prestressing and the necessity of High Strength Concrete and High Strength steel.	10M	CO1	BL4
4	a)	Discuss about Hoyer's and Magnel Blaton's systems of Prestressing.	5M	CO2	BL2
	b)	Briefly explain about Lee McCall system of Prestressing.	5M	CO2	BL4
		OR			
5		A post-tensioned beam 250 mm × 500 mm, having 12 m simply supported span, is Prestressed by 12 wires of 7 mm diameter initially stressed to 1600 MPa. The cable profile is parabolic with 50 mm eccentricity at supports and 150 mm at the mid span. Estimate the losses of prestress due to various factors and the total percentage loss for the following data: E_s=210 kN/mm^2; f_{ck}=45 MPa; Shrinkage strain = 0.0003; Relaxation of stress in steel =5%; Creep coefficient =1.6; Coefficient of friction between cable and duct is 0.55; Wave effect = 0.0018/m length; Anchorage slip = 5 mm	10M	CO2	BL3

6	An unsymmetrical I section is used to support an imposed load of 35 kN/m over a span of 9 m. The top flange is 600 × 150 mm. The overall depth is 1200 mm. Bottom flange is 500 × 200 mm. The beam is subjected to a prestressing force of 1600 kN. Determine stresses at quarter span for the following conditions: (i) At transfer and (ii) At working load. The losses are 15 %. Use stress concept.	10M	CO3	BL3
	OR			
7	A prestressed concrete beam 250 × 600 mm in section is simply supported over a span of 10 m. It carries an udl of 30 kN/m in addition to its own weight. It is prestressed with a parabolic cable which has minimum eccentricity of 60mm at the support and maximum eccentricity of 180 mm at mid-span. Effective prestress in the cable is 500 kN. Design the shear reinforcement as per IS:1343	10M	CO3	BL3
8	The end block of prestressed concrete beam rectangular in section is 200 wide and 400 mm deep carries an effective prestressing force of 600 kN and it is transmitted to the concrete by a distribution plate of 150 mm wide and 150 mm deep concentrically located at the ends. Calculate the maximum bursting force, maximum tensile stress and design the end block as per IS 1343:2012. Use Fe 500 grade steel.	10M	CO4	BL6
	OR			
9	A prestressing force of 300 kN is transmitted through a distribution plate 150 mm wide and 160 mm deep, the centre of which is located at 100 mm from the bottom of an end block having a section 150 mm wide and 320 mm deep. Determine the position and magnitude of the maximum tensile stress on a horizontal section passing through the centre of the distribution plate using Magnel's method.	10M	CO4	BL3
10	A precast girder 230 mm × 400 mm in section is prestressed with an effective prestress of 260 kN located at 60 mm from the soffit. A top slab 700 mm × 100 mm in section is cast in-situ over the precast girder. Determine the maximum live load/m^2, the composite section can carry over a simply supported span of 6 m.	10M	CO5	BL3
	OR			
11	A prestressed concrete beam spanning over 10 m is of rectangular section 150 mm wide and 300 mm deep. The beam is prestressed by a parabolic cable having an eccentricity of 80 mm below the centroidal axis at the centre of the span and at an eccentricity of 25 mm above the centriodal axis at the support sections. The initial prestressing force in the cable is 650 kN. The beam supports two concentrated loads of 16 kN at intervals of 3.33m from supports. E_c=38 kN/mm^2. i) Neglecting losses of prestress, estimate the short-term deflection due to prestress and self weight. Check the deflection as per IS 1343. ii) Allowing for 18 % loss in prestress, estimate the long term deflection due to prestress, self weight and live load. Assume creep coefficient as 1.80.	10M	CO5	BL3

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