KUMARAGURU
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Register Number:……..

B.E/B.TECH DEGREE EXAMINATIONS: NOV/DEC 2024

(Regulation 2018)

Seventh Semester

CIVIL ENGINEERING

U18CEE0010: Prestressed Concrete Structures

COURSE OUTCOMES

CO1: Understand different methods of Prestressing Techniques.

CO2: Design Prestressed Concrete Structures for flexure and shear.

CO3: Analyze and Design the Anchoring Zone of Prestressed elements.

CO4: Design Prestressed Concrete Pipes and Tanks .

CO5: Analyze Composite and Intermediate Prestressed Concrete structures.

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

1.	Differentiate between Pre-tensioning and Post-Tensioning.	CO1	[K_2]
2.	What is Pressure Line? Explain its significance.	CO1	[K_2]
3.	State any two factors influencing the deflection.	CO2	[K_2]
4.	Mention the Principle of Partial Prestressing.	CO2	[K_2]
5.	Write a note on End Zone Reinforcement in Pretensioning System.	CO3	[K_2]
6.	Illustrate Transmission Length.	CO3	[K_1]
7.	What is meant by Bursting Tension?	CO4	[K_1]
8.	Elaborate the term Concordant Cable.	CO4	[K_1]
9.	Explain Circular Prestressing.	CO5	[K_1]
10.	Mention types of Prestressed Concrete Pipes.	CO5	[K_1]

Answer any FIVE Questions:-

PART B (5 x 16 = 80 Marks)

(Answer not more than 400 words)

11.	a)	Consider a concrete beam of rectangular section, 150mm wide by 300mm deep, prestressed by 4 high tensile wires 5mm diameter stressed to 1200N/mm^2. The	8	CO1	[K_3]

wires are located at an eccentricity of 50mm. The stresses developed at the soffit of the beam will be examined by considering the nominal concrete and equivalent concrete section.

	b)	A PSC Beam, 200mm wide and 300mm deep is prestressed with wires area 320mm^2 located at a constant eccentricity 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 the wire if (a) the beam is pretensioned (b) the beam is post tensioned using the following data Ec= 35 kN/mm^2 Es= 210kN/mm^2 Shrinkage of concrete = 300X10^{-6} for pretensioning & 200x10^{-6} for post tensioning, creep coefficient =1.6, slip at Anchorage = 1mm, Frictional Coefficient for wave effect= 0.0015 per m	8	CO1	[K_3]
12.	a)	A pre tensioned prestressed concrete beam having a rectangular section, 300mm wide and 500mm deep has an effective cover of 40mm. If fck = 40N/mm^2 fp=1600 N/mm^2 and the area of prestressing steel AP =561 mm^2. Calculate the ultimate flexural strength of the section using IS code provisions.	8	CO2	[K_3]
	b)	The support section of a prestressed concrete beam 100mm wide and 250 mm deep is required to support an ultimate Shear Force of 60 kN. The compressive prestress at the centroidal axis is 5N/mm^2. fck = 40N/mm^2,Fe$_{250}$, cover = 50 mm. Design suitable shear reinforcement at the section using IS 1343 recommendation.	8	CO2	[K_3]
13.	a)	A prestressed concrete beam of rectangular cross section ,120mm wide and 300mm deep spans over 6 m. the beam is prestressed by a straight cable carrying an effective force of 180 kN at an eccentricity of 50mm. If it supports an imposed an effective force of 180 kN at an eccentricity of 50mm. if it supports an imposed load of 4kN/m and the modulus of elasticity of concrete is 38kN/mm^2,compute the deflection at the following stages and check whether they comply with IS code specifications (a)Upward deflection under (Prestress +Self Weight) and (b)Final downward deflection under (Prestress +Self Weight+ Imposed Load including the effects of creep and shrinkage. Assume the creep coefficient to be	10	CO2	[K_3]

1.80

	b)	Explain the mechanism of shear failure in the beams with neat sketches.	6	CO2	[K_2]
14.	a)	The end block of prestressed concrete is of size 120mm x 1300mm, an effective pre stressing force of 300 kN is transmitted. The distribution plate is of size 150mm wide and 150mm deep concentrically loaded at the ends. Calculate the maximum tensile force and bursting tension. Use Guyon's method.	12	CO3	[K_3]
	b)	Discuss the Stress Distribution in End Block.	04	CO3	[K_2]
15.	a)	A two span continuous prestressed beam ABC (AB=BC=10m) has a uniform section with a width of 100mm deep and depth of 300 mm. The cable carrying an effective prestressing force of 360 kN is parallel to the axis of the beam and located at an eccentricity of 200 mm. i) Determine the secondary and resultant moment developed at mid support section B. ii) If the beam supports an imposed load of 2.4 kN/m, calculate the resultant stresses developed at top and bottom at B. Assume density of concrete as 24kN/m^3	12	CO4	[K_3]
	b)	Distinguish between Linear and Circumferential prestressing.	04	CO4	[K2]
16.	a)	A cylindrical PSC water tank of internal diameter 30m is required to store water over a depth of 7.5m. The permissible compressive stress in concrete at transfer is 13 N/mm^2 and the minimum compressive stress under working pressure is 1 N/mm^2. The loss ratio is 0.75. Wires of 5mm diameter with an initial stress of 1000 N/mm^2 are available for circumferential winding and Freyssinet cables made up of 12 wires of 8mm diameter stressed to 1200 N/mm^2 are to be used for vertical prestressing. Design the tank walls assuming the base as fixed. The cube strength of concrete is 40 N/mm^2.	8	CO5	[K_3]
	b)	Mention some junction types of tank wall and base slab with neat sketches.	8	CO5	[K_2]

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