R22 Regulation *Subject code: 4P8AA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech VIII Semester Regular Examinations, May 2026

PRESTRESSED CONCRETE STRUCTURES

(CE)

Maximum Marks: 60 Date:04.05.2026 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	BTL
1.a)	What is the basic principle of prestressing?	1	1	L1
b)	Distinguish between Pre-tensioning and Post-tensioning.	1	1	L1
c)	Define losses of prestresssing.	1	2	L1
d)	List out the different types of post tensioning anchorage systems.	1	2	L1
e)	What is curvature effect?	1	3	L1
f)	What are permissible stresses in concrete at transfer and service load as per IS 1343?	1	3	L1
g)	Write any two factors affect transmission length?	1	4	L1
h)	What is tendon slip at anchorage?	1	4	L1
i)	What is the difference between propped and unpropped composite beams in prestressed members.	1	5	L1
j)	what is the effect of creep on long-term deflection?	1	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
2	Discuss in detail about pre-tensioning and post-tensioning and their advantages and limitations of prestressed concrete.	10	1	L2
	OR			
3	A rectangular concrete beam 100 mm wide by 250 mm deep spanning over 8m is prestressed by a straight cable carrying an effective prestressing force of 250 kN located at an eccentricity of 40 mm. The beam supports a live load of 1.2 kN/m. (a) Calculate the resultant stress distribution for the centre-of-span cross section of the beam assuming the density of concrete as 24 kN/m^3. Find the magnitude of the prestressing force with an eccentricity of 40 mm which can balance the stresses due to dead and live loads at the soffit of the centre span section.	10	1	L3
4	A. Explain loss of prestress due to Creep of concrete in prestressed members.	6	2	L2

	B. Explain "Hoyer's long line system of pre-tensioning" with neat sketches.	4	2	L2
	OR			
5	A post tensioned beam, 200mm wide and 300mm deep, is prestressed by 10 wires of 7mm diameter initially stressed to 1200N/mm^2, with their centroids located 100mm from the soffit. Find the maximum stress in concrete immediately after transfer, allowing only for elastic shortening of concrete. If the concrete undergoes a further shortening due to creep and shrinkage while there is a relaxation of five percent of steel stress, estimate the final percentage loss of stress in the wires using IS: 1343 regulations, and the following data: Es = 210 kN/ mm^2 & Ec = 5700(fcu)$^{1/2}$, fcu = 42 N/mm^2, creep coefficient = 1.6, total residual Shrinkage strain= 3x10^{-4}.	10	2	L3
6	Explain the various modes of failure encountered in prestressed concrete beams subjected to bending and shear.	10	3	L2
	OR			
7	A pretensioned, T-section has a flange 1200 mm wide and 150 mm thick. The width and depth of the rib are 300 mm and 1500 mm respectively. The high-tensile steel has an area of 4700 mm^2 and is located at an effective depth of 1600 mm. If the characteristic cube strength of the concrete and the tensile strength of steel are 40 N/mm^2 & 1600 N/mm^2 respectively, calculate the flexural strength of the T-section.	10	3	L3
8	Define End block. What is bursting force and end zone reinforcement?	10	4	L3
	OR			
9	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.	10	4	L4
10	Explain Mohr's theorem of Short-term Deflections for Uncracked Members.	10	5	L3
	OR			
11	A precast pretensioned beam of rectangular section has a breadth of 100 mm and a depth of 200 mm. The beam with an effective span of 5 m, is prestressed by tendons with their centroids coinciding with the bottom kern. The initial force in the tendons is 150 kN. The loss of prestress may be assumed to be 15 per cent. The beam is incorporated in a composite T-beam by casting a top flange of breadth 400 mm and thickness 40 mm. If the composite beam supports a live load of 8 kN/m^2, calculate the resultant stresses developed in the precast and in situ cast concrete assuming the pretensioned beam as A) unpropped and B)propped during the casting of the slab. Assume the same modulus of elasticity for concrete in precast beam and in situ cast slab.	10	5	L4