



R18 Regulation

Subject code:2E6AA

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VI Semester Supplementary Examinations, December 2024

PRESTRESSED CONCRETE

(Civil Engineering)

Maximum Marks: 70

Date:07.01.2025

Duration: 3 hours

- Note:
- 1.This question paper contains two parts A and B.
 2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

IS:1343 CODE BOOK IS ALLOWED

Part-A

All the following questions carry equal marks (10X2M=20) Marks		CO	Bloom Tx
1	Write any two advantages of Prestressing Concrete.	1	L1
2	Define Pre-tensioning and Post-tensioning.	1	L1
3	What is relaxation of steel?	2	L1
4	Types of losses in post-tensioning	2	L1
5	State Hoyer Effect?	3	L1
6	Explain the concept of load balancing.	3	L1
7	State Modes of Failure in Prestressed Beam.	4	L1
8	Draw the sketch of End Block and show the transmission of forces in the same sketch.	4	L1
9	What is the influence of differential shrinkage on composite prestressed concrete members?	5	L1
10	State any two factors influencing deflection.	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		CO	Bloom Tx
11	A)Explain the Lee McCall system of prestressing. [5M] B)Write a note on the historical development of prestressed concrete. 5M	1	L2
OR			
12	A)Write down the type of tensioning used in the following post tensioning systems. [5M] i)Freyssinet. ii)Magnetel – Blaton. B)Explain the advantages of prestressed concrete. [5M]	1	L2
13	A post-tensioned concrete beam of rectangular section, 100 mm wide and 300 mm deep, is stressed by a parabolic cable with zero eccentricity at the supports and an eccentricity of 50 mm at the centre of span. The area of the cable is 200 mm ² and initial stress in the cable is 12 N/mm ² . If the ultimate creep strain is 30×10 ⁻⁶ mm/mm per N/mm ² of stress and modulus of elasticity of steel is 210 kN/mm ² , compute the loss of stress in steel only due to creep of concrete. Assume any other missing data. [10M]	2	L2

	OR		
14	A concrete beam is prestressed by a cable carrying an initial prestressing force of 335 kN. The cross sectional area of wires is 320mm ² . Calculate the percentage loss of stress in the cable only due to shrinkage of concrete using IS-1343 recommendations assuming the beam to be [10M] a) Pre-tensioned. b) Post-tensioned. Take $E_s = 210 \text{ kN/mm}^2$. Age of concrete at the time of transfer = 10 days.	2	L2
15	An unsymmetrical I-section beam is used to support an imposed load of 2 kN/m over a span of 8 m. the sectional details are top flange: 200 mm wide and 40 mm thick, bottom flange: 100 mm wide and 40 mm thick, thickness of web is 60 mm, overall depth of the beam is 300 mm. At the centre of the span, the effective prestressing force of 120 kN is located at 30 mm from the soffit of the beam. Estimate the stresses at the centre of span section of the beam for the following load conditions: (a) Prestress + self weight (b) Prestress + self weight + live load. [10M]	3	L2
	OR		
16	The support of an PSC beam 120mm wide by 250mm deep is required to support an ultimate shear force of 60 kN. A compressive prestress of 5 N/mm ² is acting at centroidal axis. Characteristic cube strength of concrete is 40 N/mm ² . The cover to the tension reinforcement is 50 mm. If characteristic strength of steel is 250 N/mm ² . Design suitable shear reinforcement using IS:1343 provisions. [10M]	3	L2
17	(A) Write in detail about anchorage zone reinforcement and sketch the arrangement of reinforcement in end blocks. [5M] (B) Explain the distribution of prestress and bond stress along the transmission length with the help of neat sketches. [5M]	4	L2
	OR		
18	The End Block of a prestressed concrete beam, rectangular in section is 200mm wide by 300 mm deep. The prestressing force of 120 kN is transmitted to concrete by a distribution plate 200 mm wide by 100 mm deep, concentrically located at the ends. Calculate the position and magnitude of the maximum tensile stress on the horizontal section through the centre and edge of the anchor plate. Compute the bursting tension on these horizontal planes. [10M]	4	L2
19	A composite T-beam is made up of a pre-tensioned rib 100 mm wide and 200 mm deep, and a cast in situ slab 400 mm wide and 40 mm thick having a modulus of elasticity of 28 kN/mm ² . If the differential shrinkage is 100×10^{-6} units, determine the shrinkage stress developed in the precast unit. Assume any other missing data. [10M]	5	L2
	OR		
20	Distinguish between propped and un-propped constructions methods in composite construction using stress diagrams at various stages of construction. [10M]	5	L2