R18 Regulation *Subject code: 2E6AA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VI Semester Supplementary Examinations, July 2024

PRESTRESSED CONCRETE

(CE)

Maximum Marks: 70 Date:30.07.2024 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	Write the types of shear cracks and show them in a sketch.	3	L1
6	What are the different ways of improving the shear resistance by prestressing techniques?	3	L1
7	Define bond stress?	4	L1
8	Why anchorage zone has to be given special attention in design?	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)			
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	Explain the following: a) Principles of post tensioning. [5M] b) Applications of post tensioning. [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 210KN/ 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 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 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. Compute the bursting tension on these horizontal planes and Design suitable reinforcement using IS:1343 provisions. [10M]	4	L2
19	A composite T-beam is made up of a pre-tensioned rib 100mm wide by 200mm deep, and a cast in situ slab 400mm wide and 40 mm thick having a modulus of elasticity of 32 kN/mm^2. If the differential shrinkage is 100×10^{-6} units, determine the shrinkage stresses developed in the precast and cast in-situ units. [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