Regulation: R18 *Subject Code: 2E6AA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VI Semester Supplementary Examinations, January 2023

PRESTRESSED CONCRETE

(CE)

21/01/23

Maximum Marks: 70 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 questions from 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.
Note: IS1343 CODE BOOK IS ALLOWED

Part-A

All the following questions carry equal marks (10x2M = 20 Marks)

1. Write any two advantages of Prestressing Concrete.
2. Define Pre-tensioning and Post-tensioning.
3. List the losses of prestress to be considered in the Pre-tensioned Concrete member.
4. Types of losses in post-tensioning
5. State Hoyer Effect?
6. Explain the concept of load balancing.
7. State Modes of Failure in Prestressed Beam.
8. Give equation to find out Bond Length.
9. What is a composite beam?
10. What are short term deflection and long term deflection?

Part-B

Answer All the following questions. (5x10M = 50 Marks)

11. A. Explain the Lee McCall system of prestressing. [5]
    B. Write a note on the historical development of prestressed concrete. [5]

OR

12. A. Write the advantages and limitations of prestressed concrete. [5]
    B Explain the significance of high strength concrete and high tensile steel in PSC members. [5]

13. A. List the losses of prestress to be considered in the pre-tensioned and post-tensioned. [5]
    B. 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. 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 mm^2, compute the loss of stress in steel only due to creep of concrete. Assume any other missing data. [5]

OR

14. A post-tensioned concrete beam 110mm wide and 320mm deep spanning over 10m is stressed by successive tensioning and anchoring of 3 cables 1, 2, and 3 respectively. The cross sectional area of each is 220 mm^2 and initial stress in each cable is 1100 N/mm^2. Take modular ratio = 6. The cable profiles are as shown in fig. below. Estimate the percentage loss of stress in each of the cables if they are successively tensioned and

anchored. [10]

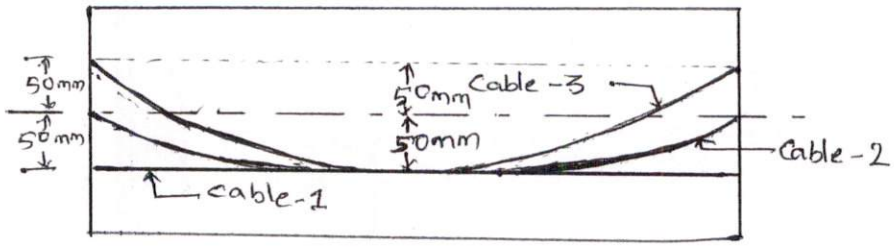

Fig.

15. A Rectangular concrete beam 250mm wide by 300 mm deep is prestressed by a force of 540KN at a constant eccentricity of 60mm. The beam supports a concentrated load of 68 kN at the center of a span of 3m. Determine the location of the pressure line at the center, quarter span and support sections of the steam. Neglect the self-weight of the beam. [10]

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. [10]

17. The end block of a prestressed concrete beam, rectangular in section, is 100mm wide and 200 mm deep. The prestressing force of 100 kN is transmitted to concrete by a distribution plate, 100 mm wide and 50 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. [10]

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. Design the End block as per IS1343.

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 $100x10^{-6}$ units, determine the shrinkage stresses developed in the precast and cast in-situ units. [10]

OR

20. Distinguish between propped and un-propped constructions methods in composite construction using stress diagrams at various stages of construction. [10]