R18 Regulation *Subject code: 2E6AA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VI Semester Regular/Supplementary Examinations, June 2022

PRESTRESSED CONCRETE
(CIVIL ENGINEERING)

Maximum Marks: 70 Date:22.06.2022 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)

1 Define Pre tensioning and Post tensioning
2 What are the grades of concrete to be used in pretensioned and post tensioned works?
3 List the losses of pre stress
4 Summarize the Relaxation of steel?
5 Compare the flexure failure of conventional RC beam with PSC beam.
6 Define Bursting tension.
7 Discuss on limiting zone for prestressing force
8 Explain the Magnel's method for end block
9 Explain how do you form the bonding between prestressed units and reinforced units?
10 List the effects of differential shrinkage in composite beams?

Part-B

Answer All the following questions. (5X10M=50Marks)

11 Write detailed notes on Lee McCall system of prestressing. [10]

OR

12 Explain the concept of transfer of prestress and also list the methods. [10]

13 A Pre-stressed pretensioned beam of 200mm wide and 300mm deep is used over an span of 10m is prestressed with wires of area 300mm^2 at an eccentricity of 60mm carrying a pre stress of 1200 N/mm^2 , Find the percentage of loss of stress. E_c= 35 kN/mm^2 , Shrinkage of concrete = 300 x 10^{-6}, creep coefficient =1.6. Assume missing data. [10]

OR

14 A pretensioned beam 300 mm x 450 mm is pre-tensioned by 12 wires each of 7 mm diameter, initially stressed to 1200 MPa with their centroids located 100 mm from the soffit. Estimate the final percentage loss of stress due to elastic deformation, creep, shrinkage and relaxation. Assume relaxation of steel stress = 90 MPa. E_c = 35 GPa, creep co-efficient = 1.6 and residual shrinkage strain = 3 X10^{-4}. [10]

15 A pretensioned T section has a flange width of 1200mm and 150mm thick. The width and depth of the rib are 300mm and 1500mm respectively. The high-tension steel has an area of 4700mm^2 and is located at an effective depth of 1600mm. If the characteristic cube strength of the concrete and the tensile strength of steel are 40 and 1600Mpa respectively; calculate the flexural strength of the section. [10]

OR

16 The support section of prestressed concrete beam, 100 mm wide by 250 mm deep, is required to support an ultimate shear force of 80 KN. The compressive pre stress at the centroidal axis is 5 N/mm^2. The characteristic cube strength of concrete is 40 N/mm^2. The cover to the reinforcement is 50 mm. If the characteristic tensile strength of stirrups is 415 N/mm^2, design suitable shear reinforcement in the section using IS code recommendations. [10]

17 The end block of a post tensioned concrete beam 300mm X 300mm is subjected to a concentric anchorage force of 832800N by a freyssinet anchorage system of area 117200 mm^2. Discuss and detail the anchorage reinforcement for the end block. [10]

OR

18 A PSC beam 250mm wide and 650mm deep is subjected to an effective pre stressing force of 1360kN along the centroidal axis. The cable is placed symmetrically over the mild steel anchor plate of area 150mm x 350mm. Design the end block. Take f_{ck}= 30N/mm^2 Assume initial prestressing force is 1.2 times the effective prestressing force. [10]

19 A prestressed concrete beam of span 8m has a section of area 42 x 10^3 mm^2. The moment of inertia of the section being 1.75 x 10^8 mm^4. The beam is prestressed with a parabolic cable providing a prestressing force of 245 kN. The cable has an eccentricity of 50mm at the centre and zero eccentricity at the ends. Ignoring all losses, examine the deflection at the centre when
(a) The beam carries its own weight and pre stress.
(b) The beam carries in addition to its own weight and pre stress, a superimposed load of 1.8kN/m. consider concrete weight 24kN/m^3 and E_c = 40kN/mm^2. [10]

OR

20 Briefly explain the necessity of using composite section in PSC structures. Also discuss about the shear in composite beams. [10]