R17 Regulation *Subject code:* 1E7AA

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Year I Semester Regular Examinations, February 2021

Prestressed Concrete

(Professional Elective-IV)

(Civil Engineering)

Maximum Marks: 70 Date: 25.02.2021 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.
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 **(10x2M=20 Marks)**

1 List the limitations of Prestressed Concrete
2 What are the characteristics of high strength steel and concrete?
3 List the various loses of Prestressing.
4 Define anchorage slip.
5 Compare the flexure failure of conventional RC beam with PSC beam .
6 List the factors influencing the ultimate shear resistance of PSC members
7 Define the zone of transmission in end block of prestressed concrete structures?
8 Draw a sketch showing the stress distribution in end block by double anchor plate.
9 What are the factors influencing for long-time deflections?
10 How do you evaluate the deflection of a concrete member prestressed by a parabollic cable with concentric anchors?

Part-B

Answer All the following questions. **(10M X 5=50Marks)**

11 Write a brief note on Historic development and general principles of Prestressing. (10M)

OR

12 Briefly explain about systems and classifications of Prestressing methods. (10M)

13 A Prestressed pretensioned beam of 200mm wide and 300mm deep is used over an span of 10m is prestressed with a wires of area 300mm2 at an eccentricity of 60mm carrying a prestress of 1200 N/mm2 Find the percentage of loss of stress, Ec= 35 kN/mm2 Shrinkage of concrete = 300 x 10^{-6} , creep coefficient =1.6. (10M)

OR

14 Explain the various losses of prestress in pretensioned and post-tensioned members. (10M)

15 A PSC beam of span 10m is of 120mm wide and 300 mm deep is prestressed by a parabolic tendon carrying an effective force of 180 kN. The tendon is having an eccentricity of 100 mm at centre span and reduced to zero at the supports. The beam supports a total UDL of 5 kN/m which includes self-weight of member. Compare the magnitude of principal tension developed in the beam with and without the parabolic tendon prestressing. If M40 grade concrete is used, state whether the beam is safe or not.. (10M)

OR

16 The support section of prestressed concrete beam, 100 mm wide and 250 mm deep, is required to support an ultimate shear force of 60 KN. the compressive prestress at the centroidal axis is 5 N/mm^2. The characteristic cube strength of concrete is 40 N/mm^2. The cover to the tension reinforcement is 50 mm. if the characteristic tensile strength of steel in stirrups is 250 N/mm^2 , design suitable reinforcements at the section using the IS: 1343 recommendations. (10M)

17 The end block of a post tensioned bridge girder is 500mm wide by 1000mm deep. Two cables, each comprising 90 high tensile wires of 7mm dia are anchored using square plates of side length 400mm with their centers located at 500mm from the top and bottom of the edges of the beam. The jacking force in each cable is 4000kN. Design a suitable anchorage reinforcement using Fe 415 grade HYSD bars conforming to IS: 1343 provision. (10M)

OR

18 Write about the Magnel's method and Guyon's method for end block. (10M)

19 A PSC beam with rectangular section, 150mm wide 300mm deep is prestressed by three cables each carrying an effective prestress of 200kN. The span of the beam is 12m. The first cable is parabolic with an eccentricity of 50mm below the centroidal axis at the center of the span and 50mm above the centroidal axis at the supports. The second cable is parabolic with an eccentricity of 50mm at the center of the span and zero eccentricity at the supports. The third cable is straight with an eccentricity of 50mm below the centroidal axis. If the beam supports an UDL of 6kN/m and Ec=38kN/mm^2. Estimate the instantaneous deflection for the following stages/

i) Pre stress + self-weight of the beam
ii) Pre stress + self-weight of the beam+ live load (10M)

OR

20 A precast pre tensioned beam of rectangular section has a breadth of 100mm and depth of 200mm. The beam with an effective span of 5m is prestressed by the tendons with their centroids coinciding with the bottom kern. The initial force in the tendons is 150kN. The loss of prestress is 15%. The top flange width is 400mm with the thickness of 40mm.If the composite beam supports a live load of 7kN/m2 calculate the resultant stresses developed if the section is unpropped. M40 and M20 concrete are used for pre tensioned and in situ concrete. (10M)