Registration No : | | | | | | | | | | |

Total Number of Pages : 02 **B.Tech**
PCI6J006

6th Semester Regular / Back Examination 2018-19
PRESTRESSED CONCRETE
BRANCH : CIVIL
Max Marks : 100
Time : 3 Hours
Q.CODE : F776

Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III.
The figures in the right hand margin indicate marks.

Part- I

Q1 **Only Short Answer Type Questions (Answer All-10)** **(2 x 10)**

a) **State the advantages of prestressed concrete.**
b) Under which circumstances loss due to elastic shortening can be ignored in post tensioned beams?
c) What are the effects responsible for loss of prestress due to friction?
d) The characteristic strength of tendon in a pre tensioned prestressing member is 1500 N/mm^2. The member is prestressed with an initial prestressing stress of 1000 N/ mm^2. What will be the loss due to relaxation of stress in steel?
e) Define the terms End block and Anchorage zone.
f) Show the variation of effective prestress over the transmission length in a pre tensioned member graphically.
g) What are the stages of loading to be considered in design of prestressed concrete section for flexure?
h) Write the expression for deflection of a beam due to prestress with a bent/harped tendon.
i) What do you mean by Effective Reinforcement Ratio?
j) State the effect of bursting force on the size of the bearing plate.

Part- II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 x 8)**

a) Justify why high tensile steel and high strength concrete are needed for prestressed concrete construction?
b) What are the various post tensioning systems based on wedge action? Explain any one of them.
c) Distinguish between pre tensioning and post tensioning members.
d) List the various types of loss of prestress in pre tensioned and post tensioned members.
e) How the shear resistance of a prestressed concrete beam can be increased. Explain briefly.
f) Briefly explain about various methods of analysis of prestressing members.
g) Write short notes on Hoyer's effect.
h) A pretensioned beam, 80 mm wide and 120 mm deep, is to be designed to support a service load of 5kN at one third point from the left over a span of 4m. If the permissible stresses in tension are zero at transfer and 1.4 N/ mm2 under working loads, design the number of 3 mm wires required at the mid span section. Permissible tensile stress in the wires is 1400 N/ mm2. The loss of prestress is 20 percent.
i) Explain the variation of stresses in steel in a reinforced concrete beam and a prestressed concrete beam.

j) A prestressed concrete beam, 120 mm wide by 300 mm deep, is prestressed by a cable which has an eccentricity of 100 mm at the centre of the span section. The span of the beam is 6 m. If the beam supports two concentrated loads of 10 kN each at one third span points, determine the magnitude of the prestressing force in the cable for balancing live loads, but neglecting self weight of the beam.

k) List out the factors influencing deflection in a prestressed concrete member.

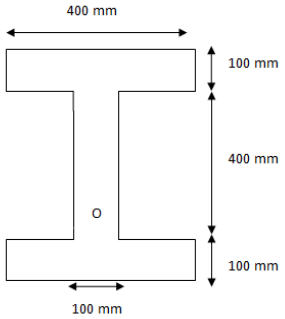
l) A two span continuous prestressed concrete beam ABC(AB=BC=10m) has a uniform cross section with a width of 250 mm and depth of 500mm.A cable carrying an effective prestressing force of 400 kN is parallel to the axis of the beam and located at an eccentricity of 150mm.Determine the secondary and resultant moment developed at the mid support section B.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 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, 300 mm wide and 60 mm thick; bottom flange, 100 mm wide and 60 mm thick; thickness of the web is 80 mm; overall depth of the beam = 400 mm. At the centre of the span, the effective prestressing force of 100 kN is located at 50 mm from the soffit of the beam. Estimate the stresses at the centre of the span section of the beam due to prestress, self weight and live load. **(16)**

Q4 Design the bearing plate and the end zone reinforcement for the bonded post tensioned beam. Strength of concrete at transfer = 50 N/mm2. Prestressing force = 1000 kN. **(16)**



Q5 A concrete beam with rectangular section, 100 mm wide and 300 mm deep, is stressed by three cables, each carrying an effective force of 240 kN. The span of the beam is 10 m. The first cable is parabolic with an eccentricity of 50 mm above the centroidal axis at the supports. The second cable is parabolic with zero eccentricity at the supports and an eccentricity of 50 mm at centre of the span. The third cable is straight with a uniform eccentricity of 50 mm below the centroidal axis. If the beam supports an udl of 5 kN/m and Ec =38 kN/mm2, estimate the instantaneous deflection due to prestress plus self weight plus live load. **(16)**

Q6 A pretensioned T section has a flange 1200 mm wide and 150 mm thick. The width and depth of the rib are 300 and 1500 mm respectively. The high tensile steel has an area of 4700 mm2 and is located at an effective depth of 1600 mm. If the characteristic cube strength of the concrete and the tensile strength of steel are 40 and 1600 N/ mm2 respectively. Calculate the flexural strength of the T- section. **(16)**