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

Total Number of Pages : 02

Course: B.Tech
Sub_Code: PCI6J006

6th Semester Back Examination: 2022-23
SUBJECT: Prestressed Concrete
BRANCH(S): CIVIL
Time : 3 Hour
Max Marks : 100
Q.Code : M245

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.
(Relevant IS codes are allowed during examination)

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) Distinguish between low and high strength concrete.
b) State the two minimum concrete strength requirements prescribed for pre-stressed members.
c) State the principles of post-tensioning.
d) State the significance of pressure or thrust line.
e) Write regarding uses of tendon.
f) Define anchorage slip.
g) Write two ways to improve the shear resistance of structural members by pre-stressing techniques.
h) Distinguish between uniaxial and biaxial pre- stressing.
i) Write the uses of cap cable.
j) State various types of flexural failures encountered in pre-stressed concrete members.

Part-II

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

a) List various types of loss of prestress in pre-tensioned and post-tensioned members.
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 50mm at the center of the span. The area of cable is 200 mm^2 and initial stress in the cable of 1200 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 210 kN/mm^2, compute the loss of stress in the steel only due to the creep of concrete.
c) Describe about the factors influencing the deflection of pre-stressed concrete members.
d) Distinguish between short-term and long term deflections pre-stressed concrete beams.
e) Sketch the typical tensile stress distribution in an end block of a post-tensioned beam with a single anchorage.
f) Describe are the various methods used for investigation of anchorage zone stresses.

g) Illustrate the advantages of continuous members in pre-stressed concrete structures.

h) Describe about various checks to be applied while designing pre-tensioned beams.

i) Distinguish between concentric and eccentric tendons indicating their practical applications.

j) A rectangular concrete beam of 250 mm wide and 600 mm deep is pre-stressed by means of four 14 mm diameter high-tensile bars located 200 mm from the soffit of the beam. If the effective stress in the wire is 700 N/mm^2, what will be maximum bending moment that can be applied to the section without causing tension at the soffit of the beam?

k) State major steps in design of post-tension beams.

l) Write applications of pre-stressed concrete in bridges.

Part-III

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

Q3 A rectangular concrete beam 100 mm wide by 250 mm deep spanning over 8m is pre-stressed by a straight cable carrying an effective pre-stressing force of 250 kN located at an eccentricity of 40 mm. The beam supports a live load of 1.2 kN/m. **(16)**

(a) Calculate the resultant stress distribution for the centre-of-span cross section of beam assuming the density of concrete as 24 kN/m^3

Find the magnitude of pre-stressing force with an eccentricity of 40 mm which can balance the stresses due to dead and live loads at the soffit of the centre span section.

Q4 A pre-stressed concrete beam of rectangular section 120 mm wide by 300 mm deep spans over 6 m. The beam is pre-stressed by straight cable carrying an effective force of 200 kN at an eccentricity of 50 mm. the modulus of elasticity of concrete is 38 kN/m^2. Compute the deflection at the center of span under the combined effect of pre-stress and self-weight. Find the magnitude of the uniformly distributed live load which will nullify the deflection due to pre-stress and self-weight. **(16)**

Q5 The end block of pre-stressed concrete girder is 200 mm wide by 300 mm deep. The beam is post-tensioned by two Freyssinet anchorages each of 100 mm diameters with their centers located at 75 mm from top and bottom of the beam. The force transmitted by an anchorage being 2000 kN. Compute the bursting force and design suitable reinforcements according to Indian Standard (IS:1343) codal provisions. **(16)**

Q6 A two-span continuous beam ABC (AB = BC = 10m) is of rectangular section, 250 mm wide by 500 mm deep. The beam is pre-stressed by a parabolic cable, concentric at end supports and having eccentricity 100 mm towards the soffit of the beam at the Centre of the span and 200 mm towards the top of mid-span. The effective force in the cable is 500 kN. **(16)**

(a) Show the cable is concordant

(b) Locate the pressure line in the beam when it supports a live load of 6 kN/m in addition to its self-weight.