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

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

PECI5415

8th Semester Back Examination 2018-19

PRESTRESSED CONCRETE

BRANCH : CIVIL

Time : 3 Hours

Max Marks : 70

Q.CODE : F054

Answer Question No.1 which is compulsory and any FIVE from the rest.

The figures in the right hand margin indicate marks.

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

a) State the basic principle of prestressed concrete.

b) List the various types of tensioning devices used in prestressed concrete.

c) What is cracking moment?

d) Write the various types of loss of prestress in post-tensioned member.

e) Distinguish between concentric and eccentric tendons.

f) Define secondary moment.

g) State the various factors influencing the deflections of prestressed concrete members.

h) What is the basic difference between primary moment and resultant moment?

i) What are the various modes of shear cracking in a structural concrete beam?

j) What is circular prestressing?

Q2 **a)** What is the necessity of using high strength concrete and high tensile steel in prestressed concrete? **(5)**

b) Explain with sketches Hoyer's long line system of pretensioning. **(5)**

Q3 **a)** A rectangular concrete beam, 100mm wide by 250mm deep, spanning over 8m is prestressed by a straight cable carrying an effective prestressing force of 250kN located at an eccentricity of 40mm. The beam supports a live load of 1.2kN/m. **(5)**

Calculate the resultant stress distribution for the central cross section of the beam. The density of the concrete is 24kN/m^3.

b) What is pressure line? Explain its significance with sketches. **(5)**

Q4 **a)** Calculate the ultimate moment of a rectangular section of 300mm wide and 600mm deep. If it is pretensioned with 950mm^2 of steel wires with initial prestress of 1100mm^2.The centroid of steel wire is at 100mm above the bottom fiber of the beam. Assume f_p=1500N/mm^2 and f_{ck}= 40N/mm^2. **(5)**

b) What is meant by kern distance? Derive the expression for upper kern and lower kern. **(5)**

Q5 **a)** The end block of a prestressed concrete beam of 150mm wide and 300mm deep, has two Freyssinet anchorages of 100mm diameter with their centers at 75mm from the top and bottom of the beam. The force transmitted by each anchorage is 200kN, estimate the maximum tensile stress and the bursting tension developed. **(5)**

b) The support section of a prestressed concrete beam, 100mm wide and 250mm deep is required to support an ultimate shear force of 60kN. The compressive prestress at the centroidal axis is 5 N/mm^2. The cover to the tension reinforcement is 50mm.Design suitable reinforcement at the section. Use M40 concrete and Fe 250 steel. **(5)**

Q6 A prestressed concrete beam of 200mm wide and 300mm deep is prestressed with wires of total cross-sectional area 300mm^2 located at a constant eccentricity of 50mm and prestressed with an initial prestress of 1000N/mm^2. The span of the beam is 10m. Calculate the percentage of loss of stress in wires assuming that the beam is pretensioned. E_s=2.1 x 10^5 N/mm^2, E_c=3.5 x 10^4 N/mm^2, Relaxation of steel= 4%, shrinkage of concrete = 0.0003, ultimate creep strain = 4 x 10^{-6} N/mm^2. **(10)**

Q7 A rectangular concrete beam of cross section 150mm wide and 300mm deep is simply supported over a span of 8m and is prestressed by a symmetric parabolic cable at a distance of 75mm from the bottom of the beam at midspan and 125mm from the top of the beam at support sections. If the force in the cable is 350kN, modulus of elasticity of concrete is 3.8 x10^4 N/mm^2 and unit weight of concrete is 24kN/m^3, calculate
The deflection at mid span when the beam is supporting its own weight.
Long term deflection if loss factor is 0.8 and creep coefficient is 1.6. **(10)**

Q8 **Write short answer on any TWO :** **(5 x 2)**

a) Loss of stress due to friction.
b) Stress distribution in end block.
c) Application and limitations of prestressed concrete.