Registration no: | | | | | | | | | | |

Total Number of Pages: 2 **B.Tech**

PECI5415

8th Semester Regular / Back Examination 2016-17
PRESTRESSED CONCRETE
BRANCH: CIVIL ENGINEERING
Time: 3 Hours
Max Marks: 70
Q.CODE: Z407

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.
Use of IS Code, IS1343 is allowed.

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

a) Distinguish between *pre tensioning* and *post tensioning*.

b) State the various factors which influence the long term deflection of a prestressed concrete member.

c) State the formula to find the loss due to *anchorage slip* in a pre stressed concrete member.

d) State the value of total residual shrinkage strain for pre tensioned members and post tensioned members.

e) What measure can be taken for implementing the principle of *load balance* in pre stressed concrete members.

f) Calculate the location and magnitude of the maximum deflection value of a rectangular pre stressed concrete member of span L subjected to an eccentric pre stressing force of P applied through a triangular cable profile with zero eccentricity at ends and an eccentricity of *e*, below the neutral axis at the centre of the span applying Mohr's theorem.

g) What do you mean by *loss ratio*? Find the range of *loss ratio* for pre tensioned members and post tensioned members separately.

h) State St Venant's principle.

i) State three different methods to analyse and design the *end block* in a pre stressed concrete member.

j) What do you mean by a *concordant cable profile*?

Q2 A simply supported rectangular concrete beam of size 175x350 mm and of span, 6 m carries an external load of 6 kN/m in addition to its dead load. It also carries a concentrated load of 10 kN at a distance of 3 m from left end. An effective prestressing force of 250 kN is applied through an eccentric triangular tendon with eccentricity of zero at ends and an eccentricity of 50 mm below the neutral axis at centre of the span. Draw the stress distribution diagrams separately at the middle point of the beam considering all possible stresses. Draw the resultant stress diagram at this section also for extreme top and extreme bottom . **(10)**

Q3 The end section of a prestressed concrete beam of 175 mm width and 350 mm depth is supported by an ultimate shear force of 450 kN. The compressive prestress at the centroidal axis is 5 N/sq mm. Assuming the cover to tension **(10)**

reinforcement as 50 mm, f_y value of stirrups as 415 N/sq mm, and grade of concrete as M35, find the suitable shear reinforcements in the section following relevant IS Code provisions. Draw the diagram for reinforcement detailing for the whole soan.

Q4 A pre stressed concrete beam of span 7 m with rectangular section, 150 mm wide and 300 mm deep is prestressed by a straight cable profile carrying an effective force of 250 kN with uniform eccentricity of 50 mm below the neutral axis. If there is a total udl of 7 kN/m including the self weight of the beam, find the (i) deflection under pre stress plus self weight plus external load and (ii) final deflection under pre stress, self weight, live load and creep. The creep coeff. = 1.5 **(10)**

Q5 A pretensioned beam of 200 mm by 400 mm is prestressed by 8 wires each of 5 mm diameter applied with an initial stress of 100 N/mm^2 with their centroid located at 100mm from the soffit. Calculate the final losses of stress due to elastic deformation, shrinkage, creep and stress relaxation as per the given input data. **(10)**

E_s= 210 kN/mm^2, Ec= 35 kN/mm^2, creep coefficient = 1.5, residual shrinkage strain = $3x10^{-4}$.

Q6 A pre stressed concrete beam of rectangular section, 150 mm wide and 300 mm deep is to be designed to support two imposed loads of 15 kN, each located at one third points of a beam of length 9 m. If there is no tensile stress in the concrete at transfer and service loads, find the minimum prestressing force and the corresponding eccentricity. **(10)**

Q7 A two span continuous beam ABC having each span of 6 m consists of uniform cross section of 150 mm by 300 mm throughout the length. The beam is prestressed by a straight cable carrying an effective prestressing force of 200 kN having uniform eccentricity, of 50 mm below the neutral axis. If the beam supports concentrated loads of 15 kN each at mid points of the spans, calculate the resultant stresses at the intermediate support. **(10)**

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

a) Loss of stress due to curvature effect and wobble effect

b) Stress- strain curves for prestressing steels

c) Stress distribution at end block

d) Cap cable