No. of Printed Pages : 4

BCEE-061

DIPLOMA IN CIVIL ENGINEERING
DCLE(G)
Term-End Examination

00842

December, 2016

BCEE-061 : PRESTRESSED CONCRETE

Time : 2 hours *Maximum Marks : 70*

Note : *Question no. 1 is* ***compulsory****. Attempt any* ***four*** *questions from the remaining questions. Use of scientific calculator is allowed. Assume required data suitably, if found missing.*

1. Choose the most appropriate answer from the given options : *7×2=14*

   (a) The value of shrinkage strain for concrete in post-tensioned structures

   (i) increases with age of member at transfer

   (ii) decreases with age of member at transfer

   (iii) depends on type of anchorage system

   (iv) remains constant

   (b) Splices are used for

   (i) stretching tendons

   (ii) positioning anchorages

   (iii) holding tendons with correct profile

   (iv) joining tendons

(c) As compared to an R.C.C. Beam for the same span and loading, the size in prestressed concrete structure is

(i) less

(ii) more

(iii) equal

(iv) None of the above

(d) In prestressed concrete structures, the steel used is

(i) Mild steel bars

(ii) HYSD bars

(iii) High tensile strength wires

(iv) All of the above

(e) The minimum grade of concrete used in pre-tensioned concrete structures is

(i) M-25

(ii) M-30

(iii) M-35

(iv) M-40

(f) Tensile strength of concrete may be calculated from the relation

(i) $0{\cdot}6\sqrt{f_{ck}}$

(ii) $0{\cdot}8\sqrt{f_{ck}}$

(iii) $0{\cdot}7\sqrt{f_{ck}}$

(iv) $0{\cdot}5\sqrt{f_{ck}}$

(g) Which of the following losses occurs only in post-tensioning ?

(i) Shrinkage of concrete

(ii) Elastic shortening of concrete

(iii) Loss due to friction

(iv) Creep of concrete

2. (a) Discuss the advantages of prestressed concrete members as compared to reinforced concrete members. 7

(b) Discuss the reasons to provide high strength steel and high strength concrete for prestressed concrete structures. 7

3. (a) A pre-tensioned concrete beam of size 150 mm × 350 mm is carrying prestressing force of 400 kN. Calculate the loss of prestress due to elastic deformation if this beam has constant eccentricity of prestressing force as 60 mm. Assume $E_s = 210$ kN/mm^2 and $E_c = 35$ kN/mm^2. 7

(b) Explain the loss of prestress due to friction in a post-tensioned concrete beam. 7

4. (a) Discuss, briefly, the Load Balancing concept for prestressed concrete beam. 7

(b) Discuss thermo-electric prestressing in brief. 7

5. (a) Explain Hoyer's long line system of pre-tensioning in brief. 7

(b) Discuss the steps to design a prestressed concrete rectangular beam. 7

6. (a) Calculate the stresses at mid span of a prestressed concrete beam in top and bottom fibres. The beam has a simple supported span of 6·5 m and carries an imposed load of 12 kN/m. The cross-section of the beam is 200 mm × 450 mm (depth) and a prestressing force of 450 kN is applied concentrically. Assume density of concrete as 25 kN/m^3. 7

(b) Write down briefly the applications of prestressed concrete members. 7

7. Write short notes on any ***two*** of the following : *2×7=14*

(a) Salient Codal Provisions of serviceability for prestressed concrete members

(b) Prestressed concrete pipes and poles

(c) Secondary stresses due to tendon curvature