No. of Printed Pages : 4

BCEE-061

DIPLOMA IN CIVIL ENGINEERING

DCLE(G)

00610

Term-End Examination

June, 2014

BCEE-061 : PRESTRESSED CONCRETE

Time : 2 hours *Maximum Marks : 70*

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

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

(a) Splices are used for

(i) positioning of anchorages

(ii) stretching tendons

(iii) joining tendons

(iv) holding tendons at correct profile

(b) The minimum grade of concrete used for post-tensioned concrete structures is

(i) M-25

(ii) M-30

(iii) M-35

(iv) M-40

(c) Shrinkage of concrete in post-tensioned concrete structures

(i) decreases with age of concrete at transfer

(ii) increases with age of concrete at transfer

(iii) remains constant

(iv) None of these

(d) Magnel Blaton method of prestressing is used for

(i) Pre-tensioning

(ii) Post-tensioning

(iii) Both

(iv) Partial pre-tensioning

(e) As compared to an RCC Beam for the same span and loading, the size of that in prestressed concrete would be

(i) more

(ii) less

(iii) equal

(iv) None of these

(f) In prestressed concrete structures the type of steel used may be

(i) HYSD bars

(ii) Mild steel bars

(iii) High Tensile strength wires/strand

(iv) All of these

(g) Modulus of elasticity of concrete may be obtained from

(i) $4500 \sqrt{f_{ck}}$

(ii) $5200 \sqrt{f_{ck}}$

(iii) $5700 \sqrt{f_{ck}}$

(iv) None of these

2. (a) Calculate the stresses in bottom and top fibres at mid span location of a prestressed concrete beam which is simply supported. This beam of 6.0 m span has a cross-section of size 200 mm × 450 mm and is subjected to an imposed land of 5 kN/m over the entire span. Density of concrete may be assumed as 25 kN/m^3. A prestressing force of 300 kN is applied at constant eccentricity of 100 mm towards soffit of beam. *7*

(b) Compare briefly pre-tensioned and post-tensioned methods of prestressing. *7*

3. A concrete beam 200 mm × 400 mm (deep) is pre-tensioned by 7 wires of 6 mm diameter with initial stress 1200 N/mm^2. Pre-stressing force is applied at an eccentricity of 60 mm. Calculate the loss of pre-stress due to (i) elastic shortening (ii) creep of concrete (iii) shrinkage of concrete and (iv) relaxation of steel. Assume $E_S = 2 \times 10^5$ N/mm^2, $E_C = 35 \times 10^3$ N/mm^2, Creep coefficient = 1·6, Shrinkage strain = 3×10^{-4}, Relaxation of steel = 6%. *14*

4. (a) Describe the utility of Hoyer's long line method of pre-tensioning. Explain with a neat sketch. 7

(b) Discuss briefly the concept of pressure line. 7

5. Write short notes on any ***two*** of the following : $2 \times 7 = 14$

(a) Flexure failure of prestressed concrete beams

(b) Prestressed concrete pipes

(c) Secondary stresses due to tendon curvature

6. (a) Discuss why a good quality of concrete and steel is needed in prestressed concrete structures. 7

(b) Describe chemical prestressing briefly. 7

7. (a) Explain reasons of variation in tendon stresses in post-tensioned concrete members. 7

(b) Explain three advantages of prestressed concrete. What are the types of structures in which use of prestressed concrete is preferred ? 7