BCEE-061

DIPLOMA IN CIVIL ENGINEERING
DCLE(G)

0621

Term-End Examination, 2019

BCEE-061 : PRESTRESSED CONCRETE

Time : 2 Hours   **Maximum Marks : 70**

Note : Attempt **any five** questions, including question **no. 1**, which is **compulsory**. Use of scientific calculator is allowed. Assume **any data** required suitably.

1.   Choose the most appropriate answer from the given options in questions (a) to (g).   [7x2=14]

   (a)   Loss of prestress due to anchorage slip occurs in

      (i)   post-tensioned concrete members

      (ii)   pre-tensioned concrete members

      (iii)   both (i) and (ii) above

      (iv)   pretensioned concrete members if concrete grade is below M30.

(b) In construction of prestressed concrete members nominal maximum size of aggregate should be

  (i) 5mm less than spacing between tendons provided in the member

  (ii) One fourth of thickness of member

  (iii) Smaller of (i) & (ii)

  (iv) Greater of (i) & (ii)

(c) If a beam carries uniformly distributed load, ideal profile of tendons for a simply supported beam is

  (i) Linearly varying

  (ii) With uniform eccentricity

  (iii) Passing through neutral axis

  (iv) Parabolic

(d) In Freyssinet system of construction of post-tensioned concrete members, how many tendons are stretched at a time ?

  (i) 1

(ii)   2

(iii)   All tendons

(iv)   4

(e)   In the pre-tensioned members, value of shrinkage strain

    (i)   decreases with age of member

    (ii)   increases with age of member

    (iii) remains constant with time

    (iv)   is equal to creep strain.

(f)   Total loss of prestress in a post tensioned member _____ the total loss in a similar pre tensioned member.

    (i)   is less than

    (ii)   is more than

    (iii) is same as

    (iv)   may be more or less than

(g)　Most common method of prestressing used for mass production of a prestressed concrete member is

　　(i)　Freyssinet method

　　(ii)　Lee-Macall method

　　(iii)　Hoyer's method

　　(iv)　Magnel Blaton method

2.　(a)　Explain Load Balancing concept for the analysis of a prestressed concrete member briefly.　[7]

　(b)　Describe Gifford-Udall method of post-tensioned prestressed concrete structure. Draw also relevant figures.　[7]

3.　(a)　Explain reasons why high strength concrete and high strength steel is provided in a prestressed concrete structure.　[7]

　(b)　Write any three advantages of the use of prestressed concrete.　[7]

4. (a) Discuss steps to design a prestressed concrete beam of rectangular section. [7]

(b) Explain why tendon splices are provided in a prestressed structure. [7]

5. (a) A prestressed concrete beam of 300mm x 550mm (total depth) is pre tensioned by 9 wires of 8mm diameter with initial prestress of $1150N/mm^2$. Compute the stresses at top and bottom fibres of beam at the mid space if eccentricity of prestressing force is 80 mm at mid span and the beam carries an imposed load of 20 KN/m over a simply supported span of 7 m. Take density of concrete as $25KN/m^3$. [14]

6. Write short notes on **any two** of the following :

[2x7=14]

(a) Chemical Prestressing

(b) Prestressed concrete pipes

(c) Losses of prestress

7. (a) Discuss any one principle of providing anchorage in a post tensioned structure. Explain with relevant figures. [7]

(b) Discuss prestressing loss due to relaxation of steel and creep of concrete. [7]

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