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BCEE-061

DIPLOMA IN CIVIL ENGINEERING
DCLE(G)
Term-End Examination
June, 2018

00213

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 : *7×2=14*

(a) As compared to RCC beam for the same space and loading, the size of the beam in a prestressed concrete structure is

(i) more

(ii) equal

(iii) less

(iv) None of the above

(b) Loss of pre-stress due to elastic shortening occurs in

(i) post-tensioned concrete

(ii) pre-tensioned concrete

(iii) Both the above

(iv) None of the above

(c) Splices are used for

(i) stretching tendons

(ii) joining tendons

(iii) positioning anchorages

(iv) holding tendons with correct profile

(d) In post-tensioned concrete structures, value of shrinkage strain

(i) remains constant

(ii) decreases with age of member at transfer

(iii) increases with age of member at transfer

(iv) depends on the type of anchorage system

(e) For characteristic load, the probability of not being exceeded is

(i) 95%

(ii) 98%

(iii) 90%

(iv) None of the above

(f) The concept of transmission length is applicable to

(i) post-tensioned concrete

(ii) pre-tensioned concrete

(iii) Both the above

(iv) None of the above

(g) Most common method of pre-stressing used for factory production is

(i) Hoyer's Method

(ii) Freyssinet System

(iii) Magnel-Blaton Method

(iv) Lee-Macall System

2. (a) Discuss reasons to provide high strength concrete and high strength steel for pre-stressed concrete structure. 7

(b) Discuss Hoyer's method of pre-tensioning briefly. Explain utility of the method. 7

3. (a) A pre-tensioned concrete beam of size 200 mm × 400 mm has 6 wires of 5 mm diameter. Calculate loss of pre-stress due to creep of concrete if wires have initial pre-stress of 1050 N/mm^2 and effective eccentricity is 90 mm.
Assume $E_s = 2 \times 10^5$ N/mm^2 and
$E_c = 30 \times 10^3$ N/mm^2 and
creep coefficient = 1·6. 7

(b) Write down any three advantages of pre-stressed concrete. Also discuss three applications of the same. 7

4. (a) Discuss briefly Load Balancing concept for a pre-stressed concrete beam. 7

(b) Discuss losses of pre-stress due to relaxation of steel and shrinkage of concrete in pre-stressed concrete structures. 7

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

(a) Chemical pre-stressing

(b) Flexural failures in pre-stressed beam

(c) Pre-stressed concrete pipes

6. (a) Define tendon splices. Discuss briefly types of tendon splices. 7

(b) Discuss steps to design a pre-stressed concrete rectangular beam. 7

7. (a) Compare briefly pre-tensioning and post-tensioning methods of pre-stressing. 7

(b) Concrete beam of 300 mm × 550 mm carries an imposed load of 15 kN/m over a simply supported span of 7 m. Calculate the stresses at the mid span in top and bottom fibres if beam is pre-tensioned by 8 wires of 6 mm diameter. The cables have eccentricity of 70 mm at mid span and are stressed with initial stress of 1200 N/mm^2. 7