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BCEE-061

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

00942 **December, 2017**

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) Tensile strength of concrete for the design of a prestressed concrete structure may be calculated from the relation

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

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

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

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

(b) For a beam carrying a uniformly distributed load, ideal profile of prestressing cable is

(i) Linearly varying

(ii) Passing through neutral axis

(iii) Parabolic

(iv) With uniform eccentricity

(c) Minimum grade of concrete for a pre-tensioned concrete structure should be

(i) M-40

(ii) M-30

(iii) M-45

(iv) None of the above

(d) A bearing plate below an anchorage system

(i) is desired

(ii) is unsafe

(iii) distributes the force evenly

(iv) increases stress intensity in concrete

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

(i) Elastic shortening of concrete

(ii) Shrinkage of concrete

(iii) Creep of concrete

(iv) Loss due to friction

(f) Partial safety factor to design a prestressed structure for wind load for dead load + wind load combination is

(i) 0·8

(ii) 1·2

(iii) 1

(iv) 1·5

(g) For a prestressed structure, the value of creep coefficient for concrete

(i) Decreases with age at loading

(ii) Increases with age at loading

(iii) Depends upon type of anchorage system used

(iv) Remains constant and does not depend on age at loading

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

(b) Discuss the advantages of prestressed concrete structures as compared to reinforced concrete structures. 7

3. (a) Discuss briefly the concept of pressure line for a prestressed concrete member. 7

(b) Discuss the reasons of variations in tendon stresses in post-tensioned concrete members. 7

4. (a) A pre-tensioned concrete beam of size 200 mm × 350 mm is carrying a prestressing force of 400 kN. Calculate the loss of prestress due to elastic deformation if the beam has constant eccentricity of prestressing force as 70 mm. Assume $E_c = 35$ kN/mm^2 and $E_s = 210$ kN/mm^2. 7

(b) Explain briefly, the Freyssinet method for post-tensioned prestressed structures. 7

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

(a) Prestressed Concrete Poles

(b) Secondary Stresses Due to Tendon Curvature

(c) Salient Codal Provisions of Serviceability for Prestressed Concrete Structures

6. (a) Calculate the stresses at midspan of a prestressed concrete beam in top and bottom fibres. The beam has a simple supported span of 6·0 m and carries an imposed load of 15 kN/m. The cross-section of the beam is 200 mm × 500 mm (deep) and a prestressing force of 500 kN is applied concentrically. Assume density of concrete as 25 kN/m^3. 7

(b) Write down the names of any two types of devices used to stretch tendons. Explain briefly any one type of device. 7

7. (a) Discuss briefly, flexure failures in prestressed concrete beams. 7

(b) Discuss briefly, light weight aggregate prestressed concrete. 7