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BCEE-061

DIPLOMA IN CIVIL ENGINEERING
DCLE(G)

00690

Term-End Examination

June, 2016

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 options given in each case. *7×2=14*

(a) Tensile strength of concrete for pre-stressed concrete structure may be assumed as

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

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

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

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

(b) Minimum grade of concrete used for pre-tensioned concrete structures is

(i) M 35

(ii) M 25

(iii) M 40

(iv) M 30

(c) Ideal profile of pre-stressing cable for a beam carrying uniformly distributed load is

(i) with uniform eccentricity

(ii) passing through neutral axis

(iii) parabolic

(iv) linearly varying

(d) A bearing plate below an anchorage system

(i) is desired

(ii) distributes the force evenly

(iii) is unsafe

(iv) increases stress intensity in concrete

(e) Loss of pre-stress due to elastic shortening of the member occurs in

(i) post-tensioned concrete structures

(ii) pre-tensioned concrete structures

(iii) both (i) and (ii)

(iv) None of the above

(f) Stress due to eccentric pre-stressing only, at an extreme fibre of a pre-stressed beam of cross-sectional area A, moment of inertia I, may be given as

(i) $\frac{A}{P} \pm \frac{Pey}{I}$

(ii) $\frac{P}{A} \pm \frac{I}{Pey}$

(iii) $\frac{P}{A} \pm \frac{Pey}{I}$

(iv) None of the above

(g) Partial safety factor for live load for limit state of serviceability required for the load combination (DL + LL + WL) is _____

(i) 0·8

(ii) 1·0

(iii) 1·2

(iv) 0·9

2. (a) Write down any three advantages of pre-stressed concrete. Also indicate three applications of the same. *7*

(b) Explain the utility of Hoyer's long line system of pre-stressing with a neat sketch. *7*

3. (a) Explain the concept of load balancing as applied for pre-stressed concrete structures. *7*

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

4. (a) Explain briefly the utility of high strength steel and high strength concrete for pre-stressed concrete structures. *7*

(b) Discuss briefly secondary stresses due to tendon curvature. *7*

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

(a) Chemical pre-stressing

(b) Pre-stressed concrete poles

(c) Flexure failure of pre-stressed concrete beams

6. (a) A pre-tensioned concrete beam of 200 mm × 450 mm has 6 wires of 7 mm diameter. The wires have initial stress of 1200 N/mm^2 and effective eccentricity is 70 mm. Calculate the loss of pre-stress due to creep of concrete, if $E_s = 2 \times 10^5$ N/mm^2, $E_c = 30 \times 10^3$ N/mm^2, creep coefficient = 1·6. 7

(b) Discuss the losses of pre-stress due to anchorage slip and relaxation of steel. 7

7. (a) Define tendon splices. Discuss the types of tendon splices in brief. 7

(b) Calculate stresses at mid span in top and bottom fibres for a simply supported beam of 6 m span. The beam carries an imposed load of 10 kN/m and has cross-section of 250 mm × 400 mm (deep). Pre-stressing force of 400 kN is applied concentrically. Assume density of concrete as 24 kN/m^3. 7