

**DIPLOMA IN CIVIL ENGINEERING
DCLE(G)**

Term-End Examination

June, 2017

00034

BCEE-061 : PRESTRESSED CONCRETE

Time : 2 hours

Maximum Marks : 70

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

1. Choose the most appropriate answer from the given options in questions (a) to (g) below : $7 \times 2 = 14$
- (a) The minimum grade of concrete used in a post-tensioned concrete structure is
- (i) M-30
 - (ii) M-40
 - (iii) M-45
 - (iv) None of the above
- (b) The most common method of pre-tensioning used for factory production is
- (i) Freyssinet system
 - (ii) Hoyer's method
 - (iii) Magnel Blaton method
 - (iv) Lee-McCall system

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- (c) Ideal profile of prestressing cable for a beam carrying uniformly distributed load is
- (i) passing through the neutral axis
 - (ii) parabolic
 - (iii) linearly varying
 - (iv) with uniform eccentricity
- (d) Modulus of elasticity of concrete for any design of prestressed concrete structure may be assumed as
- (i) $4500 \sqrt{f_{ck}}$
 - (ii) $5000 \sqrt{f_{ck}}$
 - (iii) $5700 \sqrt{f_{ck}}$
 - (iv) None of the above
- (e) A bearing plate below an anchorage system
- (i) distributes the force unevenly
 - (ii) is desired
 - (iii) is unsafe
 - (iv) increases stress intensity in concrete
- (f) Loss of prestress 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



- (g) For characteristic load, the percentage probability of not being exceeded is
- (i) 95%
 - (ii) 90%
 - (iii) 98%
 - (iv) None of the above
2. (a) Explain the Freyssinet method of prestressing briefly. 7
- (b) Discuss briefly, the load balancing concept for a pre-tensioned concrete beam. 7
3. (a) Discuss the losses of prestress due to anchorage slip and relaxation of steel. 7
- (b) A pre-tensioned concrete beam of 250 mm × 500 mm section has 7 wires of 6 mm diameter. Calculate the loss of prestress due to creep of concrete if the wires have initial prestress of 1100 N/mm² and effective eccentricity is 85 mm. Assume $E_s = 2 \times 10^5$ N/mm², $E_c = 30 \times 10^3$ N/mm² and creep coefficient = 1.6. 7
4. Write short notes on any *two* of the following : 2×7=14
- (a) Prestressed Concrete Poles
 - (b) Chemical Prestressing
 - (c) Secondary Stresses due to Tendon Curvature

5. (a) Write down any three advantages of prestressed concrete. Also discuss three applications of the same. 7
- (b) Discuss the reasons of variations in tendon stresses along tendon length in post-tensioned concrete members. 7
6. (a) What are tendon splices ? Discuss briefly the types of tendon splices. 7
- (b) Calculate the stresses in bottom and top fibres at mid span of a simply supported beam of 6.0 m span. Cross-section of the beam is 150 mm × 350 mm and it is subjected to an imposed load of 6 kN/m over the entire span. Assume density of concrete as 25 kN/m³. Prestressed force of 350 kN is applied at a constant eccentricity of 30 mm. 7
7. (a) Enlist the names of any two types of devices used to stretch tendons. Explain briefly any one type. 7
- (b) Discuss the concept of a pressure line briefly. 7
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