

DIPLOMA IN CIVIL ENGINEERING
DCLE(G)

Term-End Examination, 2019

BCEE-061: PRESTRESSED CONCRETE

Time : 2 Hours

Maximum Marks : 70

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

1. Choose the most appropriate answer from the given options : [2×7=14]
- (a) Value of shrinkage strain for concrete in the design of pretensioned structures :
- (i) increases with age of member
 - (ii) remains constant
 - (iii) decreases with age of member
 - (iv) none of these

(b) In a prestressed concrete structure, nominal maximum size of aggregate for concrete should be :

(i) 5mm less than the spacing of cables provided in the members

(ii) $\frac{1}{4}$ of thickness of member

(iii) greater of (i) and (ii)

(iv) smaller of (i) and (ii)

(c) In prestressed members, type of strain in tendons is :

(i) compressive

(ii) tensile

(iii) bending

(iv) none of these

(d) The concept of transmission length is applicable to :

- (i) pre-tensioned structures
- (ii) post-tensioned structures
- (iii) both (i) and (ii)
- (iv) none of these

(e) Total loss of pre-stress in a pretensioned structure is _____ the loss in post-tensioned structure :

- (i) more than
- (ii) less than
- (iii) same as
- (iv) none of these

(f) Most common method of prestressing of used for mass production of prestressed members is the use of :

(i) Magnel-Blatou system

(ii) Freyssinet system

(iii) Lee-Macall system

(iv) Hoyer's long line system

(g) In a prestressed member, splices are used for :

(i) positioning of anchorages

(ii) stretching tendons

(iii) joining tendons

(iv) holding tendons with correct profile

2. (a) Discuss, briefly, Load Balancing concept for a prestressed concrete beam. [7]
- (b) Describe losses of prestress due to creep of concrete and relaxation of steel in prestressed concrete structures. [7]
3. (a) Discuss why high strength steel and concrete are needed in prestressed concrete structures. [7]
- (b) A prestressed concrete beam of 200 mm × 600 mm carries an imposed load of 20 kN/m. This beam has simple supported span of 6.5 m and is pretensioned by 9 wires of 7 mm diameter with initial stress 1200 N/mm². Calculate the stresses at the mid span in top and bottom fibres, if eccentricity of prestressing force is 75mm. Assume density of concrete as 25 kN/m³. [7]
4. (a) Compare briefly how stresses are transferred to concrete in Pre-tensioning and Post-tensioning methods of prestressing. [7]

- (b) Discuss briefly flexure failures occurring in prestressed concrete beams. [7]
5. (a) Write down any three advantages of prestressed concrete. Describe any three applications of the same also. [7]
- (b) Discuss the concept of chemical prestressing. [7]
6. (a) Discuss any one principle of providing anchorage in post-tensioning of concrete. [7]
- (b) What is the use of tendon splices ? Give some examples of tendon splices. [7]
7. 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 of prestressed concrete members

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