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BICEE-002

B.Tech. CIVIL ENGINEERING

(BTCLEVI)

Term-End Examination, 2019

BICEE-002 : PRESTRESSED CONCRETE

Time : 3 Hours]

[Maximum Marks : 70

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**Note :** Attempt any five questions. Use of scientific calculator is allowed. Use of IS-1343 is allowed.

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1. (a) What are different principles on which various post-tensioning anchorage system are based ? Explain any one. [7]
- (b) Compare pre-tensioned and post-tensioned members. [7]
2. (a) Why do we need tendon splices ? With the help of diagrams describe any two type of tendon splices. [7]
- (b) A rectangular concrete beam  $250 \times 600$ mm is prestressed by four 14 mm diameter bars located

200 mm from soffit of the beam. If the effective stress in wires is  $700 \text{ N/mm}^2$ , what is the maximum bending moment that can be applied to the section without causing tension at soffit of beam. [7]

3. (a) Explain types of losses in pre-stressed concrete. [7]

(b) A concrete beam AB of span 12 m is post-tensioned by a cable which is concentric at supports and has an eccentricity of 200 mm in the mid-third span with a linear variation towards the support. If the cable is tensioned at jacking end A, what should be the jacking stress in wires if stress at B is  $1000 \text{ N/mm}^2$ . Take  $\mu = 0.55$  and  $K = 0.0015/m$ . [7]

4. (a) The support section of a prestressed concrete beam  $100 \times 250 \text{ mm}$  is required to support an ultimate shear force of  $80 \text{ kN}$ . The compressive prestress at centroidal axis is  $5 \text{ N/mm}^2$ . Design the suitable shear reinforcement using IS 1343. Given  $f_{ck} = 40 \text{ N/mm}^2$ ,  $f_y = 415 \text{ N/mm}^2$ , Cover = 50 mm. [7]

- (b) Explain the IS code procedure of design of torsional reinforcement. [7]
5. Explain bearing stress and bursting tensile stress in end block. Discuss the steps for design of bearing and bursting tensile stresses in end block. [14]
6. (a) Discuss the effect of tendon profile on deflection for : [7]
- (i) Straight Tendon
- (ii) Trapezoidal Tendon
- (b) A pre-tensioned prestressed concrete beam having a rectangular section  $150 \times 350 \text{ mm}$  has an effective cover of  $50 \text{ mm}$ . If  $f_{ck} = 40 \text{ N/mm}^2$ ,  $f_p = 1600 \text{ N/mm}^2$  and the area of prestressing steel =  $46 / \text{mm}^2$ , Calculate the ultimate flexural strength as per IS 1343. [7]
7. Write short notes on any four of the following :  $[4 \times 3\frac{1}{2} = 14]$
- (a) Kern Zone
- (b) Transmission Length
- (c) Limit State of Serviceability

- (d) Modes of failure of prestressed beam under shear
- (e) Concordant cable profile

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