

**B.Tech. CIVIL ENGINEERING (BTCLEVI)**

**Term-End Examination**

00023

June, 2018

**BICEE-002 : PRESTRESSED CONCRETE**

*Time : 3 hours*

*Maximum Marks : 70*

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*Note : Answer any five questions. All questions carry equal marks. Assume any missing data, if necessary. Use of scientific calculator is permitted.*

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1. (a) Why are high strength materials used in prestressed concrete ? 7
- (b) Explain the basic difference between stress concept and load balancing concept. 7
  
2. (a) Define and explain the following terms :  $4 \times 2 \frac{1}{2} = 10$ 
  - (i) Tendon
  - (ii) Anchorage
  - (iii) Transmission length
  - (iv) Degree of prestressing
- (b) Discuss the advantages of prestressed concrete in comparison with reinforced concrete and steel construction. 4

3. (a) Explain the procedure to compute the loss of stress in steel due to curvature and wobble effect. 7

(b) A pre-tensioned concrete beam, 200 mm wide and 300 mm deep, is prestressed by straight wires carrying an initial force of 150 kN at an eccentricity of 50 mm. Take modulus of elasticity of steel as  $2 \times 10^5$  N/mm<sup>2</sup> and that of concrete as  $0.33 \times 10^5$  N/mm<sup>2</sup>, respectively. Estimate the percentage loss of stress in steel due to elastic deformation of concrete, if the area of steel wires is 188 mm<sup>2</sup>. 7

4. (a) Why should cable profile follow the bending moment profile for economical design? 7

(b) A prestressed concrete beam with a cross-section 300 mm wide and 600 mm deep, is 12 m long. It carries a live load of 12 kN/m in addition to its own weight. It is prestressed with 2000 mm<sup>2</sup> high tensile steel located at 175 mm from soffit. The cable profile is straight for the full length of the beam and it is stressed to a level of 8000 N/mm<sup>2</sup>. It is bonded to concrete. Determine the location of thrust line in the beam and plot its position at the end, and at mid-span section. 7

5. (a) Distinguish clearly between pre-tensioned and post-tensioned prestressed concrete bringing out all the operations involved. 7
- (b) Discuss various modes of failure of prestressed concrete flexural members. 7
6. A prestressed concrete beam 400 mm wide and 600 mm deep has a span of 6 m. The beam is prestressed with a tendon bent as shown in Figure 1. A central concentrated load of 180 kN is acting on the beam. Effective prestressing force is 1200 kN. Calculate the extreme fibre stresses at mid span taking into account the self weight of beam also. 14

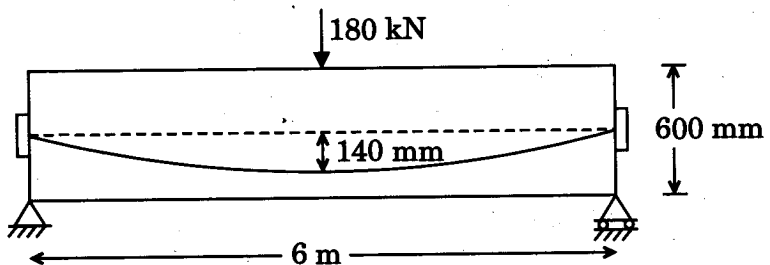


Figure 1

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

- (a) Short Term and Long Term Deflections for Prestressed Concrete Members
  - (b) Bearing and Bursting Tensile Stresses in End Block
  - (c) Limit State of Collapse
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