

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

**Term-End Examination**

**December, 2017**

**00932**

**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) Discuss the advantages and disadvantages of pre-tensioning and post-tensioning systems of prestressing. 7
- (b) Enumerate the various losses of prestress. Discuss any one type of loss of prestress. 7
2. (a) Discuss the factors affecting deflection in prestressed concrete beams and slabs. 7
- (b) Define bearing stresses and bursting tensile stresses in the end blocks. Write steps for the design of bearing and bursting tensile stresses in end block. 7

3. A prestressed concrete beam of  $400 \text{ mm} \times 800 \text{ mm}$  (depth) is prestressed by a tendon with constant eccentricity of  $130 \text{ mm}$ . The beam has an effective span of  $6 \text{ m}$  and is simply supported at both ends. Calculate the stresses at mid-span during service if this beam supports an imposed UDL of  $8 \text{ kN/m}$ . The force of prestress is  $1600 \text{ kN}$ . Assume  $16\%$  loss of prestress. 14
4. (a) Describe the Freyssinet system of post-tensioning. 7
- (b) Explain with the help of an example, the concept of thrust line in a prestressed concrete beam. 7
5. For a prestressed concrete beam supporting a UDL of intensity  $w \text{ kN/m}$ , derive the equation giving resultant stresses at the top and bottom fibres at any given section. 14
6. (a) What are the ways of improving shear resistance of structural members by prestressing techniques ? 7
- (b) A post-tensioned prestressed beam of rectangular section  $240 \text{ mm}$  wide is to be designed for a live load of  $25 \text{ kN/m}$ , uniformly distributed on an effective span of  $12 \text{ m}$ . The stress in concrete must not exceed  $17 \text{ MPa}$  in compression or  $1.4 \text{ MPa}$  in tension at any time. The loss of prestress may be taken as  $15\%$ . Calculate the minimum possible depth of the beam. 7

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

- (a) **Limiting Zone for Cables in Prestressed Concrete Beams**
  - (b) **Limit State of Serviceability**
  - (c) **Concept of Load Balancing**
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