



**B.E/B.TECH DEGREE EXAMINATIONS: NOV/DEC 2023**

(Regulation 2018)

Seventh Semester

**CIVIL ENGINEERING**

U18CEE0010: Prestressed Concrete Structures

( Use of IS:1343 to be permitted)

**COURSE OUTCOMES**

- CO1:** Understand different methods of prestressing techniques.  
**CO2:** Design prestressed concrete structures for flexural and shear.  
**CO3:** Analyse and design the anchoring zone of prestressed elements.  
**CO4:** Design prestressed concrete pipes and tanks.  
**CO5:** Analyse composite and indeterminate prestressed concrete structures.

**Time: Three Hours**

**Maximum Marks: 100**

**Answer all the Questions:-**

**PART A (10 x 2 = 20 Marks)**

**(Answer not more than 40 words)**

- |  |     |                   |
|--|-----|-------------------|
| 1. What are the various methods of prestressing?                               | CO1 | [K <sub>1</sub> ] |
| 2. List the sources of prestress force.  | CO1 | [K <sub>1</sub> ] |
| 3. At initial stage what forces are considered in prestresses concrete design? | CO2 | [K <sub>2</sub> ] |
| 4. How can prestressed concrete beam be considered to carry its own weight?    | CO2 | [K <sub>2</sub> ] |
| 5. Why anchorage zone has to be given special attention in design?             | CO3 | [K <sub>2</sub> ] |
| 6. Sketch the arrangement of reinforcement in End Blocks?                      | CO3 | [K <sub>1</sub> ] |
| 7. Why a parabolic tendon preferred in prestressed concrete?                   | CO4 | [K <sub>2</sub> ] |
| 8. Name the loadings to be considered for computing initial deflection.        | CO4 | [K <sub>1</sub> ] |
| 9. What is the necessity of vertical prestressing in water tank?               | CO5 | [K <sub>2</sub> ] |
| 10. What are the advantages of Prestressed concrete Sleeper?                   | CO5 | [K <sub>2</sub> ] |

**Answer any FIVE Questions:-**

**PART B (5 x 16 = 80 Marks)**

**(Answer not more than 400 words)**

- |   |   |     |                   |
|---|---|-----|-------------------|
| 11. a) Explain the factors influencing deflections?                                 | 8 | CO1 | [K <sub>2</sub> ] |
| b) Describe the effect of loading on the tensile stresses in tendons.               | 8 | CO1 | [K <sub>2</sub> ] |
| 12. a) A pretensioned prestressed concrete beam having a rectangular section 150 mm | 8 | CO2 | [K <sub>2</sub> ] |

wide and 350 mm deep has an effective cover of 50 mm. If  $f_{ck} = 40 \text{ N/mm}^2$ ;  $f_p = 1600 \text{ N/mm}^2$  and area of prestressing steel =  $461 \text{ mm}^2$ . Calculate the ultimate flexural strength of the section using IS 1343 codal provisions.

- |        |   |    |     |                   |
|--------|---|----|-----|-------------------|
| b)     | Explicate the precast prestressed concrete stresses at serviceability limit state.  | 8  | CO2 | [K <sub>2</sub> ] |
| 13. a) | The end block of a prestressed concrete beam, rectangular in section is 100 mm wide and 200 mm deep. The prestressing force of 100 kN is transmitted to concrete by a distribution plate 100 mm wide and 50 mm deep concentrically located at the ends. Calculate the position and magnitude of the maximum tensile stress on the horizontal section through the center and edge of the anchor plate. Compute the bursting tension on these horizontal planes.  | 10 | CO3 | [K <sub>2</sub> ] |
| b)     | Explain magnel's method for anchorage.  | 6  | CO3 | [K <sub>2</sub> ] |
| 14.    | A two-span continuous beam ABC (AB = BC = 10 m) is of rectangular section, 200 mm wide and 500 mm deep. The beam is prestressed by a parabolic cable, concentric at end supports and having an eccentricity of 100 mm towards the soffit of the beam at centre of spans and 200 mm towards the top of beam at mid support B. The effective force in the cable is 500 kN.<br>(a) Show that the cable is concordant.<br>(b) Locate the pressure line in the beam when, in addition to its self-weight, it supports an imposed load of 5.6 kN/m. | 16 | CO4 | [K <sub>2</sub> ] |
| 15. a) | Explain the step-by-step design procedure of circular tanks.  | 8  | CO5 | [K <sub>2</sub> ] |
| b)     | Elucidate the types of prestressed concrete pipes with neat sketch.   | 8  | CO5 | [K <sub>2</sub> ] |
| 16. a) | Explain the assumption made in prestressed concrete sections and also the major steps to be followed in the strain compatibility method.  | 8  | CO2 | [K <sub>2</sub> ] |
| b)     | Explain the various types of flexural failures encountered in prestressed concrete members.   | 8  | CO2 | [K <sub>2</sub> ] |

\*\*\*\*\*