

9. Design a non cylinder prestressed concrete pipe of 600mm internal diameter to withstand a working hydrostatic pressure of  $1.05\text{N/mm}^2$ , using a 2.5 mm tensile wire stressed to  $1000\text{N/mm}^2$  at transfer. Permissible maximum and minimum stress are 14 and  $0.7\text{N/mm}^2$ . Calculate the pressure required to produce a tensile stress of  $0.7\text{N/mm}^2$  in concrete when applied immediately after tensioning and winding stress in steel if  $E_s = 210\text{KN/mm}^2$  and  $E_c = 35\text{KN/mm}^2$ . 15

Roll No. ....

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**B. Tech. 6th Semester (Civil) (Elective-II)  
Examination – May, 2023**

**PRE-STRESSED CONCRETE**

Paper : PEC-CEEL-310-G

Time : Three hours ]

[ Maximum Marks : 75

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

**Note :** Attempt *five* questions in all, selecting *one* question from each Section. Question No. 1 is *compulsory*. All question carry equal marks.

1. Describe the following : 15
- (a) Stress distribution in end block
  - (b) Advantages of continuous structure
  - (c) Types of prestressed concrete pipe
  - (d) Junction of Tank
  - (e) Factors influencing deflection

4. Explain the mechanism of shear failure in the beams. 15
5. Determine the maximum short term and the long term deflection of pre-tensioned concrete beam of section  $350 \text{ mm} \times 600 \text{ mm}$  has an effective span of  $16 \text{ m}$ . The beam is prestressed by parabolic cable carrying initial force of  $700 \text{ kN}$  at transfer. The cable is concentric at the supports and has an eccentricity of  $150 \text{ mm}$  at its

## SECTION - B

3. A prestressed concrete pile  $250 \text{ mm}$  square, contains 60 prestressed wires each of  $2 \text{ mm}$  diameter uniformly distributed over the section. The wires are initially tensioned on the prestressing bed with total force of  $300 \text{ kN}$ . Calculate the final stress in concrete and the percentage loss of stress in steel after all losses. Given the following data  $E_s = 210 \text{ kN/mm}^2$ ,  $E_c = 32 \text{ kN/mm}^2$ . Shortening due to creep  $= 30 \times 10^{-6} \text{ mm/m per N/mm}^2$  of stress. Total shrinkage  $= 200 \times 10^{-6}$  per unit length, relaxation of steel stress  $= 5$  per cent of initial stress. Prestressing Force  $P = 300 \text{ kN}$ . 15
2. Explain the types of prestressing system and stress strain curve for ductile material. 15

## SECTION - A

8. Write down the design procedure of circular tank in detail. 15

## SECTION - D

7. Derive three moment equation for beam. Write down the design procedure for piles. 15
6. A precast pre tensioned beam of rectangular section has a breadth of  $100 \text{ mm}$  and a depth of  $200 \text{ mm}$ . The beam with an effective span of  $5 \text{ m}$ , is prestressed by tendon with their centroids with the bottom kern. The initial force in the tendons is  $150 \text{ kN}$ . The loss of prestress may be assumed to be 15 percent. The beam is incorporated in a composite T beam by casting a top flange of breadth  $400 \text{ mm}$  and thickness  $40 \text{ mm}$ . If the composite beam supports a live load of  $8 \text{ kN/m}^2$ . Calculate the resultant stress for unropped and probed section. 15

## SECTION - C

6. A precast pre tensioned beam of rectangular section has a breadth of  $100 \text{ mm}$  and a depth of  $200 \text{ mm}$ . The beam with an effective span of  $5 \text{ m}$ , is prestressed by tendon with their centroids with the bottom kern. The initial force in the tendons is  $150 \text{ kN}$ . The loss of prestress may be assumed to be 15 percent. The beam is incorporated in a composite T beam by casting a top flange of breadth  $400 \text{ mm}$  and thickness  $40 \text{ mm}$ . If the composite beam supports a live load of  $8 \text{ kN/m}^2$ . Calculate the resultant stress for unropped and probed section. 15
5. A beam of length  $10 \text{ m}$  is subjected to uniformly distributed live load of  $15 \text{ kN/m}$  in addition to two concentrated loads of  $50 \text{ kN}$  each at quarter span points respectively. Adopt M40 grade of concrete, loss of prestress as 20 % creep coefficient is 2 and the permanent load of transverse load is 25%. 15