

Roll No.

3310

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 :

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- (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

SECTION – A

2. Explain the types of prestressing system and stress strain curve for ductile material. 15
3. A prestressed concrete pile 250 mm square, contains 60 pretensioned wires each of 2 mm diameter uniformly distributed over the section. The wires are initially tensioned on the prestressing bed with total force of 300 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 = 200×10^{-6} per unit length, relaxation of steel stress = 5 per cent of initial stress, Prestressing Force $P = 300 \text{ KN}$. 15

SECTION – B

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 m. The beam is prestressed by parabolic cable carrying initial force of 700 KN at transfer. The cable is concentric at the supports and has an eccentricity of 150 mm at its

mid span. The beam is subjected to uniformly distributive live load of 15 KN/m in addition to two concentrated loads of 50 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

SECTION – C

6. A precast pre tensioned beam of rectangular section has a breadth of 100mm and a depth of 200mm. The beam with an effective span of 5m, is prestressed by tendon with their centroids with the bottom kern. The initial force in the tendons is 150kn. 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 400mm and thickness 40mm. If the composite beam supports a live load of 8 kN/m^2 . Calculate the resultant stress for unpropped and probed section. 15
7. Derive three moment equation for beam. Write down the design procedure for piles. 15

SECTION – D

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

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

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