

7. (a) Sketch a typical concordant cable profile in a two span continuous prestressed T-3 concrete beam. 10
- (b) Explain the method of computing the ultimate shear strength in composite PSC members. 10
8. (a) How will you evaluate factor of safety against bursting pressure in cylindrical pipes ? 10
- (b) Discuss the stages concrete pipes should cover as per IS 754. 10

23380- (P-4)/(Q-8)/(23) (4)

Roll No.

23380

**M. Tech. 1st Semester (Civil Engg.)
(Specialization in Structural Engg.)
(Elective-II)**

Examination – December, 2022

PRE-STRESSED CONCRETE

Paper : CE-61S

Time : Three Hours] [Maximum Marks : 100

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. All questions carry equal marks.

1. (a) What is basic principle of prestressed concrete ? 5
- (b) Differentiate between full prestressing and partial prestressing. 5
- (c) What are the advantages of prestressing ? Mention the limitations of prestressing. 10

23380-32-(P-4)/(Q-8)/(23) P. T. O.

2. (a) What are the criteria concerning prestressed concrete for the ultimate limit state ? 5
- (b) What are Class 3-type prestressed members ? Mention their advantages. 5
- (c) How do you account for relation of stresses in prestressed members ? Explain provision made in IS 1343 for relaxation. 10
3. (a) A post-tensioned beam AB of span 25 m is prestressed with an initial prestressing force of 400 kN at the jacking end A of the beam. The cable is having zero eccentricity at the supports A and B and an eccentricity of 400 mm towards the soffit at mid-span. The coefficient of friction $\mu = 0.30$ and the coefficient of wave effect $K = 0.0043/\text{m}$. Determine :
- (i) The loss of prestressing force in the cable due to friction. 10
- (ii) The effective prestressing force in the cable at the farther end B of the beam. 10
- (b) What are the factors influencing the loss of stress due to creep of concrete ? 10

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4. (a) How do you estimate the ultimate shear strength of PSC sections with flexure shear cracks ? 10
- (b) A pretensioned T section has a flange width of 1200mm and 150 mm thick. The width and depth of the rib are 300 mm and 1500 mm respectively. The high tension steel has an area of 4700 mm² and is located at an effective depth of 1600 mm. If the characteristic cube strength of the concrete and the tensile strength of steel are 40 and 1600 Mpa respectively; calculate the flexural strength of the section. 10

5. Discuss briefly the design of slender prestressed concrete columns. 20

6. A continuous beam ABC (AB = BC = 10 m) is prestressed by a parabolic cable carrying an effective force of 200 kN. The cable profile is shown in Fig. The beam supports dead load and live load of 0.24 kN/m and 2.36 kN/m respectively. Calculate the resultant moments developed in the beam and locate the pressure line. 20

23380- (P-4)/(Q-8)/(23) (3) P. T. O.