8. (a) How do you compute the loss of stress due to shrinkage of concrete as per IS:1343 code recommendations ? 5 × 4 = 20

(b) Discuss the various methods of predicting long-term deflections of uncracked prestressed concrete members.

(c) What are the advantages of using composite construction with pre-stressed and in situ concrete in structural members ?

(d) How do we compute resultant stresses in composite members with un-propped condition ?

Roll No. _____

23380

M. Tech. 1st Sem. Civil Engg.
(Specialisation in Structural Engg.)
(Elective-II)
Examination – February, 2022

PRE-STRESSED CONCRETE

Paper : CE-618

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 any *five* questions. All questions carry equal marks.

1. (a) Distinguish between concentric and eccentric tendons, indicating their practical applications. 10

(b) Explain the various modes of failure encountered in prestressed concrete beam subjected to bending moment, shear & torsion. 10

2. A concrete beam of rectangular section 200mm wide and 600mm deep, is prestressed by a parabolic cable located at an eccentricity of 100mm at the mid span and zero at the supports. If the beam has a span of 10m

and carries a uniformly distributed live load of 4 kN/m, find the effective force necessary in the cable for zero shear stress at the support section. For this condition, calculate the principal stresses. The density of concrete is 24 kN/m³. 20

3. A post-tensioned bonded prestressed concrete beam of rectangular cross section, 300mm wide by 500mm deep, is subjected to a service-load bending moment of 150 KNm, torsional moment of 46.6 KNm and shear force of 80 kN. The section has an effective prestressing force, determined from service load requirements, of magnitude 500KN at an eccentricity of 120 mm, provide 3 numbers of 12 mm stress-relieved strands with an ultimate tensile strength of 1820 N/mm² ? If the cube strength of concrete is 40MPa, design suitable longitudinal and transverse reinforcement in the beam using IS:1343-1980. 20

4. (a) Explain the design procedure of prestressed folded plates. 10

   (b) How do you compute the shrinkage and resultant stresses in composite members. 10

5. Write a short note on : 5 × 4 = 20

   (a) Linear transformation

   (b) Jaeques Muller's theorem.

   (c) Analysis of Railway sleepers.

   (d) Deflection of prestressed structures

6. A rectangular pre tensioned concrete beam has a breadth of 200mm and depth 230mm and prestressed after all loses have occurred is 12 N/mm2 at the soffit and zero at the top. The beam is incorporated in a composite T beam by casting a top flange of breadth 300mm and depth 50mm. calculate the maximum uniformly distributed LL that can be supported on a simply supported span of 4.5m with out tensile stresses occurring. Assume support condition to be propped and modular ratio as 1. 20

7. Design a non-cylinder prestressed concrete pipe of internal diameter 50 cm to withstand working pressure of 1 N/mm². High tensile wires of 2mm diameter stressed to 1200 N/mm² at transfer. The permissible maximum stress in concrete in transfer and at working load conditions are 13N/mm² and 1/N/mm² respectively. The loss ratio = 0.8 Es = 210000N/mm² and Ec = 35,000N/mm2. Calculate : 20

   (i) minimum thickness of concrete pipe

   (ii) the test pressure required to produce a tensile stress of 0.7 N/mm² in concrete

   (iii) number of turns of wire per metre length of pipe