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M.Tech. (SE)   (Sem.–1)
PRE-STRESSED CONCRETE STRUCTURES
Subject Code : CE-504
M.Code : 35205

Time : 3 Hrs.   Max. Marks : 100

INSTRUCTIONS TO CANDIDATES :
1. **Attempt any FIVE questions out of EIGHT questions.**
2. **Each question carries TWENTY marks.**
3. **Use of BIS 1343 is allowed.**
4. **Assume suitable data if required.**

1. a) Discuss in brief the various losses in prestressing force and explain as to how they are accounted for in design. (12)

   b) In terms of strength and serviceability, compare prestressed concrete with reinforced concrete. (8)

2. a) A concrete beam 150mm × 320 mm is prestressed by a force of 550 KN at a constant eccentricity of 70mm. The beam supports a concentrated load of 70 KN at the centre of span of 3m. Determine the location of pressure line at the centre, quarter span and support sections of the beam. Neglect self weight. (12)

   b) A concrete beam supports three concentrated loads equally spaced on Simply Supported beam. Suggest a suitable cable profile to contract the effect of these loads. (8)

3. Design a two span continuous prestressed concrete beam of 9 m span each carrying a superimposed live load of 22 kN/m. Assume permissible stresses. (20)

4. a) A concrete beam of rectangular x-section 250mm wide and 600mm overall depth is subjected to a torque of 25KNm and a uniform prestressing force of 125KN. Calculate the maximum principal tensile stress. Assuming 15% loss of prestress, calculate the prestressing force necessary to limit the principal tensile stress to 0.4 N/mm^2. (10)

   b) Outline the principle and procedure of design of end block for a prestressed concrete beam (10)

5. Design a V-shaped pre-tension folded plate roof to cover an industrial building warehouse measuring 20 m by 50 m. Loading is a per IS: 875. M 45 grade concrete and 5 mm high tensile wires are available for use. Check for stresses under working loads and for load factors required as per IS: 1343 in flexure. Sketch the details of the wires in the plates and the valley junction cable in the cross-section of the pre-tensioned units. (20)

6. a) What is transmission length? List the various factors influencing transmission length. (8)

   b) What are the effects of creep on composite prestressed concrete construction? (12)

7. Write short notes on :

   a) Design of end block of a prestressing girder. (10)

   b) Design of prestressed pipes. (10)

8. a) Design an oblique cable system for an airport runway 150mm long and 15mm wide using Freyssinet cables 12 No- 5mm diameter stressed to 1200MPa. Minimum longitudinal stress should not be less than 2MPa and minimum traverse stresss should not be less than 15 MPa. (12)

   b) Explain the various modes of failure encountered in prestressed concrete beam subjected to bending moment, shear & torsion. (8)

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.