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23392

M. Tech. 1st Sem. Civil Engg. (Specialisation in Structural Design) Examination– December, 2016

PRE-STRESSED CONCRETE DESIGN

Paper : MTSD-103

Time : 3 hours ***Max. 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 the examination.

Note: Attempt any **five** questions. All carry equal marks.

1. (a) Compare prestressed concrete beam with reinforced concrete beam. (15)

(b) Explain pre-tensi ; and post-tensioning. (5)

2. (a) What is pressure o st line? Explain its significance with hes. (10)

(b) Define Gifford Udal em and Magnel Blaton post tensioni detail. (10)

3. A pretensioned prestre concrete beam having a rectangular se 150 mm × 375 mm, has an effective of 55 mm. If f_{ck} = 40 N/mm² and fp 00 N/mm² and the area of prestressing Ap = 460 mm². Calculate the ultimate ral strength of

the section using IS: 1343 code provision. (20)

4. Explain the concept of load balancing in prestressed concrete members. A rectangular concrete beam 250mm wide by 400mm deep spanning over 7.5m is prestressed by a straight cable carrying an effective prestressing force of 375 kN located at an eccentricity of 30mm. The beam supports a live load of 2.0 kN/m. Calculate the resultant stress distribution for the central cross section of the beam. (20)

5. A prestressed concrete beam of rectangular section is 125 mm wide and 250 mm deep

and has a span of 6 he beam is provided with a straight om at a uniform eccentricity of 40 n ıe prestressing force being 190kN. Fin : deflection at the centre.

(a) Under the actio prestress and dead load of the bean (10)

(b) Under the actio prestress, dead load and a live lo 3.75 kN/m and including the t of creep and shrinkage, taki eep coefficient as 1.75. (10)

Compare these ctions with the permissible limits.

6. A beam of rectangular section 175 mm × 400 mm is prestressed by a straight cable with an effective prestressing force of 300 kN at an eccentricity of 45 mm. The imposed load on the beam is 3.50 kN/m on a span of 7.50 m. Find the load factor against cracking. The modulus of rupture of concrete is 5 N/mm^2.

(20)

7. (a) How do you estimate the ultimate shear strength of prestressed concrete sections with web shear cracks? (10)

(b) Distinguish between shear, flexural shear and flexura ear cracks in concrete beam with s ies. (10)

8. Design a prestressed rete cylindrical pipe using a steel cy of 1400 mm internal diameter and ness 1.75 mm. The service internal hy atic pressure in the pipe is 0.8 N/mm mm diameter high tensile wires initia tensioned to a stress of 1 kN/mm² available for circumferential winding yield stress of mild steel cylinder is N/mm². The maximum permissible c essive stress in concrete at transfer is N/mm² and no tensile stress is perm Determine the

thickness of the concrete lining and the number of turns of circumferential wire winding and the factor of safety against bursting. Assume the modular ratio as 6 and loss ratio as 0.8. (20)

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