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23392

M. Tech. 1st Semester (Civil Engg.)

(Specialization in Structural Design)

Examination – January, 2016

PRE-STRESSED CONCRETE DESIGN

Paper : MTSD-103

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 : (i) Students have to attempt ***five*** questions in total.

(ii) Assume any data if missing.

1. What is minimum concrete strength requirements for prestressed concrete as per IS 1343 ? Write down a note on materials properties required for prestressed concrete. 20

2. Explain in detail two different t)f prestressing system, also write down it /antages and disadvantages. 20

3. A pretensioned prestressed con(eam having a rectangular section 200 mm x 400 las an effective cover of 50 mm. If f_{ck} = 40 N/n id fp = 1600 N/mm^2 and the area of prestre steel A_p = 460 mm^2. Calculate the ultimate fle trength of the section using IS : 1343 code provis 20

4. Explain the concept of load bala in prestressed concrete members. A rectangula :ete beam 200 mm wide by 350 mm deep sp over 7 m is prestressed by a straight cable (g an effective prestressing force of 350 kN loca an eccentricity of 25 mm. The beam supports load of 1.75 kN/m. Calculate the resultant s istribution for the central cross section of the bea 20

5. Explain all prestress losses in det) explain how can we minimize the loss of :esses due to friction ? 20

6. A beam of rectangular section 150 mm x 375 mm is prestressed by a straight cable with an effective prestressing force of 275 kN at an eccentricity of 60 mm. The imposed load on the beam is 3.75 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. What are serviceability limit states ? Discuss briefly the IS : 1343 code recommendations regarding serviceability limit states. 20

8. Design a prestressed concrete cylindrical pipe using a steel cylinder of 1350 mm internal diameter and thickness 2.0 mm. The service internal hydrostatic pressure in the pipe is 0.8 N/mm^2. 4.5 mm diameter high tensile wires initially pretensioned to a stress of 1 kN/mm^2 are available for circumferential winding. The yield stress of mild steel cylinder is 280 N/mm^2. The maximum permissible compressive stress in concrete at transfer is 15 N/mm^2 and no tensile stress is permitted. 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