concrete should not exceed 30 N/mm^2 in compression and no tension is permitted at any stage. Design the spacing of the cables and their position at mid span section. Assume loss of prestress as 20%. **15**

7. Write down the design steps for designing a compression member along with Load-Moment interaction curves for prestressed concrete for short columns. **15**

8. What is differential shrinkage ? Explain its importance in composite construction. How do you compute the shrinkage and resultant stresses in composite members. **15**

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BB-562

M. Tech. EXAMINATION, May 2017

(Second Semester)

(B. Scheme) (Main & Re-appear)

CE(SE)

CES-504

Prestressed Concrete Structures

Time : 3 *Hours*] [*Maximum Marks :* 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. Assume any data if missing in the question paper. Use of IS 1343 is allowed.

1. Write a note on the material properties required for prestressed concrete. What is minimum concrete strength requirements for prestressed concrete as per IS 1343. **15**

2. A pretensioned prestressed concrete beam having a rectangular section 250 mm × 550 mm, has an effective cover of 60 mm. If f_{ck} = 50 N/mm^2 and f_p = 1900 N/mm^2, and the area of prestressing steel A_p = 561 mm^2. Calculate the ultimate flexural strength of the section using IS:1343 code provisions. **15**

3. Explain with sketches three different types of prestressing systems. **15**

4. A composite T-beam is made up of a pretensioned rib 400 mm thick and 900 mm deep and a cast in situ slab of 250 mm thickness and 1200 mm width. The modulus of elasticity of cast in situ slab is 28 kN/mm^2. If the differential shrinkage is .0001, estimate the shrinkage stresses developed in precast and cast in situ units. **15**

5. Design a prestressed concrete cylindrical pipe using a steel cylinder of 1100 mm internal diameter and thickness 1.5 mm. The service internal hydrostatic pressure in the pipe is 0.6 N/mm^2. 4 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 12 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. **15**

6. A highway bridge deck slab spanning 12m is to be designed as a one way prestressed concrete slab with parallel post-tensioned cables carrying an effective force of 720 kN. The deck slab is required to support a UDL live load of 35 kN/m^2. The permissible stresses in