If the differential shrinkage is .0001, estimate the shrinkage stresses developed in precast and cast in situ units. **15**

Unit IV

7. Design a prestressed concrete cylindrical pipe using a steel cylinder of 1200 mm internal diameter and thickness 2.5 mm. The service internal hydrostatic pressure in the pipe is 0.9 N/mm^2. 3 mm diameter high tensile wires initially pretensioned to a stress of 1.1 kN/mm^2 are available for circumferential winding. The yield stress of mild steel cylinder is $270N/mm^2$. 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. **15**

8. Write down the design steps according to IS codal provisions for designing a compression member for prestressed concrete for short columns. **15**

No. of Printed Pages : 04 **Roll No. .....**

BB-562

M. Tech. EXAMINATION, May 2018

(Second Semester)

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

CE(SE)

CES504

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.

Unit I

1. What is the basic principle of prestressed concrete ? Also distinguish between the terms (a) Uniaxial (b) Biaxial and (c) Triaxial prestressing ? **15**

2. What are the main factors influencing the design of high-strength concrete mixes ? What are different types of lossses occur in pretensioning ? **15**

Unit II

3. What are the salient design features of prestressed concrete one-way and two-way slab panels ? Also write down the IS codal provisions shear strength of prestressed concrete member. **15**

4. A highway bridge deck slab spanning 8m is to be designed as a one way prestressed concrete slab with parallel post-tensioned cables carrying an effective force of 520 kN. The deck slab is

required to support a UDL live load of 10 kN/m^2. The permissible stresses in concrete should not exceed 25 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 18%. **15**

Unit III

5. A pretensioned prestressed concrete beam having a rectangular section 250 mm × 550 mm, has an effective cover of 50 mm. If f_{ck} = 40 N/mm^2 and f_p = 1750 N/mm^2, and the area of prestressing steel A_p = 400 mm^2. Calculate the ultimate flexural strength of the section using IS : 1343 code provisions. **15**

6. A composite T-beam is made up of a pretensioned rib 400 mm thick and 1000 mm deep and a cast in situ slab of 230 mm thickness and 1300 mm width. The modulus of elasticity of cast in situ slab is 28 kN/mm^2.