8. Design a prestressed concrete cylindrical pipe using a steel cylinder of 1100 mm internal diameter and thickness 2 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 $15N/mm^2$ 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**

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BB562

M. Tech. EXAMINATION, May 2019

(Second Semester)

(B. Scheme) (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 any *Five* questions. Assume any data if missing in the question paper. Use of IS 1343 is allowed.

1. What is thrust line explain its significance with sketches ? Explain the principle of post tensioning in detail. What are post tensioning anchorages ? **15**

2. Explain the concept of internal resisting couple in a prestressed concrete beam supported dead and live loads. What are different types of losses occurs in pretensioning ? **15**

3. A pretensioned prestressed concrete beam having a rectangular section 230 mm × 550 mm, has an effective cover of 50 mm. If f_{ck} = 45 N/mm^2 and f_p = 1750 N/mm^2. Calculate the ultimate flexural strength of the section using IS:1343 code provisions. **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 950 kN. The deck slab is required to support a UDL live load of 22.5 kN/m^2. The permissible stresses in concrete

should not exceed 14 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**

5. Explain with sketches, the stresses developed due to differential shrinkage in composite section. What is differential shrinkage ? Explain its importance in composite construction. **15**

6. A composite T-beam is made up of a pretensioned rib 450 mm thick and 1200 mm deep and a cast in situ slab of 250 mm thickness and 1500 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**

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