T.E – SEM VI (CBGS) (150)

07.06.16

(CIVIL) TRPC

Q.P. Code : 577801

(3 Hours) **[Total Marks : 80**

(1) Question **No.1** is compulsory.
(2) Attempt **any three** questions out of remaining **five** questions.
(3) Assume suitable data wherever required and state it clearly.
(4) Illustrate your answers with neat component sketches wherever required.

1. Attempt the following. **20**
   (a) Explain the various types of losses in pretensioned and post tensioned prestress.
   (b) Define anchorage bond, development bond and flexural bond
   (c) Derive the expression for balanced moment of resistance for a singly reinforced rectangular section
   (d) What are the assumption in Working Stress Method.

2. (a) Design the shear reinforcement in a simply supported beam 230 mm wide, 400mm effective depth carrying a u.d.l of 40 KN/m. The span of beam is 3m. The beam has main tension steel of 6 nos. bar 16 mm dia Use M 20 /Fe 415 **10**
   (b) A prestressed concrete beam 275mm × 400 mm has a span 10m. the beam is 10 prestressed with steel wire of 300 mm² provided at uniform eccentricity of 75 mm with initial prestressed of 1200 N/mm². Determine percentage loss of stress in; i) Pre-tensioning and ii) Post-tensioning. **10**
   Take Es = 210 kN/mm² Ec 35 kN/mm², Creep strain = 42×10^{-6} mm/mm per N/mm² in pretension and 20×10^{-6} mm/mm per N/mm2 in post-tension. Shrinkage strain in concrete = 300×10^{-6} for pretensioned and 220×10^{-6} for post-tensioned. Relaxation of steel stress = 6 % of initial stress. Anchorage slip = 1.? mm, coefficient of ffriction for wave effect K= 0.0015 / m.

3. (a) Design a two way slab for a room having clear dimension of 4 m X 5m. Take live load 2 KN/m². Use M 20 / Fe 415. **10**
   α_x = 0.0879 α_y =0.0572, Draw sketch showing reinforcement details.
   (b) Design a Circular column with Helix to carry 800 kN axial load effective length column is 4 m Adopt WSM for M 25 , σ_{cc} = 6 Mpa and for σ_{sc} = 190 Mpa. **10**

TURN OVER

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4. (a) A doubly reinforced concrete beam is 250mm wide and 500 mm deep from the compression edge to the centre of tensile steel. The area of compression and tensile steel is 1400 mm^2 each. The center of compression steel is 50 mm from the compression edge. If the beam is subjected to a bending moment of 80 kN .m, Determine the stress in concrete, tension steel and compression steel. Take m =10.98. **10**

(b) Explain Pre-tension and Post-tension prestressing systems. **4**

5. (a) Explain the conditions when a doubly reinforced beam is provided. What is moment of resistance of a doubly reinforced beam? **5**

(b) Why high strength concrete and steel is used in prestressed concrete Construction? **5**

(C) A PSC beam of section 120mm wide by 300mm deep is used over an effective span 6m to support a udl of 4 kN/m which includes the self weight of beam. The beam is prestressed by a straight cable carrying a force of 200 kN located at eccentricity of 50 mm. Determine the location of thrust line in the beam and plot its position at quarter and central span section. **10**

6. (a) A prestressed concrete beam 125 mm × 350 mm in size supports u.d.l of 5 kN/m including self weight. The beam is prestressed by a parabolic cable with position 50 mm from soffit at mid span and 150 mm from soffit at support. Consider span as 6m simply supported and the cable carries 200 kN prestressed force. Locate pressure line along the span. **5**

(b) Design the footing for a reinforced concrete column 230 x 450 mm carrying an axial load of 1200 kN, The bearing capacity of soil is 150 kN/m^2.Use M20/Fe 415. **15**