

Code: 9A01807

R09

B.Tech IV Year II Semester (R09) Regular & Supplementary Examinations April 2016

PRESTRESSED CONCRETE

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 Define prestressed concrete. Write its advantages and disadvantages.
- 2 A simply supported beam of cross section 230×500 has a span of 7 m, it is prestressed with an initial prestressing force of 500 kN. A beam has to carry a load of 7 kN/m in addition to its self weight, assuming an efficiency of 85%. Determine the stress distribution in the beam at transfer and at working. Eccentricity of the forces is 120 mm.
- 3 (a) Mention the various losses of prestressing.
(b) A post tensioned concrete beam spanned 10 m has C/S of $300 \text{ mm} \times 500 \text{ mm}$ and is pre-stressed with straight cable of C/S area 320 mm^2 at an eccentricity of 80 mm. Initial stress in the cable is 1000 N/mm^2 . Calculate the total losses, creep coefficient = 1.6, shrinkage strain = 2×10^{-4} , relaxation of steel = 5%, anchorage slip = 1 mm, $E_s = 210 \text{ kN/mm}^2$, $E_c = 35 \text{ kN/mm}^2$.
- 4 A concrete beam with a C/S area of 32000 mm^2 and radius of gyration of 72 mm is prestressed by a parabolic cable carrying an effective stress of 1000 N/mm^2 . The span of the beam is 8 m. The cable composed of 6 wires of 7 mm diameter, has an eccentricity of 50 mm at the centre and zero at the supports. Neglecting all losses, find the central deflection of the beam under:
(a) Self weight and prestress.
(b) Self weight + Prestress + Live load of 2 kN/m.
- 5 (a) Discuss the effect of Tendon profile on deflection of PSC beam.
(b) Explain the design procedure of rectangular section according to IS code.
- 6 A PSC beam having an unsymmetrical I – section has a fibre stress distribution of 13 kN/mm^2 in compression at the top edge and linearly reducing to zero at the bottom edge. The top flange width and thickness of the beam is $2400 \times 400 \text{ mm}$. The bottom flange width and thickness are $1200 \times 900 \text{ mm}$ respectively. The total vertical shear forces in the concrete at the beam section is 2350 kN. Compute and compare the principle tensile stress at the centroidal axis and at the section of the web with the lower flange. Take the web dimension as $600 \times 1000 \text{ mm}$.
- 7 Compute the resultant stress developed in the precast pre-tensioned beam and cast insitu slab for the unpropped case if the modulus of elasticity of concrete in slab and beam are different. Assume E_c (Prestressed beam) = 35 kN/mm^2 . Assume any dimensions for beam of slab.
- 8 (a) List the factors affecting deflection of PSC beams.
(b) Write the procedure of determining short term and long term deflections of PSC beams.
