

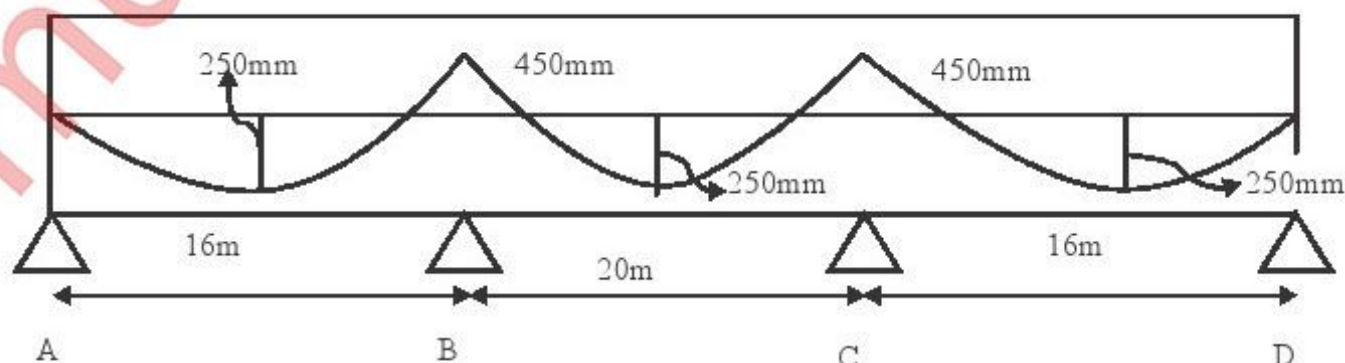
MAY 2016
(REVISED COURSE)
(3 Hours)

QP Code : 31466
[Total Marks : 80]

- N.B.: (1) Question no.1 is compulsory, maximum duration 3hrs
(2) Solve any three from remaining five questions.
(3) Assume suitable data if required.
(4) Use of IS-1343 is permitted.

1. (a) (i) The grade of concrete for prestressed members should be in the range of 1
(1) M-20 to M-30 (2) M-80 to M-100 (3) M-30 to M-60
- (ii) In a concrete beam subjected to prestress, dead and live loads the pressure line. 1
(1) shifts more at centre span and zero at support (2) Coincide with the cable line.
(3) Shifts uniformly towards top of beam as load increases.
- (iii) Short term deflection of a prestressed beam can be computed using 1
(1) three moment theorem. (2) Mohr's theorem. (3) Moment distribution method.
- (iv) Failure of under reinforced prestressed concrete beam can be identified by 1
(1) Very few cracks near centre of span.
(2) Very little deflections.
(3) large number of cracks with large deflections.
- (v) For a bonded prestressed concrete beam at failure the effective reinforcement ratio according to 1
IS: 1343 is limited to a value of
(1) 0.15 (2) 0.4 (3) 0.25
- (vi) Horizontal prestressing of concrete beams. 1
(1) has no effect on the shear strength (2) Increases the shear strength (3) Reduces the shear strength

- (vii) Transfer of prestress in pretensioned members is due to 1
 (1) shear resistance (2) Bearing on end face (3) Bond between concrete and steel
- (viii) Stress distribution in the anchorage zone of a post tensioned PSC beam is 1
 (1) biaxial (2) Uniaxial (3) triaxial
- (ix) The minimum prestressing force is a function of 1
 (1) range of stress at top fibre (2) range of stress at bottom fibre
 (3) Range of stress at top and bottom fibre
- (x) The clear cover to cables in a PSC post tensioned girder should not be less than 1
 (1) 50mm (2) 35mm (3) 50mm
- (b) Write short note on advantages of prestressed concrete 5
 (c) Write short note on advantages of continuous members in PCS 5
2. (a) A rectangular concrete beam of c/s 250mm*350mm is prestressed by means of 15 wires of 6mm diameter located 60mm from the bottom of the beam and 5 wires of dia. 8mm 50mm top Assuming prestress in steel as 1000N/mm². Calculate the stresses at the extreme fibres of the mid span section, when the beam is supporting its own weight over a span of 5m. If a u.d.l of 5kN/m is imposed. Determine the maximum working stress in concrete. 10
- (b) A prestressed concrete beam with rectangular section 120mm by 300mm deep supports a u.d.l of 5kN/m including self wt. of the beam. The effective span is 6m. The beam is concentrically prestressed by a cable carrying a force of 180kN. Locate the position of pressure line in the beam. 10
3. (a) Write short note on various losses in pretensioning and post tensioning? 5
 (b) A prestressed concrete beam having size 230×400mm is prestressed with wires (area = 320mm²) located at a constant eccentricity of 55mm and carrying an initial stress of 1200N/mm² the span of beam is 10m. Calculate the percentage loss of stress in wires if (i) The beam is pretensioned (ii) The beam is posttensioned Use the following data : 15
 $E_s = 210\text{KN/mm}^2$ and $E_c = 35\text{KN/mm}^2$ relaxation of steel stress = 5% of initial stress. Shrinkage of concrete = 300×10^{-6} for pretensioning and 200×10^{-6} for post tensioning creep coefficient = 1.6 slip at anchorage = 1mm, frictional co-efficient for wave effect = 0.0015/m
4. (a) A prestressed concrete beam having a rectangular section 100mm wide and 200mm deep spans over 3m. The beam is prestressed by a straight cable containing five wires of 5mm diameter stressed to 1100N/mm² at an eccentricity of 40mm. Assume the modular ratio $a = 6.2$. If the modulus of elasticity of concrete is 34KN/mm² and the modulus of rupture is 4N/mm² Calculate the maximum deflection of the beam at the following stages : 15
 (i) prestress + self wt. of the beam (ii) prestress + self wt. + imposed load of 8 KN/m
 (iii) Cracking load (iv) 1.46 times the working load
- (b) Explain safe cable zone in prestressed concrete members 5
5. Determine equivalent upward load and hence locate pressure line, is It concordant cable? If not make concordant by linear transformation. The beam is symmetrically prestressed by a cable carrying 4500kN prestressing force. 20



6. (a) Explain the stress distribution in the end block 5
- (b) State and explain principle of prestressing. What is difference between service and transfer stage 5
- (c) Calculate the efficiency of the section : 10
- I-section top flange : $400 \times 200\text{mm}$ bottom flange $200 \times 200\text{mm}$ web : $100 \times 600\text{mm}$
overall depth = 1000mm
- Tea section flange $600 \times 250\text{mm}$ web $750 \times 100\text{mm}$ overall depth = 1000mm

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