

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

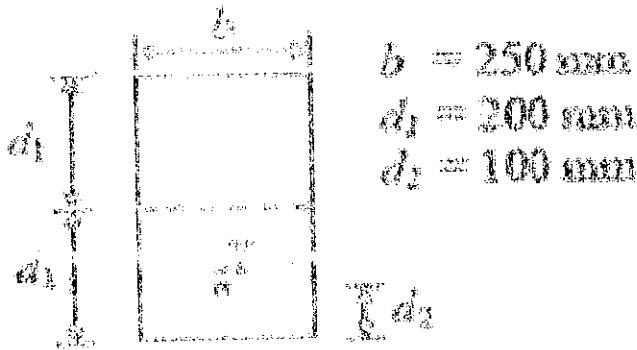
Q.No	Question	CO	Marks
Q1.	A prestressed concrete beam 400mm wide and 600mm deep has a span of 6m. The beam is prestressed with a straight tendon with $e=0$ at ends and $e=150$ mm at the center of the span. The beam has to sustain concentrated a live load of 180kN at mid span. Calculate the extreme fiber stresses for the mid span section if effective prestressing force is 1200kN.	1	5
Q2.	A rectangular prestressed concrete beam of size 200 mm \times 400 mm and effective span 12 m is post tensioned by a cable with an initial stress of 1200 N/mm ² from one end. The circular cable is concentric at supports and has an eccentricity of 120 mm at midspan. Coefficient of friction due to curvature effect is 0.5 and coefficient of friction for wobble effect is 0.0015 per m. Calculate the loss of prestress due to friction	3	5
Q3.	<p>In a pre-stressed concrete beam section shown in the Fig. 1, the net loss is 10% and the final pre-stressing force applied at X is 750 kN. Calculate the initial fiber stresses (in N/mm²) at the top and bottom of the beam.</p>  <p>$b = 250 \text{ mm}$ $d_1 = 200 \text{ mm}$ $d_2 = 100 \text{ mm}$</p>	2	4

Fig. 1

Q4.	A pretensioned concrete electric pole with a uniform circular cross-section, stands 10 metres high above the foundation block, and is subjected to an unbalanced horizontal pull of 2500 N at the top. Design a suitably axially prestressed section so that there are no tensile stresses, and the maximum compressive stress in concrete does not exceed 15 N/mm^2 .	4	5
Q5.	A prestressed concrete beam of rectangular section is 125 mm wide and 250 mm deep and has a span of 6 m. The beam is provided with a straight tendon at a uniform eccentricity of 40 mm, the prestressing force being 190 kN. Find the deflection at the centre. i) under the action of prestress and dead load of the beam. ii) under the action of prestress, dead load and a live load of 3.75 kN/m and including the effect of creep and shrinkage, taking the creep coefficient as 1.75. Compare these deflections with the permissible limits as per IS	3	5
Q6.	Deduce an equation to calculate the central sag "h" of a suspended parabolic cable profile on a beam of length l and carrying a load w per m. Determine the eccentricity e of a load balancing cable for a beam of span 8m carrying a udl of 50 kN/m including self weight. Prestressing force is 1500kN. Beam section $300 \text{ mm} \times 800 \text{ mm}$.	2	5
Q7.	Short Answer type a) State any two advantages of prestressed concrete over reinforced concrete? b) What is the need for the use of high strength concrete and tensile steel in prestressed Concrete? c) Justify with an example the loss of prestress in post tensioned members due to elastic shortening when wires are pulled subsequently.	1	6