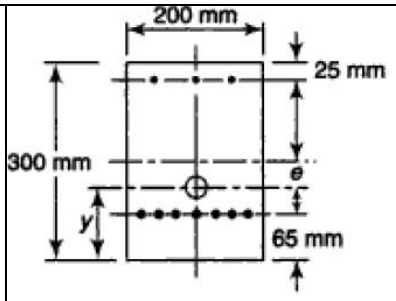
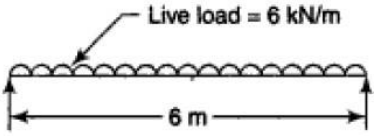
UNIT-III

S.No	Questions	BTL	CO	PO
	Part–A(Short Answer Questions)			
1	What are the three approaches to analyze a prestressed member at transfer and under service loads?	L1	CO3	PO1
2	Brief the term load balancing concept.	L1	CO3	PO1
3	What is meant by cracking moment?	L1	CO3	PO1
4	What is meant by linear transformation of the cable?	L1	CO3	PO1
5	What is the meant by line of prestress (or) CGS line?	L1	CO3	PO1
6	What is concordant cable?	L1	CO3	PO1
7	What is known as kern zone and pressure line?	L1	CO3	PO1
8	How prestressed concrete structures are classified under limit state of severability?	L2	CO3	PO2
9	What are the methods used for obtaining shear bond?	L1	CO3	PO1
10	What is meant by primary moment and secondary moment?	L1	CO3	PO1
11	What are the advantages of statically indeterminate prestressed concrete structures?	L1	CO3	PO1
12	List out the assumptions for analysis of members under flexure for ultimate strength.	L1	CO3	PO1
13	Show the stress distribution in a section of PSC beam for concentric and eccentric tendons.	L2	CO3	PO2
	Part–B (Long Answer Questions)			
1	A PSC beam supports an imposed load of 5kN/mm^2 over a simply supported span of 10m.The beam has an I section with an overall depth of 450mm.Thickness of flange and web are 75mm and 1000mm respectively. The flange width is 230mm. the beam is prestressed with an effective prestressing force of 350kN at a suitable eccentricity such that the resultant stress at the soffit of the beam at mid span is zero. Find the eccentricity required for the force.	L3	CO3	PO3
2	A pretensioned T section has a flange width of 1200mm and 150mm thick. The width and depth of the rib are 300mm and 1500mm respectively. The high-tension steel has an area of 4700mm^2 and is located at an effective depth of 1600mm. If the characteristic cube strength of the concrete and the tensile strength of steel are 40 and 1600MPa respectively; calculate the flexural strength of the section.	L4	CO3	PO3
3	A PSC beam 500 x 800mm deep has S.S span of 10m. It is prestressed with the linear bent tendon with zero eccentricity and an eccentricity of 200mm below the axis of mid span. The beam carries a concentrated load of 150kN at centre besides its self-weight. Compare the extreme fibre stress at mid span using stress concept and load balancing concept?	L3	CO3	PO3

4	  A rectangular beam of cross section 30cm deep and 20cm wide is prestressed by means of 15 wires of 5mm diameter located 6.5cm from the bottom of the beam and 3 wires of diameter 5mm, 2.5cm from the top. Assuming the prestress in steel as 840N/mm^2, calculate the stresses at the extreme fibres of the mid span section when the beam is supporting its own weight over a span of 6m. If a uniformly distributed live load of 6kN/m is imposed, evaluate the maximum working stress in concrete. The density of concrete is 24kN/m^3.	L4	CO3	PO3
5	A rectangular concrete beam 100mm wide & 250mm deep spanning over 8m is prestressed by a straight cable carrying effective prestressing force of 250kN located at an eccentricity of 40mm. The beam supports a live load of 1.2kN/m. a) Calculate the resultant stress distribution for the centre of the span cross section of the beam assuming the density of concrete as 24kN/m^2 b) Find the magnitude of prestressing force with an eccentricity of 40mm which can balance the stresses due to dead load & live load at the soffit of the centre span section.	L4	CO3	PO3
6	A PSC beam of effective span 16m is of rectangular section 400mm wide and 1200mm deep. A tendon consists of 3300mm^2 of strands of characteristic strength of 1700N/mm^2 with an effective prestress of 910N/mm^2. The strands are located 870mm from the top face of the beam. If f_{cu}=60N/mm^2. estimate the flexural strength of the section as per IS1343 provisions for the following cases: (i) Bonded tendons (ii) Unbonded tendon	L3	CO3	PO3
7	The cross section of a prestressed concrete beam is an unsymmetrical T- section with an overall depth of 1300mm. thickness of web is 150mm. Distance of top and bottom fibres from the centroid are 545mm and 755mm respectively. At a particular section, the beam is subjected to an ultimate moment M = 2130kNm and a shear force V=237kN. Effective depth d = 1100mm, fck = 45N/mm^2, f_{ep}=19.3 N/mm^2, I=665x10^{8}mm^4, A^p= 2310mm^2, fp=1500N/mm^2, f_{ep}=890N/mm^2. Estimate the flexural-shear resistance using IS code.	L2	CO3	PO2
8	The cross-section of a symmetrical I-section prestressed beam is 400mm by 750mm (overall), with flanges and web 250mm thick. The beam is post-tensioned by cables containing 45 wires of 5mm diameter high- tensile steel wires at an eccentricity of 350mm. The 28-days strength of concrete in compressing is 40 N/mm^2 and the ultimate tensile strength of wires is 16500N/mm^2. Assuming that the grouting of the tendons is 100 percent effective,	L4	CO3	PO3

	determine the ultimate moment of the section as per IS 1343.			
9	A pretensioned T section has a flange width of 300mm and 200mm thick. The width and depth of the rib are 150mm and 350mm respectively. The effective depth of cross section is 500mm. Given Ap=200 mm^2, fck=50N/mm^2 and fp=1600N/mm^2. Estimate the ultimate moment capacity using the IS code regulations.	L2	CO3	PO2
10	A post tensioned concrete T beam with unbounded tendons is made up of a flange 300mm wide and 150mm thick and width of rib is 150mm. The effective depth of section is 320mm. The beam is prestressed by 24 wires each of 5 mm diameter having the characteristic strength of 1650N/mm^2.The effective stress after loss is 900 N/mm^2.If the cube strength of concrete is 56 N/mm^2. Estimate the flexural strength of the section. Take L/d =20	L2	CO3	PO2
11	A pre tensioned beam of rectangular section 300mm wide by 650mm deep is stressed by 800mm^2 of high tensile steel at an effective depth of 600mm. The beam is provided with two 25mm diameter, high yield strength deformed bars both at the tension and compression faces with an effective cover of 50mm. Given f_c= 40N/mm^2, f_{pu}=1600N/mm^2, f_y= 460N/mm^2 and (f_{py}/f_{pu}) =0.9, estimate the ultimate moment capacity of the section using ACI provision.	L2	CO3	PO2
12	The support section of prestressed concrete beam, 100 mm wide by 250 mm deep, is required to support an ultimate shear force of 80 KN. The compressive prestress at the centroidal axis is 5 N/mm^2. The characteristic cube strength of concrete is 40 N/mm^2. The cover to the reinforcement is 50 mm. if the characteristic tensile strength of stirrups is 415 N/mm^2, design suitable shear reinforcement in the section using IS code recommendations.	L6	CO3	PO4

Blooms Taxonomy Level (BT) (L1–Remembering; L2–Understanding; L3–Applying; L4– Analyzing; L5–Evaluating; L6–Creating)