JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2025

M.Tech-II Semester (SE)

COURSE CODE (CREDITS): 12M1WCE231 (3) MAX. MARKS: 25

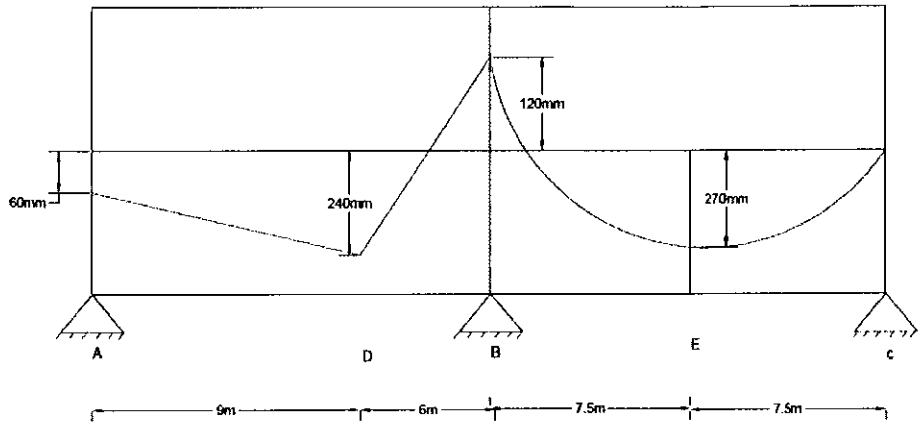
COURSE NAME: PRESTRESSED CONCRETE DESIGN

COURSE INSTRUCTORS: DR. SAURAV MAX. TIME: 1.5 Hour

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.	Derive an equation to find the Loss of prestress due to friction in a post tensioned member. On what factors wobble in the tendon is effected?	**3**	**4**
Q2.	A pretensioned beam 250 mm wide and 360 mm deep is prestressed by 10 wires of 8 mm diameter initially stressed to 1000 N/mm^2. The centroid of the steel wires is located at 105 mm from the soffit. Determine maximum stresses in concrete immediately after transfer allowing elastic shortening of concrete only at the level of the centroid of the steel. If however the concrete is subjected to additional shortening due to creep and shrinkage and the steel is subjected to relaxation of stress of 5%, find the final percentage loss of stress in the steel wires. Take E_s= 210kN/mm^2, E_c= 36.85 kN/mm^2, creep coefficient ϕ= 1.60, Total residual shrinkage strain = 3×10^{-4}	**3**	**5**
Q3.	A rectangular concrete beam 250 mm wide and 600 mm deep is pre-stressed by means of 16 high tensile wires, each of 7 mm diameter, located at 200 mm from the bottom face of the beam at a given section. If the effective pre-stress in the wires is 700 MPa, what is the maximum sagging bending moment (in kNm) due to live load that this section of the beam can withstand without causing tensile stress at the bottom face of the beam? Neglect the effect of dead load of beam.	**4**	**4**

Q4.	A continuous prestressed concrete beam as shown in the **Fig 1**. The tendon has an eccentricity at A and is bent sharply at D and B and has a parabolic profile for the span BC. Locate the pressure line due to prestress alone. P= 1000kN.  **Fig. 1**	**3**	**7**
Q5.	A rectangular concrete beam of cross-section 150 mm wide and 300 mm deep is simply supported over a span of 8 m and is prestressed by means of a symmetric parabolic cable, at a distance of 75 mm from the bottom of the beam at mid span and 125 mm from the top of the beam at support sections, If the force in the cable is 350 kN and the modulus of elasticity of concrete is 38 kN/mm^2 calculate; (a) The deflection at mid-span when the beam is supporting its own weight and (b) The concentrated load which must be applied at rnid-span to restore it to the level of supports.	**4**	**5**