JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2026

M.Tech-II Semester (SE)

COURSE CODE (CREDITS): 25M11CE214 (3) MAX. MARKS: 15

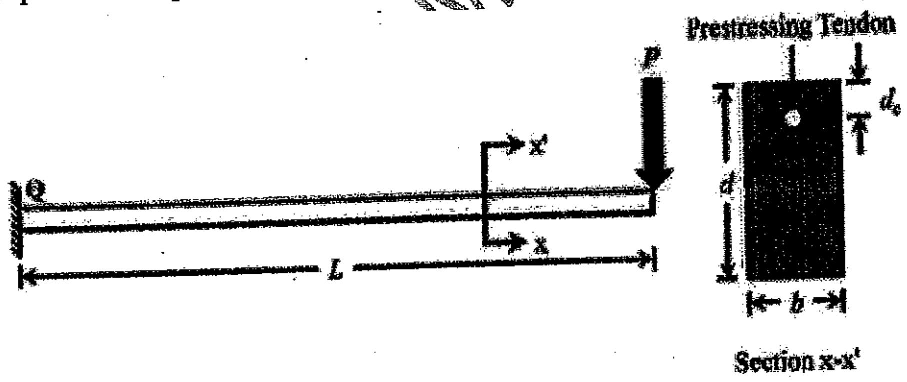
COURSE NAME: PRESTRESSED CONCRETE DESIGN

COURSE INSTRUCTORS: DR. SAURAV MAX. TIME: 1 Hour

Note: *(a) All questions are compulsory.*

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

(c) Use of Non programmable calculator is allowed.

Q.No	Question	CO	Marks
Q1	A prismatic cantilever prestressed concrete beam of span length, L = 1.5 m, has one straight tendon placed in the cross-section as shown in the following Fig. 1. (not to scale). The total prestressing force of 50 kN in the tendon is applied at dc = 50 mm from the top in the cross-section of width, b = 200 mm, and depth, d = 300 mm. If the concentrated load, P = 5kN, Determine the sum of resultant stress at Bottom fibre to top fibre experienced at point 'Q'? Ignore self weight of the beam.  **Fig. 1**	2	4
Q2	A rectangular concrete beam 250 mm wide and 600 mm deep is prestressed by means of 16 high tensile steel wires, each of 7 mm diameter, located at 200 mm from the bottom face of the beam at a given section. If the effective prestress in the wires is 700 MPa, (a) Determine the maximum sagging bending moment that the beam section can resist without developing tensile stress at the bottom fiber. (b) Using your result from part (a), evaluate the magnitude of uniformly distributed live	2	5

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	load that can act on an 8 m span beam to produce this moment.		
Q3.	Analyze the loss of prestressing force in a tendon during the tensioning process caused by friction. Derive the mathematical expression used to evaluate the variation of prestress along the length of the tendon, and support your derivation by drawing appropriate diagrams. Further, *explain* the mechanisms responsible for: **(a)** length (wobble) effect **(b)** curvature effect and interpret their influence on the prestress distribution in a prestressed concrete member, using relevant figures wherever necessary. **ii)** A Post-tensioned beam 400 mm × 600 mm and 10 m long is provided with straight tendons which are tension to 1050 N/mm^2 at the jacking end. Find the loss of pre-stress due to wobbling effect (i) at the mid span and (ii) at the end remote of the jack. Take k= 0.3 per 100 metre	3	6