

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION SP/2025)

CLASS: B.TECH
BRANCH: CIVIL

SEMESTER : VI/ADD
SESSION : SP/2025

SUBJECT: CE414 PRE-STRESSED CONCRETE

TIME: 02 Hours

FULL MARKS: 25

INSTRUCTIONS:

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates.
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		CO	BL
Q.1(a)	Why high strength concrete is preferred in prestressed concrete?	[2]	1 K1
Q.1(b)	Mention the advantages of prestressed concrete.	[3]	1 K1
Q.2(a)	Mention the types of prestressing.	[2]	2 K2
Q.2(b)	A prestressed concrete beam 500mm x 750mm has a simple span of 7.3 m loaded by a uniform load of 45 kN/m including its self-weight. The prestressing tendon is parabolically curved having an eccentricity of 150 mm at the centre of the span and zero at the end supports. The effective force in the tendon is 1600 kN. Compute the extreme fibre stresses at mid span section by using stress concept.	[3]	2 K2
Q.3(a)	A rectangular concrete beam 250 mm wide and 300 mm deep is prestressed by a straight cable of force of 540 kN at a constant eccentricity of 50 mm. The beam supports a uniformly distributed load of 5 kN/m (Inclusive Self weight) over a span of 5.5 m. Determine the location of the pressure line at the (a) mid span of beam (b) quarter span of beam	[2]	2 K2
Q.3(b)	A prestressed concrete beam 350mm x 720mm has a simple span of 10 m loaded by a uniform load of 35 kN/m excluding its self-weight. The beam is prestressed by an effective prestressing force of 1750 kN. The profile of the tendon is parabolic, with no eccentricity at the ends and 200 mm eccentricity at centre of span. Find the stress at extreme fibres at 4 m from one end by using (a) load balancing method (b) Pressure line method	[3]	2 K2
Q4.	A post-tensioned beam supports a uniformly distributed load of 5 kN/m over a simply supported span of 10 m. The beam has an 'I' section with an overall depth of 450 mm. The thickness of flanges and web are 75 mm and 100 mm respectively. The width of the flanges is 230 mm. The beam is prestressed by an effective prestressing force of 350 kN. The profile of the tendon is parabolic, with no eccentricity at the ends and 100 mm eccentricity at centre of span. Evaluate (a) The kern levels at top and bottom (b) Cracking moment. (c) Cracking load (d) FOS against cracking Tensile strength of concrete is 5.6 N/mm ² .	[5]	2 K2
Q.5(a)	List the various types of loss of prestress in pre-tensioned and post tensioned members.	[2]	3 K1
Q.5(b)	A pretensioned concrete beam, 100 mm wide and 300 mm deep is prestressed by straight wires carrying an initial force of 150 N with an eccentricity of 50 mm. Estimate the percentage loss of stress due to elastic deformation of concrete if the area of steel wire is 188 mm ² . using the following data: Es = 210 kN/mm ² , Ec = 35 kN/mm ²	[3]	3 K2