

B. Construction Engineering 3rd Year 2nd Semester Examination 2022

PRE-CAST & PRE-STRESSED CONCRETE

Part I

Use **Separate Answer Script** for Each Part

Answer **All** Questions. Assume any suitable data not provided.
Answer should be explained with Neat Sketches.

1. (a) Discuss **Principle** of Pre-stressed concrete from Elastic Concept. 8
- b) Discuss on the failure of early attempts of Pre-stressing with **Mild Steel** 7
- c) Distinguish conceptually between **Pre-Stressed Concrete and RCC** 8

2. An **I beam** is used to support live load of 28 KN/m over a simple supported span of 25 meters. The size of the flanges is 800 x 200 mm at top and 400 x 400 at bottom. The overall depth of the pre-stressed beam is 1250 mm. Thickness of the web is 150 mm. Assume density of concrete is 25 KN/m³. Initial pre-stressing forces each of 1400 KN applied through the cable duct of 100 mm diameter. The centres of the duct are located at 200 mm above the soffit (bottom) of the beam at mid span. Calculate the stresses at transfer and final stages at top and bottom fibres at mid span. Assume 3% loss due to slip and Total loss of pre-stress of 16 % at the final stage. 25

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Subject: Precast & Prestressed Concrete

Total Time: Three hours

Full Marks: 70

(Part-II), Full Marks-50

Answer Question No. 1 and any three from the rest.

1. [5]	[1] Answer any two from (a)–(e) in this block a. Tendon & Axial prestressing. b. Anchorage c. Degree of prestressing d. Duct e. Loss of Prestress
2. [15]	A rectangular concrete beam of cross section 50cm deep & 25 cm wide is prestressed by means of 18 wires of 5mm dia located 6 cm from the bottom of the beam & 3 wires of diameter of 5mm, 5 cm from the top. Assuming the prestress in the steel as 1000 N/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 10m. Take UDL= 15KN/m. density of concrete= 25KN/m ³ [15]
3. [15]	(a) A rectangular concrete beam of cross section of 600× 250 is prestressed by means of 18 wires of 5mm dia located 6 cm from the bottom of the beam & 3 wires of diameter of 5mm, 4 cm from the top. Assuming the prestress in the steel as 1200 N/mm ² . Calculate the percentage loss of stress in steel due to elastic deformation of concrete.[15]
4. [15]	a) A Prestress concrete beam of rectangular section 250 mm wide and 500 mm deep spans over 10m. the beam is prestressed by a straight cable carrying an effective force of 500 KN at an eccentricity of 50 mm. if its supports an imposed load of 20KN/m and the modulus of elasticity of concrete is 38KN/mm ² , compute the deflection at the following stages and check whether they comply with the IS Code specification.(i)Upward deflection under (Prestress + self-weight) (ii)Final downward deflection under (Prestress+ Self-weight + imposed load) including the effects of creep and shrinkage, and total loss is 15%. Assume the creep coefficient is 1.80. [10]. b) If imposed load of 15 KN/m calculate the resultant stress at top and bottom of the beam at B. Locate also the resultant line of thrust through the beam AB. [5]
5. [15]	Prestressed concrete beam of section 250×500 mm deep is Prestressed by force of 600 KN at a constant eccentricity of 60 mm. the beam is supported a concentrated load of 120KN at the center of a span of 4 meter from one support. Determine the location of the pressure line at the center, quarter span and support section of the beam. Neglect the self-weight of the beam. Show also the Sketches. [15]