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M. TECH.
FIRST SEMESTER THEORY EXAMINATION, 2016-2017
PRE-STRESSED CONCRETE

Time: 3Hours *Max. Mark: 70*

Note: Attempt all questions. All questions carry equal marks.

1. Attempt any two parts of the following: (2x7=14)

a) Explain the stresses at anchorage and Magnel's method**.**
b) (i) Where do you adopt circular pre-stressing?
(ii) What is debonding?
c) Differentiate between following
(i) Concentric and Eccentric pre-stressing.
(ii) Full and partial pre-stressing.

2. Attempt any two parts of the following: (2x7=14)

a) What are the main factors influencing the design of high-strength concrete mixes?
b) Distinguish between the terms, stress relaxation, stress corrosion and hydrogen embrittlement with reference to high-tensile steel.
c) A rectangular concrete beam of cross section 30cm deep and 20 cm wide is pre-stressed by means of 15 wires of 5 mm diameter located 6.5 cm from the bottom of the beam and 3 wires of diameter of 5 mm, 2.5 cm from the top. Assuming the pre-stress in the steel as 840 N/ mm^2, calculate the stresses at the extreme fibres of the mid-span section when the beam is supporting is own weight over a span pf 6 m. If a uniformly distributed live load of 6 kN/m is imposed, evaluate the maximum working stress in concrete. The density of concrete is 24 kN/m^3.

3. Attempt any two parts of the following: (2x7=14)

a) What are the factor influencing the creep and shrinkage of concrete?
b) A pre-stressed concrete beam with a rectangular section 120 mm wide by 300 mm deep supports a uniformly distributed load of 4 kN/m, which includes the self weight of beam. The effective span of the beam is 6 m. the beam is concentrically pre-stressed by a cable carrying a force of 180 kN. Locate the position of the pressere line in the beam.
c) The cross section of a pre-stressed concrete beam used over a span of 6 m is 100 mm wide and 300 mm deep. The initial stress in the tendons located at a constant eccentricity of 50 mm is 1000 N/ mm^2. The section area of the tendons is 100 mm^2. Find the percentage increase in stress in the wires when the beam supports a live load of 4 kN/m. the density of concrete is 24 24 kN/m^3.

4. Attempt any two parts of the following: **(2x7=14)**

a) What is the 'pressure or thrust line'? Explain its significance with sketches.
b) How do you compute the various loss of pre-stress in pre-tensioned and post-tensioned members?
c) A pre-stressed concrete beam , 200mm wide and 300 mm deep, is pre-stressed with wires(area= 320 mm^2) located at a constant eccentricity of 50 mm and carryin an initial stress of 1000 N/mm^2. The sapan of the beam is 10 m. calculate the percentage loss of stress in wires if (a) beam is pre-tensioned, and (b) the beam is post-tensioned. Assume the necessary data.

5. Attempt any two parts of the following: **(2x7=14)**

a) Explain with sketches 'Hoyer's long line system of pre-tensioning.
b) What are the different types of flexural failure modes observed in pre-stressed concrete beams? Explain with sketches.
c) Distinguish the clearly between short-term and long-term deflections of pre-stressed concrete beam.