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2005 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

III B.TECH. I SEMESTER REGULAR EXAMINATIONS
CONCRETE TECHNOLOGY AND PRESTRESSED CONCRETE
(CIVIL ENGINEERING)

NOVEMBER -2005

TIME: 3 HOURS
MARKS: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Explain in detail the formation of Bouge's compounds
.
(b) Discuss the effect of Tricalcium Silicate on the setting properties of cement.

2. Bring out the detailed classification of aggregates and explain each one of them briefly.

3. (a) Define the term creep of concrete and explain the same.

(b) Describe the laboratory test for the measurement of creep of con crete.

4. (a) Discuss the various requirements as per ACI method, for w/c ratio and strength for special exposure conditions.

(b) Discuss the various factors in the choice of Mix Proportions.

5. A prestressed concrete beam section is 250 mm wide and 300 mm deep. The initial prestressing force is 450 KN at an eccentricity of 60 mm. The beam has a span of 5.75 m and has to carry a superimposed load of 7.50 KN/m. Analyse the beam section for the stresses produced at mid span before and after the application of the live load. Allow a loss of prestress at 15 % . Take weight of concrete equal to 24KN/m3.

6. (a) A concrete beam is post tensioned by cable carrying an initial stress of 1075MPa. The slip at the jacking end was observed to be 6mm. Estimate the percentage loss of stress due to anchorage slip if the length of beam is 12m. Take ESt= 206kN/mm2.

(b) A post tensioned cable of a beam 10m long is initially tensioned to a stress of 1050 MPa at one end. If the tendons are curved so that the slope is 1 in 22 at each end with cross sectional area of 620mm2. Calculate the loss of prestress due to friction using the following data.

i. Coefficient of friction = 0.52

ii. Friction coefficient for wave effect = 0.0015 per m During anchoring if there is slip of 4mm at the jacking end, calculate the final force in the cable and the percentage loss of presteress.

7. A prestressed concrete beam 200 mm wide and 300 mm deep is used an effective span of 5m to support an imposed load of 5kN/m. The density of concrete is 24kN/m3. At the quarter span section of the beam, find the magnitude of

(a) The concentric prestressing force necessary for zero fibre stress at the soffit when the beam is fully loaded and

(b) The eccentric prestressing force located 100 mm from the bottom of the beam, which would modify the bottom fibre stress due to loading.

8. The horizontal stress at the centroid of a prestressed concrete beam of rectangular cross section is 125 mm x 250 mm is 7N/mm2 and the maximum shearing force on the beam section is 68 KN. Find the principal tensile stress. Also find the minimum vertical prestress required to eliminate this principal tensile stress.

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