Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER- II(New course) • EXAMINATION (Remedial) - WINTER- 2015

Subject Code: 2722011

Date: 10/12/2015

Subject Name: Prestressed Concrete

Time: 2:30 pm to 5:00 pm

Instructions:

Total Marks: 70

- 1. Attempt all questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- 4. Use of IS: 1343 and IS: 3370 part 3 is permitted.
- 5. 5. Assume density of concrete as 24 kN/m³ until otherwise stated.
- Q.1 (a) Enlist the types of losses in Prestressed concrete. Explain any one of them. 07
 - (b) Explain the how Prestressed concrete pole is preferred. Explain its 07 advantages and disadvantages. Draw typical cross section to be used.
- Q.2 (a) Differentiate Prestressed concrete and partially Prestressed concrete. Which 07 is better and why?
 - (b) Enlist various Prestressing systems and explain any one which is used in 07 posttensioned beams.

OR

- (b) A rectangular beam cross section B x D has a Prestressing cable at 07 eccentricity ÷e∅ carries bending moment M and shear force S. If effective prestress force at section is P, Determine the expression for maximum shear stress at mid-section and soffit section.
- Q.3 A cylindrical Prestressed concrete water tank is required to store 4 lacs litres of water. Ratio of diameter to height = 3.5. The maximum compressive stress in concrete at transfer is 13.5 MPa (Compression) and the minimum compressive stress under working load is 1.1 MPa. The loss ratio is 0.78. Wires of 5 mm diameter with an initial stress of 1200 MPa are available for circumferential winding and Freyssinet cables made up of 14 wires of 7 mm diameter stressed to 1300 MPa are to be used for vertical Prestressing. Design the tank walls assuming the base as hinged. The cube strength of the concrete is 45 MPa.

OR

- Q.3 (a) A rectangular beam of span 9 m and cross-section 350 x 600 mm is 07 Prestressed by a parabolic cable with zero eccentricity at end and 120mm eccentricity at centre by a Prestressing force 1200kN. The beam carries a live load 45 kN/m all over its span. Calculate top and bottom fibre stress at centre of span.
 - (b) Derive expression for contribution of Prestressing force in resisting shear 07 force when cable profile is (i) Parabolic (ii) Linear with zero eccentricity at end and eccentricity -eøat centre.

Design a post tensioned simply supported I- section beam having canter to canter span 25m. The beam carries a uniformly distributed load of intensity 60 kN/m. The concrete strength at transfer is 40MPa and at service loads is 50 MPa. Assume parabolic cable profile and prestress losses as 12%. Propose a suitable cross section, cable profile and amount of Prestressing steel for flexure at the canter of span. The beam is Prestressed by steel having characteristic strength 1750MPa. Design for flexure only

OR

Q.4 (a) Explain load balancing concept in beams

Q.4

- (b) What are bursting stresses in anchorage zone? Draw and explain the stress 07 contours in anchorage zone.
- Q.5 A cylindrical pipe of diameter 800mm carries pressurized water supply at working pressure 1.6 N/mm². If the wall is to be Prestressed then find the pitch of 2.5 mm diameter wires if initial prestress is be limited to 1000 N/mm². Take cube strength at transfer is 35N/mm². Find safety factor against cracking at working stage if residual compression in concrete is required to be 2 N/mm². Assume prestress losses as 18 % and cube strength at working stage as 40 N/mm². Check the safety under pipe empty and full conditions.

OR

- Q.5 (a) Define and explain in brief following terms used in Prestressed concrete: (1) 07 Tendon (2) Bonded Prestressed concrete and (3) Transfer.
 - (b) A simply supported Prestressed concrete beam having rectangular section 07 300 x 550mm, spans over 8m. The beam is Prestressed by a straight cable at eccentricity 130 mm. Working load over beam is 15 kN/m. Determine central deflection of beam at transfer stage: Prestressing force 250 kN and characteristic cube strength 40 MPa.

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