Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – SUMMER • 2013

Subject code: 712007N **Date: 17-06-2013**

Subject Name: Pre Stressed Concrete

Time: 10.30 am – 01.00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Explain the term prestressed concrete and mention the differences between normal concrete and prestressed concrete. Which are the advantages of using prestressed concrete?	**07**
	(b)	Explain in detail all strength aspects of prestressed concrete. Which are the materials used in prestressed concrete technique? Give reasons.	**07**
Q.2	**(a)**	Explain losses in the prestressed concrete techniques in detail.	**07**
	(b)	Enlist and explain in detail all the zones of a prestressed concrete member according to IS: 1343. Explain the bursting tensile force in end zone of a member in detail.	**07**
		OR	
	(b)	Explain limit state design of prestressed members with all major limit states. Explain limit state of collapse with flexure, compression, tension and shear.	**07**
Q.3	**(a)**	A beam of rectangular section with following details is to be analyzed for extreme fiber stresses at mid span section. Calculate stresses and draw the stress diagram, when Beam = 230mmx 460mm, Span = 6m, Total UDL =7kN/m, Pre stressing wires = 15 no. of 6mm diameter, located at 75mm above bottom, Pre stress in steel = 850N/mm^2.	**07**
	(b)	Enlist all important limit states of serviceability of a pre stressed beam according to IS: 1343. Discuss all in detail.	**07**
		OR	
Q.3	**(a)**	What is pre tensioning and post tensioning of a concrete member? Clearly differentiate between them as pre stressing methods.	**07**
	(b)	A beam of rectangular cross section of 230mm x 510mm is pre stressed by a cable carrying effective force of 225kN at an eccentricity of 80mm. The beam is subjected to the UDL of 3.5kN/m load for entire span of 6m. If the modulus of rupture of concrete is 4.5N/mm^2, find the cracking moment of the beam where the self weight of beam is 25kN/m^3.	**07**
Q.4	**(a)**	Clearly explain the advantages and disadvantages of partial pre stressing.	**07**
	(b)	A pre tensioned concrete rectangular beam of size 300mmx460mm has an effective cover of 50mm. Calculate the flexural strength of the section as per the IS:1343 F_{ck} =40N/mm^2,F_p =1600N/mm^2,and area of pre stressing steel A_p=500mm^2.	**07**
		OR	

Q.4	**(a)**	A pre tensioned beam of size 150mmx200mm is supporting UDL of 5kN/m for the entire span of 5m. If the permissible stress in steel in tension is zero at transfer and 1.4N/mm^2 at working loads, find how many wire of 6mm diameter shall be required? The permissible tensile stress in wire is 1200N/mm^2 and the pre stress loss is 15%, the concrete density is 25kN/m^3.	**07**
	(b)	Discuss following terms for the pre stressed concrete structures in brief, Externally and internally pre stressed members, linear and circular pre stressing, pre tensioning and post tensioning, with and without end anchoring of members.	**07**
Q.5	**(a)**	A rectangular beam section of 9m span has to support the total UDL of 15kN/m for the entire span. It is a simply supported beam and the neutral axis is located at the half of the depth of the section. If the losses are 25% and permissible tensile stress at transfer is 2.5N/mm^2 and under service 2N/mm^2 and a constant compressive stress in concrete is 20N/mm^2, find the appropriate cross section dimensions of the beam.	**07**
	(b)	Enlist the important design aspects of shear, bond and torsion for a pre stressed concrete member as per the code provisions. Highlight important design consideration of the end blocks.	**07**
		OR	
Q.5	**(a)**	Explain all stages of loading of a pre stressed concrete member in detail.	**07**
	(b)	Discuss effects of bonded and unbounded tendons in a concrete member. Also discuss the advantages and limitations of cast in place, precast and composite type of members used for pre stressing process.	**07**

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