Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER II (NEW) – • EXAMINATION – SUMMER 2016

Subject Code: 2722011 **Date: 27/05/2016**

Subject Name: Prestressed Concrete

Time:10:30 am to 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.**
4. **IS 1343, 456 and 3370 are permitted.**

Q.1		A simply supported post tensioned symmetric I- section beam having effective span 20 m is a class-I structure. It carries a uniformly distributed load of intensity 50 kN/m. The cube strength at transfer is 35MPa and at service loads is 45 MPa. The beam is prestressed by steel having characteristic strength 1600 MPa. Assume parabolic cable profile and losses in prestress as 16%. Design suitable cross section, cable locations and amount of prestressing steel for flexure. Check suitability of section at mid span and support.	**14**
Q.2	**(a)**	Explain various anchorage systems for post-tensioned beams.	**07**
	(b)	Explain in brief following terms used in prestressed concrete: Tendon, Bonded prestressed concrete and Transfer.	**07**
		OR	
	(b)	How the cable profile affects the stress distribution across the depth of beam? Explain with example. Neglect self-weight of beam.	**07**
Q.3		A cylindrical prestressed concrete water tank of internal diameter 40 m is required to store water over a depth of 7.5 m. The permissible compressive stress in concrete at transfer is 15 MPa and minimum compressive stress under working pressure is 1.1 MPa. The loss ratio is 0.80. Wires of 5 mm diameter with an initial stress of 1200 MPa are available for circumferential winding and Freyssinet cables made up of 12 wires of 8 mm diameter stressed to 1200 MPa are to be used for vertical prestressing. Design tank wall assuming base connection to be fixed and tentative initial thickness of wall 220mm. Take Maximum ring tension = 900 N/mm and Maximum moment in tank wall for fixed base condition = 92000 N.mm/mm for design.	**14**
		OR	
Q.3	**(a)**	A rectangular beam cross section B x D has a prestressing cable at 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.	**07**
	(b)	Explain load balancing concept in beams	**07**
Q.4	**(a)**	Enumerate the advantages of prestressed concrete piles.	**07**
	(b)	What are bursting stresses in anchorage zone? Draw and explain the stress contours in anchorage zone.	**07**
		OR	
Q.4		A post tensioned T-Section girder having top flange 1200mm wide and 250mm depth and web 250mm width and 1000mm depth. The girder is prestressed by 14 nos. 7 ply-8mm strands situated in bottom flange at 80 mm from bottom. The characteristic strength of concrete and steel is 45 MPa and 1500 MPa respectively. Calculate moment of resistance of the section.	**14**

Q.5		A continuous concrete beam ABC (AB=BC=12 m) has a uniform rectangular cross section, 120 mm wide and 320 mm deep. A cable carrying an effective prestressing force of 340 kN varies linearly with an eccentricity of 60 mm towards the soffit at the end supports to 60 mm towards the top of beam at mid-support B. Determine the resultant moment at B due to prestressing only. If the eccentricity of the cable at B is + 25mm, find weather the cable is concordant or not?	**14**

OR

Q.5	**(a)**	Explain partial prestressing and its advantages.	**07**
	(b)	State and explain the reasons for using the high strength materials in prestressed concrete.	**07**

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