Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER II– EXAMINATION – WINTER - 2016

Subject Code: 2722011 **Date: 19/11/ 2016**

Subject Name: Prestressed Concrete

Time: 2:30 pm to 5:00 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 continuous concrete beam ABC (AB = BC = 12 m) has a uniform rectangular cross section, 150 mm wide and 350 mm deep. A cable carrying an effective prestressing force of 300 kN varies linearly with an eccentricity of 70 mm towards the soffit at the end supports to 70 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**
Q.2	**(a)**	Explain in brief following terms used in prestressed concrete: (i) End Block (ii) Transmission length (iii) Cap cable	**07**
	(b)	How will you fix cable profile for a simply supported beam of span L carrying (i) Eccentric point load (ii) UDL and (iii) Two equal point loads each at L/3 from supports. Neglect self weight of beam.	**07**
		OR	
	(b)	Explain various anchorage systems for post-tensioned beams.	**07**
Q.3	**(a)**	State different types of losses encountered in the pre-tensioning and post tensioning systems. Explain any one.	**07**
	(b)	State and explain the reasons for using the high strength materials in prestressed concrete.	**07**
		OR	
Q.3	**(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**
Q.4	**(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**
		OR	
Q.4		A post tensioned T-Section girder having top flange 1250mm wide and 300mm depth and web 300mm width and 1200mm depth. The girder is prestressed by 14 nos. 7 ply-8mm strands situated in bottom flange at 90 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 cylindrical prestressed concrete water tank of internal diameter 30 m is required to store water over a depth of 7 m. The permissible compressive stress in concrete at transfer is 15 MPa and minimum compressive stress under working pressure is 1.2 MPa. The loss ratio is 0.82. Wires of 6 mm diameter with an initial stress of 1250 MPa are available for circumferential winding and Freyssinet cables made up of 12 wires of 8 mm diameter stressed to 1250 MPa are to be used for vertical prestressing. Design tank wall assuming base connection to be fixed and tentative initial thickness of wall 250mm. Take Maximum ring tension = 920 N/mm and Maximum moment in tank wall for fixed base condition = 90000 N.mm/mm for design. **14**

OR

Q.5 A simply supported post tensioned symmetric I- section beam having effective span 24 m is a class-I structure. It carries a uniformly distributed load of intensity 60 kN/m. The cube strength at transfer is 40MPa and at service loads is 45 MPa. The beam is prestressed by steel having characteristic strength 1650 MPa. Assume parabolic cable profile and losses in prestress as 15%. Design suitable cross section, cable locations and amount of prestressing steel for flexure. Check suitability of section at mid span and support. **14**

****