Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER–II • EXAMINATION – SUMMER - 2017

Subject Code: 2722011 **Date: 29/05/2017**

Subject Name: Prestressed Concrete

Time: 02:30 PM To 05:00 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 cylindrical prestressed concrete water tank of internal diameter 32 m is required to store water over a depth of 7 m. The permissible compressive stress in concrete at transfer is 20 MPa and minimum compressive stress under working pressure is 1.5 MPa. The loss ratio is 0.85. Wires of 5 mm diameter with an initial stress of 1320 MPa are available for circumferential winding and Freyssinet cables made up of 15 wires of 8 mm diameter stressed to 1320 MPa are to be used for vertical prestressing. Design tank wall assuming base connection to be fixed and tentative initial thickness of wall 200mm. Take Maximum ring tension = 700 N/mm and Maximum moment in tank wall for fixed base condition = 60000 N.mm/mm for design.	**14**
Q.2	**(a)**	State and explain the reasons for using the high strength materials in prestressed concrete.	**07**
	(b)	Enlist the design steps for end blocks.	**07**
		OR	
	(b)	Explain the concept of concordant cable profile.	**07**
Q.3		A continuous concrete beam XYZ (XY=YZ=10 m) has a uniform rectangular cross section, 150 mm wide and 330 mm deep. A cable carrying an effective prestressing force of 360 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 + 15mm, find weather the cable is concordant or not?	**14**
		OR	
Q.3	**(a)**	Explain the design steps for concrete poles.	**07**
	(b)	Explain the design steps of Flag masts.	**07**
Q.4	**(a)**	What are bursting stresses in anchorage zone? Draw and explain the stress contours in anchorage zone.	**07**
	(b)	Explain load balancing concept in beams	**07**
		OR	
Q.4		A simply supported post tensioned symmetric I- section beam having effective span 25 m is a class-I structure. It carries a uniformly distributed load of intensity 70 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 1550 MPa. Assume parabolic cable profile and losses in prestress as 14%. Design suitable cross section, cable locations and amount of prestressing steel for flexure. Check suitability of section at mid span and support.	**14**

Q.5		A post tensioned T-Section girder having top flange 1400mm wide and 300mm depth and web 300mm width and 1200mm depth. The girder is prestressed by 16 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 1600 MPa respectively. Calculate moment of resistance of the section.	**14**
		OR	
Q.5	**(a)**	Explain in brief following terms used in prestressed concrete: (i) End Block (ii) Transmission length (iii) Cap cable	**07**
	(b)	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 F, Determine the expression for maximum shear stress at mid-section and soffit section.	**07**

****