## **GUJARAT TECHNOLOGICAL UNIVERSITY** ME – SEMESTER-1 (OLD) EXAMINATION – WINTER 2016

Subject Code: 710901N Da Subject Name: Theory of Elasticity			ate:17/11/2016		
Tir Inst	ne:1( truction 1. 2. 3.	0:30 am to 1:00 pmToons: Attempt all questions Make suitable assumptions wherever necessary Figures to the right indicate full marks.	tal Marks: 7	70	
Q.1	<b>(a)</b>	Explain stress invariants along with their physical interpretation.		07	
0.1	(b)	Prove that the principal planes are orthogonal.		07	
Q.2	(a) (b)	Explain pure state of shear and deviatoric stress in detail		07	
	(0)	OR		07	
	<b>(b)</b>	Explain octahedral stresses.		07	
Q.3	<b>(a)</b>	Derive the equation for cubic dilatation in three dimensional Cartesian	n coordinate	07	
	<b>(b</b> )	The displacement field for a body is given by $u_x = x^2 + y$ , $u_y = x^2 + y$ .	= 3 + z and	07	
		$u_z = x^2 + 2y$ at a point P(3,1,-2). Determine the principal strains.			
		OR			
Q.3	(a)	Discuss the deviatoric state of strain and its invariants.		07	
•	<b>(b)</b>	Derive the displacement equations of equilibrium.		07	
Q.4	<b>(a)</b>	Explain Maxwell reciprocal theorem.		07	
	(b)	Derive the equilibrium equations in terms of Airy's stress function. OR		07	
04	(a)	Derive the expression for strain energy of beem due to Aviel leading		07	
Q.4	(a) (h)	Explain Menabrea's theorem	· ·	07	
Q.5	(a)	Discuss the methodology of guessing the Airy's stress function with example.	suitable		
	<b>(b</b> )	Explain plane stress and plane strain conditions and write the equations for both conditions	constitutive	07	
	OR				

- Q.5 (a) How the temperature effect is included in the constitutive equations for 07 homogeneous isotropic material? Discuss with suitable example.
  - (b) Explain: Axisymmetric problem in elasticity along with suitable boundary 07 conditions.

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