GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2017

Subject Code: 2171916 **Date:02/11/2017**
Subject Name: Applied Mechanics of Solid(Department Elective - I)
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.

			MARKS
Q.1	**(a)**	Enlist theory of failures and explain any one.	**03**
	(b)	Define: 1) Body forces, 2) Surface forces	**04**
	(c)	Explain Mohr's circle diagram for principal stresses.	**07**
Q.2	**(a)**	Explain Boundary conditions.	**03**
	(b)	What is Recapitulation? Explain in brief.	**04**
	(c)	Derive equation of Principal stresses in 2D.	**07**
		OR	
	(c)	The state of stress at a point is such that $$\sigma_x = \sigma_y = \sigma_z = \tau_{xy} = \tau_{yz} = \tau_{zx} = \rho$$ Determine the principal stresses and their directions.	**07**
Q.3	**(a)**	Elaborate Octahedral Shearing stress theory in theory of failures.	**03**
	(b)	State basic assumptions for the theory of incremental constitutive relation for elastic – plastic material.	**04**
	(c)	With the help of neat sketch, discuss behavior of Prandit-Reuss under plane stress $\sigma_{ij} = [\sigma_1 , 0 , \sigma_3]$.	**07**
		OR	
Q.3	**(a)**	What is Circular Polariscope?	**03**
	(b)	Define: Plane stress and plane strain.	**04**
	(c)	Derive stress distribution using Airy's stress function in a simply supported beam subjected to pure bending.	**07**
Q.4	**(a)**	State compatibility equations if body forces are constant.	**03**
	(b)	Difference between linear and non-linear elastic isotropic stress strain relation.	**04**
	(c)	Explain Normality, Convexity and Uniqueness for an elastic solids.	**07**
		OR	
Q.4	**(a)**	Explain Hooke's law for elastic material.	**03**
	(b)	Derive the equation of stress of thick pressure vessels only subjected to internal pressure.	**04**
	(c)	Explain the Principle of virtual work and prove the relation for elastic solids.	**07**
Q.5	**(a)**	State term associated flow rule benefits compared to non-associated flow rules.	**03**
	(b)	State the term Bouschinger Effect for an elasto-plastic material	**04**
	(c)	Discuss flow rules associated with von Mises yield function for perfectly plastic material.	**07**
		OR	

Q.5 **(a)** Explain stress strain relation for work hardening material. **03**

(b) State the term Kinematic Hardening for an elasto-plastic material. **04**

(c) Write a note on Druker's stability postulate for stability of work-hardening materials. **07**

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