

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 Prandtl-Reuss under plane stress $\sigma_{ij} = [\sigma_1, 0, \sigma_3]$.	07
OR	
Q.3 (a) What is Circular Polariscopes?	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 Bauschinger 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**
