

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 Bouschinger Effect for an elasto-plastic material | 04 |
| | (c) Discuss flow rules associated with von Mises yield function for perfectly plastic material. | 07 |

OR



- (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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