

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**FIRST SEMESTER M. TECH DEGREE EXAMINATION**

**Civil Engineering**

**(Structural Engineering and construction Management)**

**04 CE 6403- THEORY OF ELASTICITY**

Max. Marks : 60

Duration: 3 Hours

**PART A**

*Answer All Questions*

*Each question carries 3 marks*

1. Explain octahedral stresses?
2. Write a note about plane stress on an arbitrary plane.
3. Explain biharmonic equation.
4. State equations for radial and circumferential stress in rotating disc.
5. What is warping?
6. Write note on torsion of non circular sections
7. Explain residual stress in bending.
8. Write a note on Von-mises yield criteria.

**PART B**

*Each question carries 6 marks*

9. Explain with neat sketches stress ellipsoid  
OR
10. Derive compatibility equations in terms of stress
11. Derive equations for stress transformation in plane stress.  
OR
12. Derive equilibrium equations in polar coordinates for plane stress and plane strain problems.
13. Obtain the expressions for stresses for the simply supported beam of span  $l$ , width  $2C$  subjected to uniform load intensity  $q$  using stress function.  
OR
14. Explain St Venant's principle in 2D problems.
15. Derive general equations of equilibrium in polar co-ordinates for axysymmetric problems.  
OR
16. Explain the Effect of circular hole in stress distribution of plates
17. Derive the expressions for Torsion of multi celled thin wall open and closed sections  
OR
18. Derive the expressions for the torsion of prismatic bars.
19. Explain sand heap analogy with figure.  
OR
20. Sketch the stress diagram for elastic plastic yielding of a beam. Also calculate the bending moment in the elastic plastic state. The beam has rectangular cross section with width  $b$  and height  $h$ .