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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER M.TECH DEGREE EXAMINATION

Civil Engineering

(Geomechanics and Structures)

04 CE 6303 Theoretical Geomechanics

Max. Marks : 60 Duration: 3 Hours

Part A

Answer all questions
Each question carries 3 marks

1. Write the invariants of spherical stress tensor and deviatoric stress tensor.
2. Explain the vertical stress distribution on a horizontal plane.
3. Explain Burmister's two layer theory.
4. Explain different rheological models.
5. Explain failure loci in deviatoric plane.
6. Briefly explain Tresca criteria.
7. What are constitutive models? How will you evaluate a model?.
8. Explain anisotropic elastic perfectly plastic models. *8 x 3 = 24 marks*

Part B

Each question carries 6 marks

9. The stress components at a point are σx=50, σy=10, σz=7, τxy=-6, τyz=8, τxz=10 MPa. Determine the Principal Stresses and Principal Directions.

OR

10. Derive the strain compatibility equation.
11. Derive an expression for the vertical stress at a point directly below the centre of uniformly loaded circular area.

OR

12. A rectangular foundation 3mX4m transmits a uniform pressure of 450kN/m^2 to the underlying soil. Determine the vertical stress at a depth of 1m below the foundation at a point within a loaded area, 1m away from the short edge and 0.5m away from the long edge. Use Boussinesq's theory.

13. Explain with neat sketch the stress distribution around vertical shafts.

OR

14. A concentrated load of 200 kN act at foundation level at a depth of 2m below ground surface. Find the vertical stress along the axis of load at a depth of 10m and at a radial distance of 6m at the same depth by(a) Boussinesq and (b) Westergaard formula for μ=0. Neglect the depth of foundation.
15. Explain the behaviour of soil under loading.

OR

16. Write note on settlement computation.

17. Write note on Von Mises theory of failure.

OR

18. Explain Yield criteria.
19. Explain different constitutive models in soil mechanics.

OR

20. Explain Mohr-Coulomb model and advances in Mohr-Coulomb model.

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(6x6 = 36marks)