B

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

8 x 3 = 24 marks

1. Write the invariants of spherical stress tensor and deviatoric stress tensor .

2. Explain the significance of pressure bulb.

3. Explain Burmister's two layer theory.
4. Explain a Bingham solid with the help of rheological model.
5. Describe failure locus and isotropic stress line?
6. Describe yield criteria.
7. Explain anisotropic elastic perfectly plastic models.
8. Explain hardening soil model.

Part B
Each question carries 6 marks

9. At a point in a body the components of strain tensor are ϵ_x=0.001, ϵ_y= -0.003, ϵ_z= 0.002, γ_{xy}= 0.001, γ_{yz}= 0.0005, γ_{xz}= -0.002. Determine the principal strains and principal strain directions.

OR

10. The state of stress at a point for a given reference axis xyz are σ_x=15, σ_y= -5, σ_z=10, τ_{xy}=3, τ_{yz}=0, τ_{xz}=1Mpa. If coordinate system is rotated about z-axis in anticlockwise direction through an angle of 30°, Determine the new stress components with reference to x'y'z' system. Also prove that the stress invariants remain unchanged.

11. A rectangular area 2mx4m carries a uniform load of 100kN/m^2 at the ground surface. Find the vertical pressure 5m below the centre and corner of the loaded area.

OR

12. Discuss the basis of the construction of Newmark's influence chart. How it is used.

13. 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 $\mu=0$. Neglect the depth of foundation.

OR

14. Explain with neat sketch the stress distribution around tunnels.

15. Explain rheological equation of state.

OR

16. With the aid of rheological model simulate and explain the consolidation of soil.

17. Write short note on Tresca criterion.

OR

18. Write short note on influence of intermediate principal stress on failure

19. Explain different constitutive models in soil mechanics.

OR

20. What do you mean by constitutive models and give the requirements of a model.Which are the basic components of a model.

(6x6 = 36 marks)