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)

8 x 3 = 24 marks

1. Explain stress invariants.
2. Explain the limitations of Boussinesq's solution.
3. Explain Westergaard,s solution.
4. Explain rheological constants.
5. Explain yield criteria?
6. Explain Von Mises theory of failure.
7. Explain anisotropic plasticity models.
8. Explain viscous model.

Part B

6x6 marks

9. (a) At a point in body the components of strain tensor are ϵ_x=0.01, ϵ_y=-0.005, ϵ_z=0.005, γ_{xy}=0.03, γ_{yz}=0.01, γ_{xz}=-0.08. Determine the principal strain and principal strain direction. .

   OR

   (b) The normal stresses on a plane are σ_1=9, σ_2=6, σ_3=3KPa.Determine the normal and shearing stresses on a plane whose direction cosines are $1/2$, $1/2$, $1/\sqrt{2}$.

10. (a) A raft of size 4mX4m carries a load of 200 kN/m^2. Determine the vertical stress increment at a point 4m below the centre of loaded area. Use Boussineq's theory

    OR

    (b) Discuss the basis of the construction of Newmark's influence chart.How it is used.

11. (a) The plate bearing tests were conducted with 30 cm plate diameter on soil subgrade and over 18 cm base course. The pressure yielded at 0.5cm deflection are 1.25 kg/cm^2 and 4.0kg/cm^2,respectively.Design the pavement section for 4100kg wheel load with tyre

pressure of 7.5 kg/cm^2 for an allowable deflection of 0.5cm using Burmister's approach?

OR

(b) A rectangular area 2.5mX5m carries a udl of 100kN/m at ground surface.Find the vertical pressures at 4m below the centre and corner of the loaded area using Westergaard's analysis

12. (a) Write short note on rheological models

OR

(b) Write short note on ideal materials

13. (a) Write short note on Tresca criterion

OR

(b) Write short note on influence of intermediate principal stress on failure

14. (a) Write short note on constitutive models in soil mechanics

OR

(b) Write short note on advances in constitutive models

(6x6 = 36 marks)