Total No. of Questions : 8]

SEAT No. :

PD-4047

[Total No. of Pages : 3

[6402]-6
S.E. (Civil Engg.)
GEOTECHNICAL ENGINEERING
(2019 Pattern) (Semester - IV) (201008) (Theory)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary and mention it clearly.***
5) ***Use of non-programmable calculator is allowed.***

Q1) a) Describe the effect of compaction on properties of soil. **[5]**

b) Explain how compaction control is achieved in the field using a proctor needle. **[6]**

c) What is pressure bulb? Explain its significance and draw a neat sketch of pressure bulb for concentrated point load. **[6]**

OR

Q2) a) Explain Boussinesq's theory with neat sketch. State its Assumptions and formula for stress in soil by point load, with description of each term. **[6]**

b) Differentiate between Light Compaction & Heavy Compaction test. **[5]**

c) A load of 1000 kN acts as a point load at the surface of a soil mass. Estimate the stress at a point 3m below and 4m away from the point of action of the load by Boussinesq's formula. Compare the value with the result from Westergaards's theory. **[6]**

Q3) a) Explain how shear tests are conducted with different drainage conditions? **[5]**

b) Explain vane shear test procedure with a neat sketch and formula. **[6]**

c) Define total and effective stress. Determine the shear strength in terms of effective stress on a plane within a saturated soil mass at a point where the total normal stress is 200 KN/m^2 and the pore water pressure is 80 KN/m^2. The effective stress shear strength parameters for the soil are c′ = 16 KN/m^2 and ϕ= 39°. **[6]**

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OR

Q4) a) A sample of dry cohesionless soil was tested in a triaxial machine. If the angle of internal shearing resistance was 36° & the confining pressure 100kN/m^2, determine the deviator stress at which the sample failed. **[6]**

b) Describe the procedure for Direct Shear Test. **[5]**

c) Explain briefly the procedure of conducting Unconfined Compression Test on Clayey soil sample. Draw Mohr's circle for the test. **[6]**

Q5) a) Explain Rebhann's graphical method for determination of earth pressure on retaining wall. **[6]**

b) Derive the expression for active state of pressure at any point for dry cohesionless backfill with uniform surcharge. **[6]**

c) A smooth vertical wall retains a level surface with γ = l8kN/m^3, Φ = 30°, to a depth of 8 m. Draw the lateral pressure diagram and compute the total active pressure in dry condition and when water table rises to the GL. Assume γ_{sat} = 22kN/m^3. **[6]**

OR

Q6) a) Determine the relation for lateral earth pressure in active state for submerged cohesionless backfill. **[6]**

b) Discuss Culmann's graphical method for the determination of active earth pressure. **[6]**

c) In a cohesionless soil deposit having unit weight of 15 kN/m^3 and angle of internal friction Φ of 30°. Determine the active and passive lateral pressure intensities at depth of 10 m. **[6]**

Q7) a) Discuss "Taylor's Stability Number" for stability analysis of finite slope. **[6]**

b) Enlist factors of safety used in stability analysis of slopes. Calculate the factor of safety w.r.t. cohesion of clay slope laid at 1 in 2 to a height of 10 m, if the angle of internal friction Φ = 10° and c = 25kN/m^2 and γ = l9kN/m^3. What will be the critical height of the slope in this soil. Assume S_n = 0.064 for Φ = 10°. **[6]**

c) Discuss the causes and remedial measures of Landslides. **[6]**

OR

Q8) a) Derive the expression for factor of safety for dry infinite slope in sandy soil. **[6]**

b) Explain with neat sketch different modes of slope failure. **[6]**

c) Discuss "Swedish Slip Circle Method" for stability analysis of finite slope. **[6]**

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