

Total No. of Questions : 8]

SEAT No. :

PC2777

[6352]-1

[Total No. of Pages : 2

S.E. (Civil)

GEOTECHNICAL ENGINEERING
(2019 Pattern) (Semester - IV) (201008)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 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) Explain in detail Effect of compaction on properties of soil. [6]
b) What is Geostatic stresses? Enlist various approaches to compute stresses due to different loading patterns of soil. [6]
c) What is Isobar? Explain its Significance. A line load of 200 kN/m is acting on the ground surface along a vertically downward direction. Determine the vertical stress at P which is 3.6 m deep and 2 m away horizontally. [5]

OR

- Q2)** a) What is Compaction? How is it different from consolidation? Explain how compacting efforts affects compaction? [6]
b) The following observations were noted during proctor compaction test with a soil :

Water content(%)	8.6	11.0	12.5	14.5	16.0	18.0	19.5
Bulk density(kg/m ³)	1800	1900	1960	2045	2100	2050	2010

- Specific gravity of soil grains is 2.7. Find out MDD and OMC for the soil. Plot the zero air void curve and 80% saturation curve also. [6]
c) Explain in detail comparison between Boussinesq's and Westergaard's Equation. [5]
- Q3)** a) Explain the principle of Vane shear test. What are the advantages of this test? What are the limitations? [6]
b) A cohesive soil has an angle of shearing resistance of 20° and cohesion of 45 KN/m². If a specimen of this soil is subjected to a triaxial compression test, find the value of lateral pressure in the cell for failure to occur at a total axial stress of 350 KN/m². [6]
c) State and explain modes of application of Shear Force in shear strength determination. [5]

OR

P.T.O.

- Q4)** a) Enlist different drainage conditions in triaxial test also explain characteristic features of Triaxial Compression Test. [6]
 b) Explain the principle of Direct shear test. What are the advantages & limitations of the test? Explain phenomenon of Thixotropy in soil. [6]
 c) An in-situ: vane shear test was conducted in a clay at the bottom of bore hole, A torque of 153 N-m was required to shear the soil. What was the undrained strength of clay? The vane was 100mm diameter and 150mm long. [5]

- Q5)** a) Explain Earth Pressure with respect to wall movement with sketches. [6]
 b) Explain step by step Rehmann's graphical for determination of earth pressure of retaining wall. [6]
 c) For a retaining wall system, the following data was available: Height of wall – 7 m, properties of backfill – $\gamma_d = 18 \text{ kN/m}^3$, $\phi = 35^\circ$, Angle of internal friction – $\delta = 25^\circ$, back of the retaining wall is inclined at 20° to the vertical, backfill is sloping at 1 :10. Determine the magnitude of active earth pressure by Culmann's method. [6]

OR

- Q6)** a) Derive the relation for lateral pressure due to submerged cohesionless backfill with neat sketch. [6]
 b) In a cohesionless soil deposit having unit weight of 25 kN/m^3 and $\phi = 32^\circ$. Determine active and passive lateral pressure intensities at depth of 5 m. [6]
 c) Discuss points of difference between Rankines and Coulombs theory of earth pressure. [6]

- Q7)** a) What is slope stability and how are the different types of factor of safety determined? [6]
 b) Write short note on Taylor's Stability Number for stability analysis of finite slope. [6]
 c) What is the critical height of vertical excavation that can be made without any lateral support in a cohesive soil having the following properties $\gamma = 18 \text{ kN/m}^3$, $c = 10 \text{ kN/m}^2$, $\phi = 32^\circ$. [6]

OR

- Q8)** a) Analyze the stability of soil using friction circle method with neat sketch. [6]
 b) Write short notes on causes and remedial measures of landslides. [6]
 c) Determine the factor of safety for cohesive soil with vertical cut 7 m high, if stability number is known to be 0.2, slope material having cohesion = 25 kN/m^2 , $\gamma = 20 \text{ kN/m}^3$. [6]

