

Total No. of Questions : 8]

SEAT No. :

PA-1184

[Total No. of Pages : 3

[5925]-206

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) *Figures to the right indicate full marks.*
- 3) *Neat figures must be drawn wherever necessary.*
- 4) *Assume suitable data if required.*
- 5) *Use of non programmable scientific calculator is allowed.*

- Q1)** a) Discuss in detail Proctor needle in field compaction control. [6]
- b) State any four assumptions in Boussinesq's theory. Mention the formula for calculation of stress in soil by point load and circular load by Boussinesq's theory, with description of each term. [6]
- c) Describe the effect of compaction on properties of soil. [6]

OR

- Q2)** a) Differentiate between Standard Proctor Test and Modified Proctor Test. Draw typical compaction curve for both the tests. [6]
- b) What is pressure bulb? Explain its significance and draw a neat sketch of pressure bulb for concentrated point load. [6]
- c) A concentrated load of 25 kN acts on the surface of homogenous soil mass of large extent. Find the stress intensity at a depth of 8 m by using Boussinesq's theory at a horizontal distance of 2.5 m. [6]
- Q3)** a) Explain briefly the procedure of conducting Unconfined Compression Test on clayey soil sample. Draw Mohr's circle for the test. [6]
- b) State and explain factors affecting shear strength of cohesive and cohesionless soil. [5]

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- c) Two identical soil specimens were tested in a triaxial apparatus. First specimen was failed at a deviator stress of 700 kN/m^2 when the cell pressure was 200 kN/m^2 . Second specimen was failed at a deviator stress of 1300 kN/m^2 when the cell pressure was 400 kN/m^2 . Determine cohesion of soil and angle of internal friction of soil analytically. [6]

OR

- Q4)** a) 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 pore water pressure is 80 kN/m^2 . The shear strength parameters in terms of effective stress are, $c' = 16 \text{ kN/m}^2$ and $\Phi' = 39^\circ$. [6]
- b) Explain how shear tests are conducted with different drainage conditions? [5]
- c) Describe the procedure for Vane Shear Test. [6]

- Q5)** a) Explain earth pressure at rest, active earth pressure and passive earth pressure w.r.t. wall movement with sketches. [6]
- b) Compute the intensity of active earth pressure at a depth of 8 m in dry cohesionless sand with an angle of internal friction 30° and unit weight of 18 kN/m^3 . [6]
- c) Derive the equation for lateral earth pressure in active state for dry cohesionless backfill with uniform surcharge. [6]

OR

- Q6)** a) A wall with a smooth vertical back, 10 m high, supports a purely cohesive soil with $c = 9.81 \text{ kN/m}^2$ and $\gamma = 17.66 \text{ kN/m}^3$. Determine total active earth pressure against the wall and position of zero pressure before formation of tension crack. [6]
- b) Explain Rebhann's graphical method for determination of earth pressure on retaining wall. [6]
- c) Derive the expression for the active state of pressure at any point for a submerged cohesionless backfill along with pressure diagram. [6]

- Q7)** a) Explain with neat sketch different modes of slope failure. [6]
b) Discuss “Swedish Slip Circle Method” for stability analysis of finite slope. [5]
c) Derive the expression for F.O.S. for dry infinite slope in sandy soil. [6]

OR

- Q8)** a) Illustrates causes and remedial measures of landslide. [6]
b) Discuss “Taylor’s Stability Number” for stability analysis of finite slope. [5]
c) An infinite slope is made of clay with the following properties: [6]

$$\gamma_{\text{sat}} = 18 \text{ kN/m}^3, \gamma' = 9 \text{ kN/m}^3, c' = 25 \text{ kN/m}^2 \text{ and } \Phi = 28^\circ.$$

If the slope angle has an inclination of 35° and height equal to 12 m, determine stability of slope. When,

- i) The slope is submerged
- ii) There is steady seepage parallel to slope.

