

Register Number :

Name of the Candidate :

**5 9 3 0**

**B.E. DEGREE EXAMINATION, 2007**

**(CIVIL ENGINEERING / CIVIL AND STRUCTURAL  
ENGINEERING)**

**(FOURTH SEMESTER)**

**CLEC - 504 / PCLEC - 204 / CSEC - 505 /**

**PCSEC - 304. SOIL MECHANICS**

*(Common with Part - Time Civil Engineering,  
Second Semester and Structural Engineering -  
Third Semester)*

April ]

[ Time : 3 Hours

Maximum : 60 Marks

*Answer any ONE full question from each unit.*

*Assume any missing data.*

*All questions carry equal marks.*

**Turn over**

**UNIT - I**

1. A natural soil deposit has a bulk unit weight of  $18.44 \text{ kN/m}^3$  and water content of 5%. Calculate the amount of water required to be added to one cubic meter of soil to rise the water content to 15%. Assume the voids ratio to remain constant. What will then be the degree of saturation? Assume  $G = 2.67$ .
2. A cube of dried clay having sides 4 cm long has a mass of 110 gm. The same cube of soil, when saturated at unchanged volume has mass of 135 gm. Draw the soil element showing the volumes and weights of the constituents and then determine the specific gravity of soil solids and the voids ratio.

**UNIT - II**

3. Calculate the co-efficient of permeability of a soil sample, 6 cm in height and  $50 \text{ cm}^2$  in cross sectional area, if a quantity of water equal to 430 ml passed down in 10 minutes, under an effective constant head of 40 cm. If the overdry weight of the specimen is 498 gm and has a specific gravity of 2.65, calculate the seepage velocity of water during the test.

4. Define the term permeability. What is the significance of permeability determination for soils? Mention various methods of determination of permeability of soils. Explain any one method in detail.

### UNIT - III

5. (a) Mention the assumptions made by Boussinesq's in his analysis. (5)
- (b) What is a stress Isobar? (2)
- (c) Write down Boussinesq's equation for vertical stress and identify various parameters. (5)
6. Find the intensity of vertical pressure and horizontal shear stress at a point 4m directly below a 20 kN point load acting at a horizontal group surface. What will be the vertical pressure and shear stress at a point 2 m horizontally away from the axis of loading but at the same depth of 3 m?

### UNIT - IV

7. Write the Coulomb's equation for soil strength. Explain the above equation with the help of a figure.

Turn over

8. Following are the results of undrained triaxial compression test on two identical soil specimens, at failure

Lateral pressure ( $\sigma_3$ )  $\text{kN/m}^2$  - 100 - 300

Total vertical pressure ( $\sigma_1$ )  $\text{kN/m}^2$  - 440 - 760

Pore water pressure ( $u$ )  $\text{kN/m}^2$  - -20 - 60

Determine the cohesion and angles of shearing resistance

(a) referred to total stress.

(b) referred to effective stress.

Use Mohr circle method.

### UNIT - V

9. Explain the phenomenon of stability of upstream slope during sudden drawdown.

10. Calculate the factor of safety with respect to cohesion of a clay slope laid at 1 in 2 to a height of 10 m, if angle of internal friction  $\phi = -10^\circ$ ;  $c = 25 \text{ kN/m}^2$  and  $\gamma = 19 \text{ kN/m}^3$ . What will be the critical height of the slope in this soil?