

Code No: **R1632012**

**R16**

SET - 1

**III B. Tech II Semester Regular/Supplementary Examinations, August-2021**  
**GEOTECHNICAL ENGINEERING – I**

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

Note: 1. Question Paper consists of two parts (Part-A and Part-B)  
2. Answer ALL the question in Part-A  
3. Answer any **FOUR** Questions from **Part-B**

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**PART –A**

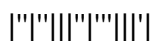
**(14 Marks)**

1. a) Explain three-phase soil system with a sketch. [3M]
- b) What is the difference between U.S. and I.S soil classification systems? [3M]
- c) Write down the equation to determine coefficient of permeability by Variable head test. [2M]
- d) State any two uses of Newmark's influence chart. [2M]
- e) Define coefficient of volume compressibility. [2M]
- f) List of any two differences between Direct shear test and Unconfined compression test. [2M]

**PART –B**

**(56 Marks)**

2. a) Discuss the structure and characteristics of Kaolinite and illite mineral groups. [7M]
- b) A partially saturated sample from a borrow pit has a natural moisture content of 15% and bulk unit weight of 1.90g/cc. The specific gravity of solids is 2.70. Determine the degree of saturation and void ratio. What will be the saturated unit weight of the sample? [7M]
3. a) What are the index properties? Name the Index properties of cohesionless soils and cohesive soils. [7M]
- b) A soil has plastic limit of 20% and plasticity index of 25%. If natural water content of soil is 10%, what is the liquidity index and consistency index? [7M]
4. a) Explain procedure for determining coefficient of permeability of soil, by Falling head permeameter. [7M]
- b) A 5m thick layer of saturated clay is overlain by sand 4m deep. The water table is 3m below ground surface. The saturated unit weights of clay and sand are 22kN/m<sup>3</sup> and 20kN/m<sup>3</sup> respectively. The unit weight of sand above water table is 17kN/m<sup>3</sup>. Find the total and effective stress at the top and middle of clay layer. [7M]
5. a) Describe 2:1 distribution method in detail. [7M]
- b) Determine the vertical stress at a point P which is 3m below and at a radial distance of 3m from the vertical load of 100KN. Use Westergaard's Solution. Take  $\nu = 0.3$ . [7M]



6. a) What are the assumptions of Terzaghi's one-dimensional consolidation theory? [7M]
- b) A saturated clay layer of 5m thickness takes 1.5 years for 50% consolidation, when drained on both sides. Its coefficient of volume change is  $1.5 \times 10^{-3} \text{ m}^2/\text{kN}$ . Evaluate the coefficient of permeability of the soil. [7M]
7. a) Explain the standard triaxial shear tests with respect to various drainage conditions. [7M]
- b) A vane 10cm long and 8cm in diameter was pressed into soft clay at the bottom of a bore hole. Torque was applied and gradually increased to 450kg-cm when failure took place. Subsequently, the vane was rotated rapidly so as to completely disturb the soil. The remoulded soil was sheared at a torque of 180kg-cm. Determine the undrained shear strength of clay in both natural and remoulded states as well as the sensitivity of clay. [7M]

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