

**VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY (VSSUT), ODISHA**  
**Odd Mid Semester Examination for Academic Session 2024-25**

COURSE NAME: B.Tech

BRANCH NAME: Civil Engineering  
SUBJECT NAME: Geotechnical Engg.-1

SEMESTER: 3<sup>rd</sup>

FULL MARKS: 30

TIME: 90 Minutes

Answer All Questions.

The figures in the right hand margin indicate Marks. *Symbols carry usual meaning.*

- Q1. ✓ Answer all Questions. [2 × 3]
- ✓ a) Distinguish between Residual soil and Transported Soil with examples. - CO1
- ✓ b) Define Darcy's law. - CO2
- ✓ c) What do you mean by optimum moisture content? - CO3
- Q2. ✓ a) Explain about various clay minerals with the help of neat sketch. [4+4]
- ✓ b) A sample of silty clay has a volume of  $14.88 \text{ cm}^3$ , a total mass of 28.81 g, a dry mass of 24.83 g, and a specific gravity of solids 2.7. Determine the void ratio and the degree of saturation. - CO1
- OR [4+4]
- c) Describe briefly about Unified classification system of soil. - CO1
- d) Determine the total stress and effective stress at a depth of 16 m below the ground level for the following conditions: Water table is 3 m below ground level;  $G = 2.68$ ;  $e = 0.72$ ; average water content of the soil above water table is 8%.
- Q3. ✓ a) Explain about the falling head permeability test to determine coefficient of permeability. [4+4]
- b) Determine the average coefficient of permeability in horizontal and vertical directions for a deposit consisting of three layers of thickness 5m, 1m and 2.5m and having the coefficients of permeability of  $4 \times 10^{-2} \text{ mm/sec}$ ,  $4 \times 10^{-5} \text{ mm/sec}$ , and  $5 \times 10^{-2} \text{ mm/sec}$ , respectively. Assume the layers are isotropic. - CO2
- OR [4+4]
- ✓ c) Explain about the constant head permeability test to determine coefficient of permeability. - CO2
- ✓ d) What are the factors affecting permeability of soil.
- Q4. ✓ a) A moist soil sample compacted into a mould of  $1000 \text{ cm}^3$  capacity and weight 35 N, weighs 53.5 N with the mould. A representative sample of soil taken from it has an initial weight of 0.187 N and oven dry weight of 0.1691 N. Determine (a) water content, (b) wet density, (c) dry density, (d) void ratio and (e) degree of saturation of sample. Take specific gravity of soil is 2.65. [4+4]
- b) What are the factors that affect compaction? - CO3
- OR [4+4]
- ✓ c) What are the different methods of compaction adopted in the field? How would you select the type of roller to be used? - CO3
- d) What is the effect of compaction on the engineering properties of soil?

$$\gamma_d = \frac{47}{110}$$