*Total number of printed pages–2*

**53 (CE 403) GTEN**

**2021**

# GEOTECHNICAL ENGINEERING

Paper : CE 403

*Full Marks : 100*

Time : Three hours

***The figures in the margin indicate full marks for the questions.***

*Answer* ***all*** *questions.*

1. Derive the relation between void ratio($e$) and porosity($n$) for 10

   *(i)* dry soil mass

   *(ii)* fully saturated soil mass.

2. A soil mass has a bulk unit weight of $20 kN/m^3$ with water content of 19%. Compute dry unit weight, void ratio, porosity, degree of saturation and submerged unit weight. Take $G$=2·7. 10

3. Draw the phase diagram for saturated and unsaturated soil. Also explain the soil classification as per USCS classification system. 10

*Contd.*

4. What is the difference between compaction and consolidation of soil? Explain the standard proctor compaction test. 4+6=10

5. Define permeability of soil. Explain the constant head and falling head permeability test. 2+4+4=10

6. Explain the procedure for determining safe bearing capacity of an Isolated footing using IS code of practice, based on shear criteria and settlement criteria. 10

7. What is '*N*' value? Explain the procedure of S.P.T. test as per IS codal provision. 10

8. *(a)* State the Terzaghi's Theory of One-dimensional consolidation. What is pre-consolidation pressure? 10

   *(b)* With suitable figure, explain the procedure for determining pre-consolidation pressure of soil. 10

9. What is shear strength of soil? Briefly explain the procedure for Unconfined Compression Strength (UCS) test and Direct Shear (DS) test for obtaining shear parameters of soil. 10