U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B.E   Semester: IV
Branch: Civil Engineering   Duration: 3 hrs.
Course Code: 19CV4PCGTE   Max Marks: 100
Course: Geotechnical Engineering - I   Date: 19.09.2023

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1 a) With the help of phase diagram, define the following terms: **08**
(i) voids ratio   (ii) Degree of Saturation   (iii) Dry Density   (iv) Air content

b) Derive from first principles the phase relation: $\Upsilon_d=[(1-n_a)\, G_s\, \Upsilon_w)]/(1+wG_s)$ **05**

c) For a given soil, having specific gravity=2.67, unit weight of 17.6 kN/m^3 and moisture content of 10.8%. Determine dry unit weight, voids ratio, porosity and degree of saturation. For the same soil, determine the weight of water in kN to be added per cum of soil to achieve 80% degree of saturation. **07**

UNIT - II

2 a) State Stoke's law. List the assumptions and limitations of Stoke's law as applied to soil sedimentation **06**

b) With the help of particle size distributions, define the following: **06**
(i)Well graded soils   (ii) Poorly graded soils   (iii) Gap graded soils

c) The following data refer to liquid limit test on a cohesive soil. Plot the flow curve and determine the liquid limit and flow index **08**

Number of blows	40	35	22	14
Moisture content (%)	25.5	28.0	32.5	36.0

OR

3 a) What is consistency of soil? Define the following in terms of soil consistency: **08**
(i) Liquid limit   (ii) Plastic Limit and (iii) Shrinkage Limit

b) Write an explanatory note of IS Plasticity Chart **06**

c) Classify the following soil as per IS system of soil classification: **06**
    Soil A: Liquid Limit=38%; plastic limit=20%
    Soil B: Passing through 4.75mm IS sieve=70%
                 Passing through 0.75mm IS sieve = 08%
       C_u=7, C_c=3 and I_p=3

UNIT - III

4 a) Distinguish between dispersed and flocculent structure **04**

b) What is diffused double layer? Discuss its importance as applied to compaction of soils **06**

c) With a neat sketch, explain the following clay minerals: Kaolinite, Illite and Montmorillonite **06**

d) A stratum of fine sand is 2m thick. Under what head of water, flowing upward direction will the quick sand condition develop? Take G_s =2.68 and e=0.6 **04**

UNIT - IV

5 a) Explain the following terms: (i) Coefficient of Permeability (ii) Coefficient of Percolation (iii) Seepage Velocity **06**

b) Derive the expression for determination of coefficient of permeability by falling head permeameter **06**

c) A sand sample tested in a permeameter 11.7cm high and 10.15 cm in diameter. The quantity of water passing through the sample under an effective head of 10cm for a period of 90 seconds was measured 600 ml. Determine (i) Coefficient of Permeability, (ii) Coefficient of percolation and seepage velocity. Assume the dry density of soil as 16.47kN/m^3 with Gs=2.64 **08**

OR

6 a) Discuss the effect of compaction on different properties of soil **06**

b) Differentiate between standard and modified proctor tests **06**

c) The observations of a standard Proctor test are given below. Plot the compaction curve and determine optimum moisture content. Also compute the voids ratio and degree of saturation at optimum condition. Take Gs=2.77 **08**

Dry Unit Weight (kN/m^3)	16.16	17.06	18.61	18.95	18.78	17.13
Water Content (%)	5.02	8.81	11.25	13.05	14.40	19.25

UNIT - V

7 a) List the assumptions of Mohr-Coulomb shear strength theory **04**

b) Explain the merits and demerits of direct shear test **04**

c) Differentiate sensitivity and thixotropy **04**

d) The triaxial shear test carried out on soil samples gave the following data. Plot Mohr's circles and obtain effective shear parameters **08**

Confining pressure(kN/m^2)	50	100	150
Deviator Stress(kN/m^2)	76	132	186
Pore water Pressure(kN/m^2)	35	59	83

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