Reg. No: ☐☐☐☐☐☐☐☐☐☐

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech III Year I Semester Supplementary Examinations December-2021
SOIL MECHANICS
(Agricultural Engineering)

Time: 3 hours   Max. Marks: 60

PART-A
(Answer all the Questions **5 x 2 = 10** Marks)

1	a	What do you mean by Three-phase diagram?	L1	2M
	b	State Darcy's Law	L1	2M
	c	What do you mean by Newark's influence Chart? write its use	L1	2M
	d	Differentiate between Normally consolidated Soil and Over consolidated soil	L3	2M
	e	Define Critical Void ratio	L1	2M

PART-B
(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2	a	What is Geological Cycle? Explain the Phenomenon of formation of soils	L3	5M
	b	A saturated sample weighs 352gm after drying in an oven its weight is reduced to 290gms.Specific Gravity of solids and Mass Specific Gravity are 2.65 and 1.85 respectively. Determine (i) Water content (ii) Void ratio (iii) Porosity (iv) Degree of Saturation	L3	5M

OR

3	a	What are the uses of Grain size /Particle size Distribution Curve? What is its use in soil Engineering?	L2	5M
	b	The dry unit weight of sand sample in the loosest state is 13.84 KN/m³ and in the densest state is 21.19KN/m³.Determine the Density Index of sand when it has a porosity of 33%. Assume grain specific gravity as 2.68.	L3	5M

UNIT-II

4	a	Define the following (i).Gravity Water (ii). Capillary water (iii). Hygroscopic water (iv) Adsorbed water (v). Structural Water		
	b	A horizontal stratified soil deposits consists of three layers each uniform in itself. The permeability's of these layers are 8×10^{-4} cm/sec, 52×10^{-4} cm/sec and 6×10^{-4} cm/sec and their thicknesses are 7,3 and 10m respectively. Find the effective average permeability of the deposit in the horizontal and vertical directions.	L3	5M

OR

5	a	Define Total stress, Neutral stress and effective stress. Write the relationship between them	L2	5M
	b	A layer of clay of thickness 12.5cm is underlain by sand. The γ_{sat} of clay is 18.5KN/m³.When depth of an open trench excavated in the clay reached a depth of 8m the bottom cracked and the water started entering the trench below. Determine the height to which the water would have risen from the top of sand in a bore hole if it were drilled into sand prior to the excavation. Take γ_w =10.	L3	5M

UNIT-III

6 a Write short note on Pressure Bulb — L2 5M

b Calculate the vertical stress at a point p at a depth of 2.5m directly under the centre of the circular area of radius 2m and subjected to a load of 100kN/m^2.Also calculate the vertical stress at a point q which is at the same depth of 2.5m but 2m away from the centre of the loaded area. Use Boussinesq's equation — L3 5M

OR

7 a Differentiate between compaction and consolidation — L3 5M

b A cohesive soil yielded a maximum dry density of 1.8g/cc at OMC16% during a standard Proctor test with a specific gravity is 2.65. What is the Void ratio, Degree of Saturation, Air content and percentages of air voids in the soil. What is the maximum density it can be further compacted to. — L3 5M

UNIT-IV

8 a What are the assumptions made in Terzaghi's One dimensional consolidation Theory — L2 5M

b In a consolidation test the following results have been obtained when the load was changed from 50kN/m^2 to 100kN/m^2, the void ratio changed from 0.70 to 0.65. Determine the coefficient of volume decrease m_v and the compression index Cc. — L3 5M

OR

9 a Define (i)Degree of Consolidation ii) Coefficient of Consolidation iii)Primary Consolidation — L2 5M

b A fully saturated clay specimen placed in consolidometer and 2kg/cm^2 pressure is applied, after some time the pore pressure is found to be 0.70kg/cm^2 and change in thickness of the sample is found to be 1mm.Find the final settlement that will occur under the applied load. — L3 5M

UNIT-V

10 a What are the merits and demerits of Triaxial test — L2 5M

b In an unconfined compression test, a sample of sandy clay 8cm long and 4cm in diameter fails under a load of 12kg at 10% strain. Compute the shearing resistance taking into account the effect of change in the cross section of the sample. — L3 5M

OR

11 a Explain shear strength of Clays — L3 5M

b A shear vane of 7.5cm diameter and 11.0cm length was used to measure the shear strength of a soft clay. If a torque of 600N-m was required to shear the soil, Calculate the shear strength of the soil. The vane was rotated rapidly to cause remoulding of the soil. The torque required in the remoulded state was 200N-m. Determine the sensitivity of the soil. — L3 5M

END