B. TECH
(SEM V) THEORY EXAMINATION 2019-20
GEOTECHNICAL ENGINEERING

Time: 3 Hours   *Total Marks: 100*

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1.   Attempt *all* questions in brief.   2 x 10 = 20

a.	Define void ratio and porosity.
b.	Discuss the formation of alluvial soil.
c.	Define hydraulic conductivity.
d.	Write Laplace's equation.
e.	Explain about contact pressure.
f.	Elaborate the term O.C.R.
g.	How can you define the shear strength of fine grained and coarse grained soil?
h.	State the assumptions in Rankine's earth pressure theory.
i.	Define net ultimate bearing capacity.
j.	Write the equation for immediate settlement.

SECTION B

2.   Attempt any *three* of the following: 10x3=30

a.	1 m^3 of wet soil weights 20 kN. Its dry weight is 18 kN. Specific gravity of solids is 2.67. Determine the water content, porosity, void ratio and the degree of saturation.
b.	Explain the effect of capillarity in soil. How it affect the effective strength of soil?
c.	Illustrate the differences between compaction and consolidation.
d.	Write a detailed note on Unconfined Compression Test and Vane Shear Test for soils.
e.	A footing of 4mx4m carries a uniform gross pressure of 300 kN/m^2 at a depth of 1.5m in a sand. The saturated unit weight of the sand is 20 kN/m3 and the unit weight above the water table is 17 kN/m3. The shear strength parameters are c'=0, ϕ'=320 . Determine the factor of safety with respect to shear failure for the following cases; a) The water table is at ground surface b) The water table is 1.5m below the surface (The values of N_q & N_γ are 29 & 26 respectively)

SECTION C

3.   Attempt any *one* part of the following: 10x1=10

a.	How we can determine water content of a soil sample using the method of pycnometer? This method is suitable for which kind of soil?

b.	Write a short note on-
	    a) Liquidity index
	    b) Thixotropy
	    c) Activity
	    d) Coefficient of curvature

4.   **Attempt any *one* part of the following:**   **10x1=10**

a.	Discuss quick sand condition? Also derive the expression for quick sand condition.
b.	Differentiate between the standard proctor test & modified proctor test.

5.   **Attempt any *one* part of the following:**   **10x1=10**

a.	Representative samples of a layer of silty clay, 5m thick, were tested in a consolidometer and the following results were obtained: Initial void ratio (e_0 = 0.90), preconsolidation stress (σ_c'=120 kN/m^2) Recompression index (C_r) = 0.03, Compression index (C_c) = 0.27 Estimate the consolidation settlement if the present average overburden stress of the layer is 70 kN/m^2 and the increase in average stress in the layer is 80 kN/m^2.
b.	Derive Terzaghi's one dimensional consolidation theory.

6.   **Attempt any *one* part of the following:**   **10x1=10**

a.	A retaining wall with a smooth vertical back retains sand backfill for depth of 6m. The backfill has a horizontal surface and has following properties c'=0, friction angle = 28°. Bulk unit weight is equals to 16kN/m^3 and saturated unit weight = 20kN/m^3. Calculate the magnitude of total thrust against wall for water table at 3m depth and there is no drainage.
b.	Derive Skempton'spore pressure parameters.

7.   **Attempt any *one* part of the following:**   **10x1=10**

a.	Explain with neat sketches the general shear failure, punching shear failure and local shear failure.
b.	Explain the following- a) Standard Penetration Test b) Dynamic Cone Penetration Test