

FACULTY OF ENGINEERING

B.E. (III/IV Year) (Civil) II Semester (Main) Examination, June 2010

SOIL MECHANICS

Time : 3 Hours]

[Max. Marks : 75

Answer **all** questions from Part A.
Answer any **five** Questions from Part B.

Part A – (Marks : 25)

1. Define “water content” and “Degree of Saturation”. Which of these can never be more than 100%. (2)
2. Differentiate coefficient of Permeability with coefficient of percolation. Which of these is always higher. Justify your answer. (2)
3. Explain the effect of gradation on compaction characteristics. (2)
4. Define consolidation process and state necessary conditions for consolidation to take place. (2)
5. Show that coefficient of active earth pressure is reciprocal of coefficient of passive earth pressure. (2)
6. A dry soil mass weighed 260g and occupied a total volume of 120cc. When this soil is poured into a jar filled with water, the water level raised from 500 to 600cc. Determine true and mass specific gravity. (3)
7. Determine the maximum capillary raise of ground water in a soil mass with mean pore diameter of 0.10 mm at 20° C. (3)
8. Explain primary and secondary consolidation processes. Which of these is significant in design of foundations. (3)
9. Show that unconfined compression test is suitable for cohesive soils only. (3)
10. “The total active earth pressure of a submerged backfill is always more than the same backfill in moist state”. Answer yes / no and justify. (3)

Part B – (Marks :50)Answer any **five** questions.

11. (a) From fundamentals, show that $r_d = \frac{(1-n_a)G.r_w}{1+w.G.}$ with standard notations. (5)
- (b) Explain the procedure for determination of field density using sand replacement method. (5)

[P.T.O.]

12. (a) The results of a wet sieve analysis are as given below:

IS Sieve Size (mm)	4.75	2.00	0.425	0.075	Pan
Wt retained (g)	64	96	122	141	77

Plot the particle size distribution curve. Determine C_u , C_e and comment on gradation of soil. (5)

- (b) In a given soil mass 88% are finer than 0.075mm. The liquid and plastic limit are found to be 68% and 24% respectively. Classify the soil as per IS : 1498-1970. (5)

13. (a) Define 'Permeability' of soils and explain the factors affecting it. (5)

- (b) Draw total, neutral and effective stress distribution diagrams for the site condition given below:

	▽	Water table	(+) 2.00
	≡	GL	0.00
SANDY		/xx	
SOIL	$r_{\text{Sat}} =$	19.80 kN/C _{nm}	(-) 5.00

14. (a) Write a detailed note on field compaction methods. (5)

- (b) A 6m thick fully saturated compressible clay medium with an average initial effective overburden pressure of 90 kpa is undergoing consolidation process due to an increment of 60Kps. Determine the total primary consolidation settlement if $e_o = 1.10$, $PL = 36\%$, $PI = 44$. (5)

15. (a) Explain the "Triaxial Shear test" and state its merits and demerits. (5)

- (b) The results of a direct shear test are as given below:

Normal stress (σ_n)	KPa	60	90
Shear stress (τ)	KPa	40	60

Determine shear parameters.

(5)

16. (a) A 6m high retaining wall is supporting a cohesion less back fill with $\phi = 36^\circ$, $\gamma = 18.6 \text{ KN/m}^3$. During monsoons, the backfill is under submergence due to clogging of weep holes. Determine the percentage increase in total active earth pressure due to submergence. (5)
- (b) Derive expression for factor of safety of a homogeneous cohesive slope using Swedish ship circle method. (5)
17. Write a note on any **two** of the following :
- (a) Vane shear test
 - (b) Use of Kozeny's parabola in seepage analysis.
 - (c) Rebhan's graphical solution.
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