

- a) 14° b) 10°
c) 12° d) 13° .

- a) increases both voids ratio & permeability
- b) decrease both voids ratio & permeability
- c) increases voids ratio & decreases permeability
- d) decreases voids ratio & increases permeability.

- a) Falling head method
- b) Horizontal permeability test
- c) Constant head method
- d) None of these.

- a) Parabolic b) Straight line
c) Circular d) Elliptical.

- vi) The part of water which is held under the influence of soil attractive forces is defined as
- a) Capillary water
 - b) Structural water
 - c) Adsorbed water
 - d) Ground water.
- vii) The clay mineral with largest swelling and shrinkage characteristics is <http://www.makaut.com>
- a) kaolinite
 - b) Illite
 - c) montmorillonite
 - d) none of these.
- viii) The soils that have been deposited from suspension in still, fresh water of lakes is known as
- a) Aeolian
 - b) Lacustrine
 - c) Alluvial
 - d) Glacial.
- ix) The co-efficient of permeability of a soil
- a) increases with decrease in temperature
 - b) increases with decrease in unit weight of water
 - c) increases with increase in temperature
 - d) decreases with an increase in void ratio.
- x) Silty clay is denoted by
- a) CM
 - b) MC
 - c) SM
 - d) MS.

- xi) When consolidation of saturated soil sample takes place, the degree of saturation
- a) Decreases
 - b) Increases
 - c) Remains constant
 - d) Decreases initially and then increases.
- xii) Both the shear stress and the normal stress on the plane of failure are measured directly in
- a) Triaxial shear test
 - b) Vane shear test
 - c) Direct shear test
 - d) Unconfined compressive test.

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. What is Compaction and Consolidation ? What are the differences between these two ? $2 + 3$
3. What do you understand by normally consolidated clay, over consolidated clay and Under consolidated clay ? $1 + 2 + 2$

4. A falling head permeability test is conducted on a 100 mm long soil sample. The diameter of the stand pipe is $1/10^{\text{th}}$ that of the specimen. The test took 900 seconds to fall from a height of 300 to 100 mm. Determine the coefficient of permeability of the specimen.
5. Calculate the stress in a soil mass 6m below the centre of a uniformly loaded circular area of radius 1.5m with a pressure of 60kN/m^2 and thus obtain the exact depth at which the stress reduced to 15% of the applied load.
6. a) What do you understand by quicksand condition ? 3
- b) Find out the value of critical hydraulic gradient for the soil, having its sp. Gravity equal to 2.68 and void ratio equal to 0.67. 2
7. A small cylinder having volume of 500 cm^3 is pressed into a recently compacted fill of embankment filling the cylinder. The mass of the soil in the cylinder is 1050 gm. The dry mass of the soil is 910 gm. Determine the void ratio and the saturation of the soil. Take the specific gravity of the soil grains as 2.7. 5

GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

8. a) State Stokes Law. What are the assumptions of Stokes Law ? 2 + 4

- b) The results of sieve analysis of a soil sample is given below. Draw the particle size distribution curve and state whether the soil is Well graded or poorly graded. 9

IS sieve (mm)	2.36	1.18	0.6	0.425	0.3	0.15	0.075	Pan
Mass retained (gm)	40	100	120	210	40	60	20	10

9. a) Derive Terzaghi's one dimensional consolidation theory and state the assumptions of the theory. 8 10 + 3

- b) What do you mean by single drainage and double drainage condition? http://www.makaut.com 2

10. a) Soil sample failed under a major principal stress of 300 kN/m² with a minor principal stress of 100 kN/m². If for the same soil, minor principal stress is 250 kN/m², find out the major principal stress for i) $\Phi = 30^\circ$ and ii) $\Phi = 10^\circ$. 10

- b) Derive $\sigma_1 = \sigma_3 N_\phi + 2C \sqrt{N_\phi}$. 5

11. a) A clay layer of thickness 6m is settling by 20 cm after 1 year of time. After 1 years of time if the degree of consolidation is 40%, find out the time required for 27 cm settlement. Also find out the coefficient of consolidation. = ? 8

- b) The values of LL, PL and SL are measured by 40%, 30% and 25%. The volume at PL is 0.4 times of the volume at LL. If the volume at SL is 36 ml, find out the volume at LL. 7

12. a) What factors affect permeability of soils ?
b) What will be the ratio of average permeability in horizontal direction to that in the vertical direction for a soil deposit consisting of three horizontal layers, if the thickness and permeability of the second layer are twice of those of the first and those of the third layer twice those of second ?

5 + 10

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