

Q 1. During consolidation process of clayey soils, indicate the sequence of occurrence of the following events in the order from first to last:

- 1• Load being taken up by the pore water
- 2• Load being taken up by the soil grains
- 3• Drainage of water from the pores of the soil

- (a) 1, 2 and 3
(b) 2, 3 and 1
(c) 1, 3 and 2
(d) 2, 1 and 3

Q 2. Settlement due to creep in soils is contingent on

- (a) Primary consolidation
(b) Secondary consolidation
(c) Initial settlement
(d) Compaction settlement

Q 3. Consider the following statements:

- 1• Consolidation time increases with increasing compressibility.
- 2• Consolidation time decreases with increasing permeability.
- 3• Consolidation time is dependent on the magnitude of stress increase.

Which of these statements are correct?

- (a) 1, 2 and 3
(b) 1 and 2 only
(c) 2 and 3 only
(d) 1 and 3 only

Q 4. Compression index developed by Casagrande is

- (a) $C_c = 0.009 (LL + 10\%)$
(b) $C_c = 0.009 (LL - 10\%)$
(c) $C_c = 0.0009 (LL + 10\%)$
(d) $C_c = 0.0009 (LL - 10\%)$

Q 5. A laboratory vane shear test apparatus is used to determine the shear strength of a clay sample and only one end of the vane takes part in shearing the soil. If T = applied torque, H = height of vane and D = diameter of the vane, then shear strength of the clay is given by

(a) $\frac{T}{\pi D^2 \left(H + \frac{D}{6} \right)}$

(b) $\frac{T}{\pi D^2 \left(\frac{H}{2} + \frac{D}{6} \right)}$

(c) $\frac{T}{\pi D^2 \left(H + \frac{D}{12} \right)}$

(d) $\frac{T}{\pi D^2 \left(\frac{H}{2} + \frac{D}{12} \right)}$

Q 6. A soil fails under an axial vertical stress of 100 kN/m² in unconfined compression test. The failure plane makes an angle of 50° with the horizontal. The shear parameters 'c' and 'φ' respectively will be

(a) 41.9 kN/m², 0°

(b) 50.0 kN/m², 0°

(c) 41.9 kN/m², 10°

(d) 50.0 kN/m², 10°

Q 7. If s is the shear strength, c and ϕ are shear strength parameters, and σ_n is the normal

stress at failure, then Coulomb's equation for shear strength of the soil can be represented by

(a) $C = s + c \tan \phi$

(c) $S = \sigma_n + c \tan \phi$

(b) $C = s - \sigma_n \tan \phi$

(d) $S = c - \sigma_n \tan \phi$

Q 8. A and B are Skempton's pore pressure coefficients. For saturated normally consolidated soils.

(a) $A > 1$ and $B > 1$

(b) $A > 1$ and $B < 1$

(c) $A < 1$ and $B > 1$

(d) $A < 1$ and $B = 1$

Q 9. A dry sand specimen is put through a triaxial test. The cell pressure is 50 kPa and the deviator stress at failure is 100 kPa. The angle of internal friction for the sand specimen is

(a) 15°

(b) 30°

(c) 37°

(d) 45°

Q 10. A triaxial test was conducted on a granular soil. At failure The effective minor principal stress at failure was 100 kpa. The values of approximate ϕ and the principal stress difference at failure are, respectively

- (a) 45° and 570 kpa
- (b) 40° and 400 kpa
- (c) $3r$ and 300 kpa
- (d) 30° and 200 kpa

Q 11. In the consolidated drained test on a saturated soil sample, pore water pressure is zero during.

- (a) Consolidation stage only
- (b) Shearing stage only
- (c) Both consolidation and shearing stages
- (d) Loading stage

Q 12. Match List-I (Investigator) with List-II (Equation) and select the correct answer:

List – I	List – II
A• Skempton	1• $V = k_i$
B• Coulomb	2• $\sigma = \sigma - u$
C• Stokes	3• $V = \frac{D^2(\gamma_s - \gamma_w)}{18\eta}$
D• Terzaghi	4• $S = c + \sigma \tan \phi$
	5• $U = B [\sigma_3 + A (\sigma_1 - \sigma_3)]$

Codes :

- A• A–4, B–5, C–3, D–2
- B• A–5, B–4, C–3, D–2
- C• A–4, B–5, C–1, D–3
- D• A–5, B–4, C–2, D–3

Q 13. Consider the following features of direct shear test:

- 1• Failure takes place on the predetermined plane.
- 2• It is a quick test.
- 3• Drainage conditions cannot be changed.
- 4• Failure of the sample is progressive.

Which of these are the disadvantages of direct shear test?

- (a) 1, 2 and 3
- (b) 1, 3 and 4
- (c) 1, 2 and 4
- (d) 3 and 4

Q 14.In a triaxial test at failure, major principal stress was 180 kPa, minor principal stress was 100 kPa, and pore pressure was 20 kPa. The tangent of the angle of shearing resistance of the sandy soil tested is

- (a) $1/3$
- (b) 217
- (c) $1/2$
- (d) $1/6$

Q 15.Laboratory vane shear test can also be used to determine

- (a) Shear parameters of silty sand
- (b) Shear parameters of sandy clay
- (c) Liquid limit of silty clay
- (d) Plastic limit of clayey slit

Q 16.A CD triaxial test was conducted on a granular soil. At failure σ_3 was 3.0. The effective minor principal stress of failure was 75 kPa. The principal stress difference at failure will be

- (a) 75 kPa
- (b) 150 kPa
- (c) 225 kPa
- (d) 300 kPa

Q 17.Which one of the following is the appropriate triaxial test to assess the immediate stability of an unloading problem, such as an excavation of a clay slope?

- (a) UU test
- (b) CU test
- (c) CD test
- (d) Unconsolidated drain test

Q18.Consider the following statements:

- 1• A sand with its void ratio higher than its critical void ratio increases in volume when sheared.
- 2• A sand with its void ratio less than its critical void ratio increases in volume when sheared
- 3• For a sand at critical void ratio, the volume change during shear is minimum.

Which of the statements given above are correct?

- (a) 1, 2 and 3
- (b) Only 1 and 2
- (c) Only 2 and 3
- (d) Only 1 and 3

Q19. Consider the following statements: Apparent cohesion in sands is exhibited mainly due to

- 1• Reduction in density.**
- 2• Increase in density.**
- 3• Capillary moisture in pores.**

Which of the above statements is/are?

- (a) 1,2 and 3**
- (b) 1 and 3 only**
- (c) 2 and 3 only**
- (d) 2 only**

