

CE8591 Foundation Engineering

1. The method of the slices is applicable to

- A. homogenous soils
- B. stratified soils
- C. saturated soils
- D. non-uniform slopes
- E. all the above.

Answer: Option A

2. When the seepage pressure becomes equal to the pressure due to submerged weight of a soil, the effective pressure is reduced to zero and the soil particles have a tendency to move up in the direction of flow. This phenomenon is generally known

- A. quick condition
- B. boiling condition
- C. quick sand
- D. all the above.

Answer: Option D

3. The phreatic line in an earth dam may be

- A. circular
- B. elliptical
- C. parabolic
- D. a straight line
- E. all the above.

Answer: Option C

4. Pick up the correct statement from the following:

- A. A maximum value of dry density is obtained at optimum water content
- B. At low value of water content most soils tend to be stiff.
- C. At high water content, the dry density decreases with an increase of water content.
- D. An airless soil will have maximum possible value of dry density for the given water content
- E. All the above.

Answer: Option E

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5. The shearing strength of a cohesion-less soil depends upon
- A. dry density
 - B. rate of loading
 - C. confining pressure
 - D. nature of loading.

Answer: Option C

6. According to IS : 2720 - 1965, the composition of a dispersing solution used in pipette analysis for determining the size of particles, is
- A. sodium-hexametaphosphate 33 g, sodium carbonate 7 g and distilled water one litre
 - B. sodium-hexametaphosphate 7 g, sodium carbonate 33 g and distilled water one litre
 - C. sodium-hexametaphosphate 23 g, sodium carbonate 17 g and distilled water one litre
 - D. none of these.

Answer: Option A

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7. Cohesive soils are generally
- A. plastic and also compressible
 - B. elastic and also compressible
 - C. plastic but incompressible
 - D. none of these.

Answer: Option A

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8. If the coefficient of the active pressure K_a is $1/3$, the coefficient of passive pressure K_p , is
- A. $1/3$
 - B. $2/3$
 - C. 1
 - D. $3/2$
 - E. 3

Answer: Option E

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9. The inventor of the term soil mechanics, was
- A. Kray
 - B. Dr. Karl Terzaghi
 - C. Leygue

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D. Fellenius.

Answer: Option B

10. Compression of soil occurs rapidly if voids are filled with

A. air

B. water

C. partly with air and partly with water

D. none of these.

Answer: Option A

11. If drainage is permitted throughout the test, during the application of both normal, and shear stresses so that full consolidation occurs and no excess pore pressure is set up at any stage of the test, is known as

A. quick test

B. drained test

C. consolidated undrained test

D. none of these.

Answer: Option B

12. A soil sample of mass specific gravity 1.92, has a moisture content 30%. If the specific gravity of solids is 2.75, the degree of saturation, is

A. 95.4%

B. 95.5%

C. 95.6%

D. 95.7%

Answer: Option D

13. For slopes of limited extent the surface of slippage, is usually along

A. a parabolic arc

B. an elliptical arc

C. a straight line

D. a circular arc.

Answer: Option D

14. For a base failure of a slope, depth factor

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- A. $D_f = 1$
- B. $D_f < 1$
- C. $D_f > 1$
- D. none of these.

Answer: Option C

15. A critical hydraulic gradient may occur when

- A. flow is in upward direction
- B. seepage pressure is in upward direction
- C. effective pressure is zero
- D. all the above.

Answer: Option D

16. Plasticity index is defined as the range of water content between

- A. liquid and plastic limit
- B. plastic limit and semi solid limit
- C. semi-solid limit and liquid limit
- D. liquid limit and solid limit.

Answer: Option A

17. The minimum depth of building foundations on

- A. sandy soils is 80 cm to 100 cm
- B. clay soils is 90 cm to 160 cm
- C. rocky soils is 5 cm to 50 cm
- D. all the above.

Answer: Option D

18. The ratio of the undrained strength in the undrained state to the undrained strength, at the same water content, in the remoulded state, is called the sensivity of the clay. Its value for quick clays is

- A. 4
- B. 8
- C. 12
- D. 16

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E. 20

Answer: Option E

19. The total weight of a pycnometer with water and oven dried soil 20 (g) is 1600 g. The pycnometer filled with water alone weighs 1500 g. The specific gravity of the soil, is

A. 1.0

B. 1.5

C. 2.0

D. 2.5

Answer: Option C

20. The consolidation time for soils

A. increases with increasing compressibility

B. decreases with increasing permeability

C. increases rapidly with increasing size of soil mass

D. is independent of the magnitude of the stress change.

E. All the above.

Answer: Option E

21. The zero atmospheric pressure is at

A. sea level

B. mean sea level

C. water table

D. phreatic surface

E. both (c) and (d) of the above.

Answer: Option E

22. A soil mass coated with a thin layer of paraffin weighs 460 g. When immersed, it displaces 299 cc of water. The weight of paraffin is 10 g. If specific gravity of solids is 2.5 and that of paraffin 0.9, the void ratio of soil, is

A. 0.55

B. 0.60

C. 0.65

D. 0.70

Answer: Option B

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23. Pick up the incorrect definition from the following:

- A. Ratio of the compressive strength of unconfined undisturbed soil to that of remoulded soil, is known as the sensitivity of the soil sample
- B. The rotation of soil particles into stable state while remoulding, is known as the thioisotropy of soil
- C. The water content at which a soil changes from the liquid state to solid state, is known liquid limit of the soil
- D. The water content at which a soil flows, is known plastic limit of the soil
- E. None of these.

Answer: Option D

24. In a flow net

- A. flow lines and equipotential lines cross each other at right angles
- B. fields are rectangles whose length is twice the breadth
- C. smaller the dimensions of the field, smaller will be the hydraulic gradient and velocity of flow through it
- D. for homogeneous soil, the curves are smooth and circular.

Answer: Option A

25. The ratio of the volume of water present in a given soil mass to the total volume of its voids, is known

- A. porosity
- B. void ratio
- C. percentage voids
- D. degree of saturation.

Answer: Option D

26. Stoke's law does not hold good if the size of particle is smaller than

- A. 0.0002 mm
- B. 0.002 mm
- C. 0.02 mm
- D. 0.2 mm

Answer: Option A

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27. In a purely cohesive soil, the critical centre lies at the intersection of
- A. perpendicular bisector of slope and the locus of the centre
 - B. perpendicular drawn at $1/3$ rd slope from toe and the locus of the centre
 - C. perpendicular drawn at $2/3$ rd slope from toe and the locus of the centre
 - D. directional angles
 - E. none of these.

Answer: Option D

28. The angle of internal friction, is least for
- A. angular-grained loose sand
 - B. angular -grained dense sand
 - C. round-grained loose sand
 - D. round-grained loose sand
 - E. clays.

Answer: Option E

29. In non-cohesive soil in passive state of plastic equilibrium
- A. major principal stress is horizontal
 - B. minor principal stress is vertical
 - C. major principal stress is vertical
 - D. minor and major principal stresses are equally inclined to the horizontal.

Answer: Option B

30. In active state of plastic equilibrium in a non cohesive soil with horizontal ground surface
- A. major principal stress is horizontal
 - B. minor principal stress is vertical
 - C. major principal stress is vertical
 - D. minor and major principal stresses are equally inclined to horizontal.

Answer: Option C

31. The reduction in volume of soil due to squeezing out of water from the voids, is termed
- A. primary consolidation
 - B. primary compression

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- C. primary time effect
- D. all the above.

Answer: Option D

32. 'Drift' is the material picked up, mixed, disintegrated, transported and redeposited by

- A. wind
- B. gravitational force
- C. glaciated water
- D. all the above.

Answer: Option C

33. The consistency index of a soil is defined as the ratio of

- A. liquid limit plus the natural water content to the plasticity index of the soil
- B. liquid limit minus the natural water content to the plasticity index of the soil
- C. natural water content of a soil minus plastic limit to the plasticity index of the soil
- D. natural water content of a soil plus its plastic limit to the plasticity index of the soil.

Answer: Option B

34. The weight of a container is W_1 and that of container with soil sample, is W_2 . If the weight of the container and oven dried soil sample is W_3 , the moisture content of the soil, is

A. $\frac{W_2 - W_3}{W_3 - W_1} \times 100$

B. $\frac{W_3 - W_2}{W_1 - W_2} \times 100$

C. $\frac{W_1 - W_2}{W_2 - W_3} \times 100$

D. $\frac{W_2 - W_1}{W_1 - W_3} \times 100$

Answer: Option A

35. The shear strength in plastic undrained clay, is due to

- A. inter-granular friction

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- B. internal friction
- C. cohesion
- D. none of these.

Answer: Option C

36. The Terzaghi's general bearing capacity equation for a continuous footing is given by (where N_c , $2V\&$ and N_y are bearing capacity factors.)

- A. $qf = cN_c + \gamma DN_q + 0.5\gamma BN_y$
- B. $qf = cN_c - \gamma DN_q + 0.5\gamma BN_y$
- C. $qf = cN_c + \gamma DN_q - 0.5\gamma BN_y$
- D. $qf = cN_c - \gamma DN_q - 0.5\gamma BN_y$

Answer: Option A

37. A clay subjected to pressure in excess to its present over-burden, is said to be

- A. pre-compressed
- B. pre-consolidated
- C. over-consolidated
- D. all the above.

Answer: Option D

38.

The expression $\frac{G_s}{1 + \omega G_s} \rho_w$ is used for

- A. dry density
- B. bulk density
- C. degree of saturation
- D. optimum water content.

Answer: Option A

39. If C_v is the coefficient of consolidation, t is the time and d is drainage path of one dimensional consolidation of soil, the time factor T_v , is given by

A. $T_v = \frac{d^2}{C_v t}$

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B. $T_v = \frac{t^2}{d^2 C_v}$

C. $T_v = \frac{C_v^3}{d^2 t}$

D. $T_v = \frac{C_v t}{d^2}$

Answer: Option D

40. The total active earth pressure due to dry back fill with no surcharge, acts at $H/3$ above the base of the wall and is directly proportional to

A. H

B. \sqrt{H}

C. H^2

D. H^3 .

Answer: Option C

41. If e_0 , e , σ' , σ'_0 have their usual meanings, the coefficient of compressibility (a_c), is given by

A. $a_c = \frac{e - e_0}{e' + e'_0}$

B. $a_c = \frac{e_0 - e}{\sigma' - \sigma'_0}$

C. $a_c = \frac{\sigma' - \sigma'_0}{e_0 - e}$

D. $a_c = \frac{\sigma'_0 - \sigma'}{e - e_0}$

Answer: Option B

42. A saturated soil sample has water content of 40% and specific gravity of soil particles 2.7. The void ratio of the soil, is

A. 0.4

B. 0.52

C. 1.08

D. none of these.

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Answer: Option C

43. For testing a saturated clay for shear strength, the test recommended, is

- A. direct shear test
- B. triaxial compression test
- C. unconfined compression test
- D. all the above.

Answer: Option C

44. The critical exist gradient of seepage water in soils, increases with

- A. an increase in specific gravity
- B. a decrease in specific gravity
- C. a decrease in void ratio
- D. both (a) and (c)
- E. none of these.

Answer: Option D

45. The coefficient k_a of the active earth pressure, is given by

- A. $k_a = \frac{1 - \tan \phi}{1 + \tan \phi}$
- B. $k_a = \frac{1 + \tan \phi}{1 - \tan \phi}$
- C. $k_a = \frac{1 + \sin \phi}{1 - \sin \phi}$
- D. $k_a = \frac{1 - \sin \phi}{1 + \sin \phi}$

Answer: Option D

46. Pick up the correct statement from the following:

- A. The void ratio in soils is defined as the ratio of the volume of voids to the volume of solids
- B. The porosity of a soil is defined as the ratio of the volume of voids to the gross volume of the soil
- C. The bulk density of a soil is defined as the unit weight of the soil
- D. The dry density of a soil is defined as weight of solids to the total volume of the soil

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E. All the above.

Answer: Option E

47. The shear strength of a soil

- A. increases with an increase in the normal stress
- B. is proportional to the cohesion of the soil
- C. is generally known as the strength of the soil
- D. is proportional to the tangent of the angle of internal friction
- E. all the above.

Answer: Option E

48. The property of a soil which permits water to percolate through it, is called

- A. moisture content
- B. permeability
- C. capillarity
- D. none of these.

Answer: Option B

49. The triaxial apparatus is usually used for

- A. unconsolidated-undrained test
- B. consolidated-undrained test
- C. drained test
- D. all the above tests.

Answer: Option D

50. A pycnometer is used to determine

- A. voids ratio
- B. dry density
- C. water content
- D. density index.

Answer: Option C

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