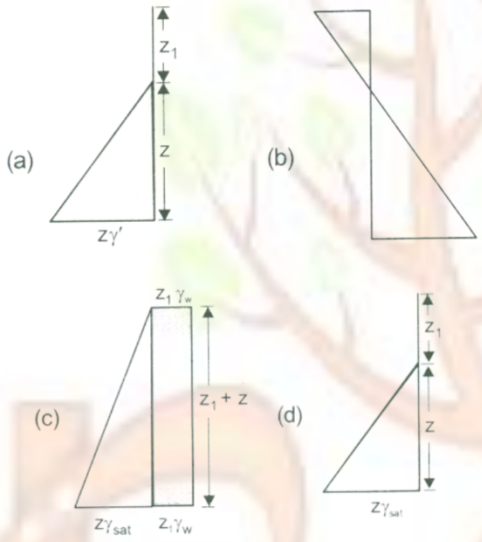
1. Which one of the following diagrams represents the effective pressure distribution for a saturated soil mass of depth z submerged under water of height Z1 above its top level (y' = submerged density of soil Ysat = saturated density of soil and Yw = unit weight of water)?



2. Assertion (A): Effective vertical stress at some depth below a river bed is unaffected by the water depth in the river.
Reason

(R): Equal amounts of increase in total stress and pore pressure will not change the effective stress.

3. The total, neutral and effective vertical stresses (in Um2) at a depth of 5m below the surface of a fully saturated soil deposit with a saturated density of 2t/m3 would , respectively, be

(a) 5, 5 and 10

(b) 5, 10 and 5

(c) 10, 5 and 10

(d) 10, 5 and 5

4. A stratified soil deposit has three layers of thicknesses: Z1 = 4, Z2 = 1, Z3 = 2 units and

the corresponding permeability of K1 = 2, K2 = 1 and K3 = 4, respectively. The average permeability perpendicular to the bedding planes will be

(a) 4

(b) 2

(d) 8

(d) 16

5. In a falling head permeability test on a soil, the time taken for the head to fall from ho to h1is t. The test is repeated with same initial head ho' The final head h' is noted in time t/2. Which one of the following equations gives the relation between h', ho and h.?

(a) h' = h0 / h1

(b) h' = √h0 / h1

(c) h' = h0 h1

(d) h' = √h0 h1

6. The installation ·of sand drains in clayey soil causes the soil adjacent to the sand drains to undergo which one of the following?

(a) Increase in porosity

(b) Increase in compressibility

(c) Decrease in horizontal permeability

(d) Decrease in shear strength

7. Consider the following statements:

1• Organic matter increases the permeability of a soil

2• Entrapped air decreases the permeability of a soil

Which of the statements given above is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

8. Consider the following statements:

1• Permeability of a soil decreases as the effective stress acting on the soil increases.

2• The presence of organic matter in the soil increases its permeability.

3• Entrapped air decreases the permeability of a soil.

Which of the above statements is/are correct?

(a) 1 only

(b) 1 and 2

(c) 2 and 3

(d) 1 and 3

9. Consider the following statements: The coefficient of permeability K depends upon

1• Void ratio of the soil.

2• Duration of flow.

3• Equivalent diameter of the soil grains.

4• Shape of the particle.

Which of the above statements are correct?

(a) 1, 2, 3 and 4

(b) 2 and 3 only

(C) 1, 3 and 4 only

(d) 3 and 4 only

10. A soil has discharge velocity of 5 x 10-7 m/s and a void ratio of 0·50. Its seepage velocity will be

(a) 15 x 10-7 m/s

(b) 10 x 10-7 m/s

(c) 20 x 10-7 m/s

(d) 30 x 10-7 m/s

11. The void ratio of a given soil A is twice that the another soil B, while the effective size of particles of soil A is one-third of that of .soil B. The ratio of height of capillary rise of water in soil A to that in soil B will be

(a) 0.67

(b) 1.0

(c) 1.5

(d) 2.0

12. Consider the following statements:

1• Effective stress in a sand layer below a lake with standing water does not alter as the water level fluctuates.

2• Regarding water table below the ground surface, any rise in the water table causes equal changes in both pore pressure and effective stress.

3• Capillary saturation will cause the effective stress to increase.

Which of the above statements are correct?

(a) 1, 2 and 3

(b) 1 and 2 only

(c) 2 and 3 only

(d) 1 and 3 only

13. A flow net is drawn to obtain

(a) Seepage, coefficient of permeability and uplift pressure

(b) Coefficient of permeability, uplift pressure and exit gradient

(c) Exit gradient, uplift pressure and seepage quantity

(d) Exit gradient, seepage and coefficient of - permeability

14. A uniform sand stratum 2.5 m thick has a specific gravity of 2.62 and a natural void ratio of 0.62. The hydraulic head required to cause quick sand condition in the sand stratum is

(a) 0.5 m

(b) 1.5 m

(c) 2.5 m

(d) 3.5 m

15. An upward hydraulic gradient i of a certain magnitude will initiate the phenomenon of boiling in granular soils. The magnitude of this gradient is

(a) 0 < i < 0.5

(c) i ~ 1.0

(b) 0.5 < I < 1.0

(d) 1 < i < 2

16. A deposit of fine sand has a porosity 'n' and specific gravity of soil solids is G The hydraulic gradient of the deposit to develop boiling condition of sand is given by

A Ic = (G - 1) (1 - n)

B. Ic = (G - 1) (1 + n)

C. $i_c = \frac{G-1}{1-n}$

D. $i_c = \frac{G-1}{1+n}$