Soil Mechanics

الاسئلة الصعبة لمادة ميكانيك التربة بنسبة (٢٠٪) مع الاجوبة النموذجية

1- Soil Origin and Rock (15%)

Question No. 01

Fine-grained soils formed from _____.

(A) Mechanical weathering
(B) Chemical weathering
(C) Mechanical and Chemical weathering
(D) Acids and salts reactions with minerals
(E) None of the above

Answer: Option (B)

Question No. 02

For a given soil mass, the void ratio is 0.60, water content is 18 % and the specific gravity of the soil particles is 2.6. The degree of saturation of the soil is?

(A) 30%
(B) 50%
(C) 78%
(D) 82.5%
(E) 40%

Answer: Option (C)

Question No. 03

There are _____ types of weathering.

(A) Two
(B) Three
(C) Five
(D) Four
(E) six

Answer: Option (A)

2- Classification of Soil (5%)

Question No. 04

For a coarse grained soil (Sandy soil), if the percent of fines equal to 7% the soil can be classify as:

(A) SW-SM or SW-SC or SP-SM or SP-SC
(B) SW-SM or SW-SC or SP-SM or SP-SC or SC-SM
(C) SC-SM or SW-SC or SP-SM or SP-SC

(D) GW-SM or GW-SC or GP-SM or GP-SC
(E) (E) None of the above

Answer: Option (A)

3- Soil Compaction (10%)

Question No. 05

There are three factors affect compaction:

(A) moisture content, soil type, and compaction effort
(B) void ratio, soil type, and compaction effort
(C) moisture content, void ratio, and compaction effort
(D) moisture content, soil type, and degree of saturation
(E) none of the above

Answer: Option (A)

Question No. 06

The maximum dry unit weight and the field unit weight of cohesive soil are 18.55 kN/m3 and 16.88 kN/m3, respectively. The relative compaction in the field qual to:

(A) 95.1%
(B) 94.2%
(C) 89.2%
(D) 90.1%
(E) 92%

Answer: Option (D)

4- Flow in Soils (15%)

Question No. 07

The solution of 1-D Laplace equation $\frac{\partial^2 h}{\partial z^2}$ is:

(A) $h = A_1 z + A_2$
(B) $h = A_1 z^2 + A_2$
(C) $h = A_1 z^2 + A_2 z + A_3$
(D) $h = A_1$
(E) none of the above

Answer: Option (A)

Question No. 08

The seepage velocity, v_s equal to:

(A) $v_s = \frac{v}{n}$
(B) $v_s = \frac{v}{e}$
(C) $v_s = \frac{v}{n+1}$

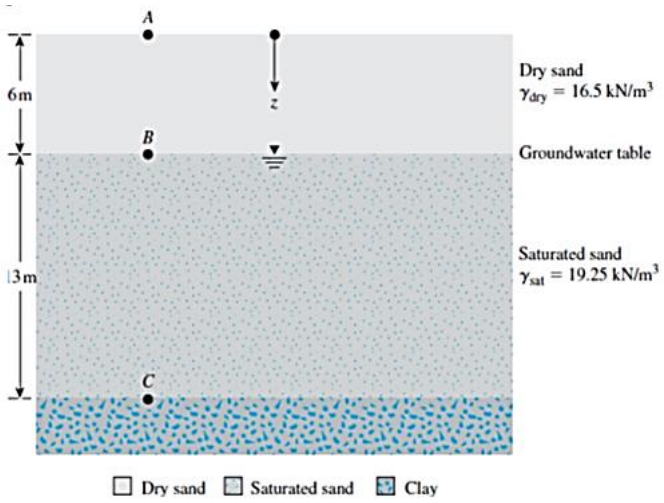
(D) $v_s = \frac{v}{1+e}$
(E) none of the above

Answer: Option (A)

5- Effective Stress Concept (10%)

Question No. 09

A soil profile is shown in Figure below. The effective stress at point C is:

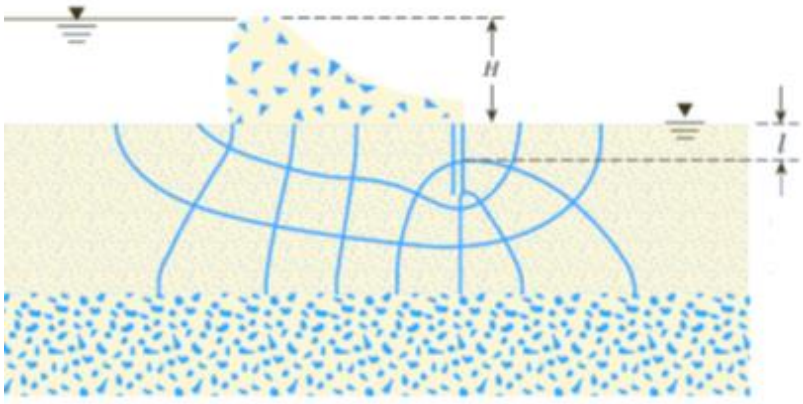


(A) 221.72 kN/m^2
(B) 241.45 kN/m^2
(C) 349.70 kN/m^2
(D) 99.88 kN/m^2
(E) 190 kN/m^2

Answer: Option (A)

Question No. 10

For the weir shown below , given H= 4, l = 1.5 m, and saturated unit weight = 19.5 kN/m^3, the factor of safety against piping is:



(A) 3.11
(B) 2.2

(C) 4.5
(D) 3.5
(E) 1.5

Answer: Option (A)

6- Stress in Soil Mass (5%)

Question No. 11

The radius of Mohr's circle is equal to:

(A) σ_x
(B) τ_{max}
(C) σ_y
(D) $(\sigma_x + \sigma_y)/2$
(E) none of the above

Answer: Option (B)

7- Compressibility of Soil (20%)

Question No. 12

The coefficient of volume change *mv* is given by?

(A) $m_v = \frac{1}{\Delta\sigma'}$
(B) $m_v = \frac{-\Delta e}{1-e_o}\frac{1}{\Delta\sigma}$
(C) $m_v = \frac{-\Delta e}{1+e_o}\frac{1}{\Delta\sigma'}$
(D) $m_v = \frac{-\Delta e}{1-e_o}$
(E) none of the above

Answer: Option (C)

Question No. 13

Which one of the following is the part of assumptions made by Terzaghi while developing the mathematical statement of the consolidation process?

(A) The soil is non-homogenous
(B) The soil particles and water are incompressible
(C) The partial deformation of soil is due to partial change in volume
(D) Coefficient of permeability is variable during consolidation
(E) none of the above

Answer: Option (B)

Question No. 13

In a consolidation test, when the load is changed from 50 kN/m^2 to 100 kN/m^2, then the void ratio changes from 0.8 to 0.6. the coefficient of compressibility will be?

(A) 0.002 m^2/kN
(B) 0.003 m^2/kN
(C) 0.001 m^2/kN
(D) 0.004 m^2/kN
(E) 0.005 m^2/kN

Answer: Option (D)

8- Shear Strength of Soil (20%)

Question No. 14

The principal stresses at a point in a material are 80 kPa and 40 kPa. The normal and shear stress on a plane inclined at 30^o to the major principal plane is:

(A) 70 and 17.3 kPa
(B) 45 and 15.0 kPa
(C) 90 and 45.0 kPa
(D) 50 and 20.0 kPa
(E) 15 and 10.0 kPa

Answer: Option (A)

Question No. 15

On a failure plane in a cohesionless soil sample, the normal and shear stresses are found as 10.0 kPa and 4.0 kPa. the angle of shearing resistance is:

(A) 21.8^o
(B) 29.1^o
(C) 25.2^o
(D) 17.5^o
(E) 10^o

Answer: Option (A)

Question No. 16

A cylindrical soil sample failed at an axial stress of 140 kPa in an unconfined compression test. The failure plane makes an angle of 54^o with horizontal. The internal friction angle of soil is:

(A) 18^o
(B) 20^o
(C) 22^o
(D) 15^o
(E) 30^o

Answer: Option (A)