



قائمة الاسئلة

ميكانيكا تربة 1- قسم الهندسة المدنية- المستوى الثالث- درجة الأختبار 50 درجة- الزمن ثلاث ساعات

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1) If a fully saturated soil mass has a water content of 100%, then its void ratio is

- 1) - less than the specific gravity
- 2) - greater than the specific gravity
- 3) + equal to specific gravity
- 4) - does not depend on specific gravity

2) Maximum size of clay particles, is:

- 1) + 0.002 mm
- 2) - 0.04 mm
- 3) - 0.06 mm
- 4) - 0.08 mm

3)

For an anisotropic soil, the permeability in the horizontal and vertical direction are k_x and k_y respectively. What will be the effective coefficient of permeability of the soil?

- (A) $k_x + k_y$
- (B) $k_x k_y$
- (C) $\sqrt{(k_x k_y)}$
- (D) k_x / k_y

- 1) - A
- 2) - B
- 3) + C
- 4) - D

4) Hydrometer readings are corrected for

- 1) - Temperature correction
- 2) - Meniscus correction
- 3) - Dispersing agent correction
- 4) + Temperature, meniscus and dispersing agent corrections.

5) What are the essentials, required to draw a flow net?

- 1) + Top Flow and Phreatic line
- 2) - Stream line
- 3) - None of the mentioned
- 4) - All of the mentioned

6) Which of the following test is commonly adopted for determining soil permeability of soil formations?

- 1) + Pumping-in test and Pumping-out test
- 2) - Horizontal capillary test
- 3) - None of the mentioned
- 4) - All of the mentioned

7) The minimum water content at which the soil just begins to crumble when rolled into threads 3 mm in diameter is known

- 1) - liquid limit
- 2) - permeability limit.



- 3) - Shrinkage limit
4) + plastic limit
8)

The laplacian form of equation for anisotropic soil is

- (A). $(\partial^2 h / \partial x^2) + (\partial^2 h / \partial y^2) = 0$
(B). $k_x (\partial^2 h / \partial x^2) + (\partial^2 h / \partial y^2) = 0$
(C). $(\partial^2 h / \partial x^2) + (\partial^2 h / \partial y^2) \cdot k_y = 0$
(D). $k_x / k_y \times (\partial^2 h / \partial x^2) + (\partial^2 h / \partial y^2) = 0$

- 1) - A
2) - B
3) - C
4) + D
- 9) The consistency index of a soil is defined as the ratio of
- 1) - liquid limit plus the natural water content to the plasticity index of the soil
2) + liquid limit minus the natural water content to the plasticity index of the soil
3) - natural water content of a soil minus plastic limit to the plasticity index of the soil
4) - natural water content of a soil plus its plastic limit to the plasticity index of the soil.
- 10) The property of a soil which allows it to be deformed rapidly without rupture, elastic rebound and also a volume change, is known
- 1) - Porosity
2) + Plasticity
3) - Permeability
4) - Ductility
- 11) Pick up the correct statement from the following:
- 1) - The void ratio in soils is defined as the ratio of the volume of voids to the volume of solids.
2) - The porosity of a soil is defined as the ratio of the volume of voids to the gross volume of the soil
3) - The bulk density of a soil is defined as the unit weight of the soil
4) + All of these.
- 12) What are the types of flow head that exist at any point in a saturated soil mass?
- 1) - Piezometric head or pressure head
2) - Velocity head
3) - Position head
4) + All of the mentioned
- 13) What is the line within a dam section, below which there are positive hydrostatic
- 1) + Phreatic and Seepage line
2) - Equipotential line
3) - None of the mentioned
4) - All of the mentioned
- 14) What kind of method was suggested by Casagrande, for determining the phreatic line?
- 1) - Experimental method
2) - Analytical method
3) + Graphical method



- 4) - All of the mentioned
- 15) Buoyant unit weight equals the saturated density
- 1) - Multiplied by unit weight of water.
 - 2) - Divided by unit weight of water.
 - 3) - Plus unit weight of water.
 - 4) ☒ Minus unit weight of water.
- 16) Pick up the correct statement from the following
- 1) - A maximum value of dry density is obtained at optimum water content.
 - 2) - At low value of water content most soils tend to be stiff.
 - 3) - At high water content, the dry density decreases with an increase of water content.
 - 4) ☒ All of these.
- 17) The ratio of the difference between the void ratio of the soil in its loosest state and its natural void ratio (e) to the difference between the void ratios in the loosest and fully dense state, is generally termed as
- 1) - degree of density
 - 2) - relativity
 - 3) - density index
 - 4) ☒ All of these.
- 18) The clay mineral with the largest swelling and shrinkage characteristics is
- 1) - Kaolinite.
 - 2) - Illite.
 - 3) ☒ Montmorillonite.
 - 4) - None of these.
- 19) The change of moisture content of soils, changes the
- 1) - Value of the angle of repose
 - 2) - Amount of compaction required
 - 3) - Cohesive strength of soil
 - 4) ☒ All of these
- 20) For general engineering purposes, soils are classified by :
- 1) - Particle size classification system
 - 2) - Textural classification system
 - 3) - High Way Research Board (HRB), classification system
 - 4) ☒ Unified soil classification system
- 21) A rock toe and a horizontal filter is provided on the downstream base of an earthen dam in order to
- 1) - Prevent piping action in the dam body
 - 2) - Prevent piping action in the dam foundation
 - 3) - Reduce the seepage quantity by blocking its flow
 - 4) ☒ Collect and drain out the seepage flow
- 22) Pick up the correct statement from the following:--
- 1) - The void space between the soil grains, is filled partly with air and partly with water.
 - 2) - In perfectly saturated soil, the voids are completely filled with water.
 - 3) - In dry soil, the voids are completely filled with air.
 - 4) ☒ All of these.
- 23)



A soil has bulk density 2.30 g/cm^3 and water content 15 per cent, the dry density of the sample, is

- (A) 1.0 g/cm^3
- (B) 1.5 g/cm^3
- (C) 2.0 g/cm^3
- (D) 2.5 g/cm^3

- 1) - A
 - 2) - B
 - 3) + C
 - 4) - D
- 24) The liquidity index is defined as a ratio expressed as percentage of
- 1) - plastic limit minus the natural water content, to its plasticity index
 - 2) + natural water content minus its plastic limit to its plasticity index
 - 3) - natural water content plus its plastic limit to its plasticity index
 - 4) - liquid limit minus the natural water content to the plasticity index.
- 25) The soil moisture driven off by heat is called
- 1) - free water
 - 2) + hygroscopic water
 - 3) - gravity water
 - 4) - None of these.
- 26) For general engineering purposes, soils are classified by
- 1) - Particle size classification system
 - 2) - Textural classification system
 - 3) - High Way Research Board (HRB), classification system
 - 4) + Unified soil classification system
- 27) Pick up the correct statement from the following:---
- 1) - A maximum value of dry density is obtained at optimum water content.
 - 2) - At low value of water content most soils tend to be stiff.
 - 3) - At high water content, the dry density decreases with an increase of water content.
 - 4) + All of these.
- 28) The seepage forces within the filter are controlled up to permissible small magnitudes when the ratio of D15 of filter to D15 of base material is
- 1) + Between 5 to 40
 - 2) - Less than 5
 - 3) - Between 5 to 20
 - 4) - Less than 4
- 29) 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
- 1) - quick condition
 - 2) - boiling condition
 - 3) - quick sand



- 4) ☒ all of these.
- 30) A soil has voids ratio of 0.78 and critical gradient at which quick sand condition occurs is 0.94. Calculate the specific gravity.
- 1) - 2.65
 - 2) - 2.5
 - 3) ☒ 2.67
 - 4) - 2.71
- 31) A piezometric surface is the line joining
- 1) - Equal velocity of flow
 - 2) - Soil stratum
 - 3) - Equal voids ratio in soil mass
 - 4) ☒ Water level in piezometers
- 32) Darcy's law describes the state of flow within individual pores.
- 1) - True.
 - 2) ☒ False.
- 33) The difference between the elevations of water surfaces in piezometers is
- 1) - Hydraulic gradient
 - 2) - Velocity
 - 3) ☒ Head loss
 - 4) - Depth or length of sample
- 34)

The effective pressure subjected to seepage pressure is given by

- (A) $\sigma' = \gamma_{sat}' * i z \gamma_w$
- (B) $\sigma' = \gamma_w' * i z \gamma_w$
- (C) $\sigma' = \gamma_w' \pm i z \gamma_w$
- (D) $\sigma' = \gamma_w' / i z \gamma_w$

- 1) - A
 - 2) - B
 - 3) ☒ C
 - 4) - D
- 35) _____ is the measure of loss of strength with remolding, with water content unchanged.
- 1) - Compressibility
 - 2) ☒ Sensitivity
 - 3) - Stability
 - 4) - Thixotropy
- 36) The first rational approach to the problem of seepage through soils was
- 1) - Archimedes
 - 2) - Poiseuille
 - 3) - Darcy
 - 4) ☒ Terzaghi
- 37) The total head at any point may be regarded as _____ measure with respect to the datum.
- 1) ☒ Potential energy per unit weight of water



- 2) - Potential energy
3) - Unit weight of water
4) - Volume of water
- 38) _Pick up the correct statement from the following:::
- 1) - To an agriculturist, soil is the substance existing on the earth's surface, which grows and develops plants
2) - To a geologist, soils the material in a relatively thin surface zone within which roots occur, and rest of the crust is termed as rock irrespective of hardness,
3) - To an engineer, soil is the un-aggregated and un-cemented deposits of minerals and organic particles covering the earth's crust
4) ☒ All of these.
- 39) The path along which, the individual particles of water seepage through the soil are
- 1) ☒ Stream lines and Flow lines
2) - Equipotential lines
3) - None of the mentioned
4) - All of the mentioned
- 40) The pressure that builds up in pore water due to load increment on the soil, is termed
- 1) - Excess pore pressure.
2) - Excess hydrostatic pressure.
3) - Hydrodynamic pressure.
4) ☒ All of these
- 41) Seepage pressure is important for which of the following purpose?
- 1) ☒ Stability analysis
2) - Structural arrangement
3) - Total head
4) - All of the mentioned
- 42) A critical hydraulic gradient may occur when
- 1) - Flow is in upward direction.
2) - Seepage pressure is in upward direction.
3) - Effective pressure is zero.
4) ☒ All of these
- 43) Cohesive soils are generally
- 1) ☒ Plastic and compressible.
2) - Elastic and compressible.
3) - Plastic but incompressible.
4) - None of these.
- 44)

In falling head permeability test, change in the head at a time interval dt is denoted as

- ☒ (A) dh
(B) $-dh$
☒ (C) h
(D) $-h$



- 1) - A
- 2) ☒ B
- 3) - C
- 4) - D

45)

Calculate the height of water table rise in soil mass from a sand stratum of 12m deep from ground level, at which the effective pressure is zero. The water percolates through a soil mass of thickness 5m. The $\gamma_{sat}=18.6$ kN/m³ and $\gamma_w=9.81$ kN/m³.

- (A) 7.68m
- (B) 10m
- (C) 5.24m
- (D) 9.48m

- 1) - A
- 2) - B
- 3) - C
- 4) ☒ D

46) The air content ratio is defined as the ratio of

- 1) - Volume of air voids to total volume of the soil mass
- 2) ☒ Volume of air voids to volume of total voids
- 3) - Volume of air voids to volume of water
- 4) - Volume of voids to total volume of the soil mass

47) In _____ direction of flow, the effective pressure is increased.

- 1) - Perpendicular
- 2) - tangential
- 3) - upward
- 4) ☒ downward

48) Loose soil has a relative density within a range of:

- 1) - 60-85
- 2) - 85-100
- 3) ☒ 10-35
- 4) - 35-60

49) Soils containing organic matters

- 1) ☒ Are of spongy nature.
- 2) - Swell with decrease of moisture.
- 3) - Shrink with increase of moisture content.
- 4) - None of these.

50) Compression of soil occurs rapidly if voids are filled with

- 1) ☒ Air.
- 2) - Water.
- 3) - Partly with air and partly with water.
- 4) - None of these