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GATE PYQ ONE LINER |SOIL MECHANICS | BY AVNISH SIR

Q : 1) Soil deposit formed due to transportation by wind is termed as

A : Alluvial deposit

B : Lacustrine deposit

C : Estuarine deposit

D : Aeoline deposit

GATE PYQ ONE LINER |SOIL MECHANICS | BY AVNISH SIR

Q : 2) A sample f 500 g dry sand, when poured into a 2 litre capacity cylinder which is partially filled with water, displaces 188 cm^3 of water. The density of water is 1 g/cm^3. The specific gravity of the sand is

A : 2.66

B : 2.52

C : 2.72

D : 2.55

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Q : 3) Which one of the following statements is NOT correct?

A : When the water content of soil lies between its liquid limit and plastic limit, the soil is said to be in plastic state

B : Boussinesq's theory is used for the analysis of stratified soil

C : The inclination of stable in cohesive soil can be greater than its angle of internal friction

D : For saturated dense fine sand after applying overburden correction, if the standard penetration test value exceeds 15, dilatancy correction is to be applied.

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Q : 4) A given cohesionless soil has e_{max} = 0.85, e_{min} = 0.5. In the field, the soil is compacted to a mass density of 1800 kg/m^3 at w/c of 8%. Take the mass density of water as 1000 kg/m^3 and G_s = 2.7. The relative density (in %) of the soil is

A : 56.43

B : 60.25

C : 62.87

D : 65.71

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Q : 5) The following data were obtained from a liquid limit test conducted on a soil sample,

Number of blows	17	22	25	28	34
Water content (%)	63.8	63.1	61.9	60.6	60.5

The liquid limit of the soil is :

A : 63.1%

B : 62.8%

C : 61.9%

D : 60.6%

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Q : 6) The values of liquid limit and plasticity index for soils having common geological origin in a restricted locality usually define

A : A zone above A-line

B : A straight line parallel to A – line

C : A straight line perpendicular to A – line

D : Points may be anywhere in the plasticity chart

Q : 7) Principle involved in the relationship between submerged unit weight and saturated weight of a soil is based on

A : Equilibrium of floating bodies

B : Archimedes' principle

C : Stokes' law

D : Darcy's law

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Q : 8) The toughness index of clayey soils is given by

A : Plasticity index / flow index

B : Liquid limit/plastic limit

C : Liquidity index / plastic limit

D : Plastic limit/liquidity index

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Q : 9) The liquid limit (LL), plastic limit (PL) and shrinkage limit (SL) of a cohesive soil satisfy the relation

A : LL > PL > SL

B : LL > PL > SL

C : LL > PL > SL

D : LL > PL > SL

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Q : 10) The water content of a saturated soil and specific gravity of soil solids were found to be 30% and 2.70 respectively. Assuming the unit wt of water to be 10 kN/m^3, the saturated unit wt (kN/m^3) and the void ratio of the soil are

A : 19.4, 0.81

B : 18.5, 0.30

C : 19.4, 0.45

D : 18.5, 0.45

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Q : 11) If the fineness modulus of a sample of the fine aggregates is 4.3, the mean size of the particles in the sample is between

A ; 150 μm and 300 μm

B : 2.36 mm and 4.75 mm

C : 300 μm and 600 μm

D : 1.18 mm and 2.36 mm

Q : 12) The notation “SC” as per Indian standard soil classification system refers to

A : Clayey silt

B : Sandy clay

C : Clayey sand

D : Silty clay

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Q : 13) The description ‘sandy silty clay’ signifies that

A : The soil contains unequal proportions of the three constituents, in the order, sand > silt > clay

B : The soil contains equal proportions of sand, silt and clay

C : The soil contains unequal proportions of the three constituents such that clay > silt > sand

D : There is not information regarding the relative proportions of the three

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Q : 14) The following two statements are made with respect to different sand samples having the same relative density. Identify if they are TRUE or FALSE.

I. Poorly graded sands will have lower friction angle than the well graded sands.

II. The particle size has no influence on the friction angle of sand.

A : II is TRUE but I is FALSE

B : Both aw FALSE statements

C : Both are TRUE statements

D : I is TRUE but II is FALSE

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Q : 15) A soil mass contains 40% gravel, 50% sand and 10% silt. This soil can be classified as

A : Silty sandy gravel having coefficient of uniformity less than 60

B : Silty gravelly sand having coefficient of uniformity equal to 10

C : Gravelly silty sand having coefficient of uniformity greater than 60

D : Gravelly silty sand and its coefficient of uniformity cannot be determined

Q : 16) The clay mineral, whose structural units are held together by potassium bond is

A : Halloysite

B : Illite

C : Kaolinite

D : Smectite

GATE PYQ ONE LINER |SOIL MECHANICS | BY AVNISH SIR

Q : 17) The clay mineral, primarily behaviour of black cotton soil is

A : Halloysite

B : Illite

C : Kaolinite

D : Montmorillonite

GATE PYQ ONE LINER |SOIL MECHANICS | BY AVNISH SIR

Q : 18) The shape of clay particle is usually

A : Angular

B : Flaky

C : Tubular

D : Rounded

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Q : 19) Following statement are made on compacted soil, where in DS stands for the soils compacted on dry side of optimum moisture content and WS stand for the soils compacted on wet side of optimum moisture content. Identify incorrect statement

A : Soil structure is flocculated on DS and dispersed on WS

B : Construction pore water pressure is low on DS and high on WS

C : On drying, shrinkage is high on DS and low on WS

D : On access to water, swelling is high on DS and less on WS

Q : 20) Deposit with flocculated structure is formed when

A : Clay particles settle on sea bed

B : Clay particles settle on fresh water lake bed

C : Sand particles settle on river bed

D : Sand particles settle on sea bed

GATE PYQ ONE LINER |SOIL MECHANICS | BY AVNISH SIR

Q : 21) Compaction by vibratory roller is the best method o compaction in case of

A : Moist silty sand

B : Well graded dry sand

C : Clay of medium compressibility

D : Silt of high compressibility

GATE PYQ ONE LINER |SOIL MECHANICS | BY AVNISH SIR

Q : 22) Compaction by vibratory roller is the best method of compaction in case of

A : Moist silty sand

B : Clay of medium compressibility

C : Clay of medium compressibility

D : Silt of high compressibility

GATE PYQ ONE LINER |SOIL MECHANICS | BY AVNISH SIR

Q : 23) The zero-air voids curve is non-linear owing to

A : The standard proctor test data of dry density and corresponding water content plotting as a non-linear curve

B : The dry density at 100% saturation being a non-linear function of the void ratio

C : The water content altering during compaction

D : The soil being compacted with an odd number of blows

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Q : 24) Group I list the type of gain or loss of strength in soils, Group II lists the property or process responsible for the loss or gain of strength in soils

Group I	Group II
P. Regain of strength with time	1. Boiling
Q. Loss of strength due to cyclic loading	2. Liquefaction
R. Loss of strength due to upward seepage	3. Thixotropy
S. Loss of strength due to Remoulding	4. Sensitivity

The correct match between Group I and Group II is

A : P-4, Q-1, R-2, S-3 **B : P-3, Q-1, R-2, S-4**

C : P-3, Q-2, R-1, S-4 **D : P-4, Q-2, R-1, S-3**

GATE PYQ ONE LINER |SOIL MECHANICS | BY AVNISH SIR

Q : 25) If the water content of a fully saturated soil mass is 100%, the void ratio of the sample is

A : Less than specific gravity of soil

B : Equal to specific gravity of soil

C : Greater than specific gravity of soil

D : Independent of specific gravity of soil

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Q : 26) Which of the following statements is not true in the context of capillary pressure in soils?

A : water is under tension in capillary zone

B : Pore water pressure is negative in capillary zone

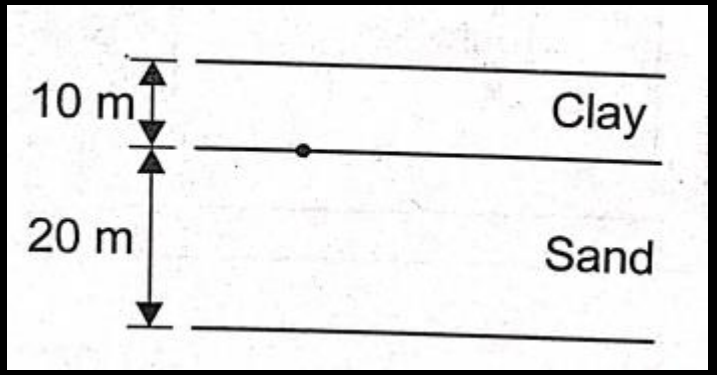
C : Effective stress increases due to capillary zone

D : Capillary pressure is more in coarse grained soils

GATE PYQ ONE LINER |SOIL MECHANICS | BY AVNISH SIR

Q : 27) A 10 m thick clay layer is underlain by a sand layer of 20 m depth (see figure). The water table is 5m below the surface of clay layer. The soil above the water table is capillary saturated. The value of γ_{sat} is 19 kN/m³. The unit weight of water is γ_w. If now the water table rises to the surface, the effective stress at a point P on the interface will be

A : Increase by 5 γ_w
B : Remain unchanged
C : Decrease by 5 γ_w
D : Decrease by 10 γ_w



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Q : 28) In a soil specimen, the total stress effective stress, hydraulic gradient and critical hydraulic gradient are σ, σ', I and i_c, respectively. For initiation of quicksand condition, which one the following statement is TRUE?

A : $\sigma' \neq 0 \; and \; i = \; i_c$

B : $\sigma = \; 0 \; and \; i = \; i_c$

C : $\sigma' \neq 0 and \; i \neq \; i_c$

D : $\sigma' = 0 \; and \; i = \; i_c$

Q : 29) The relationship between the specific gravity of sand (G) and the hydraulic gradient (i) to initiate quick condition in to sand layer having porosity of 30% is

A : $G = 0.7i + 1$

B : $G = 1.43i - 1$

C : $G = 1.43i + 1$

D : $G = 0.7i - 1$

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Q : 30) The ratio N_f/N_d is known as shape factor, where N_f is the number of flow lines and N_d is the number of equipotential drops. Flow net is always drawn with a constant b/a ratio, where b and a are distance between two consecutive flow lines and equipotential lines, respectively. Assuming that b/a ratio remains the same, the shape factor of a flow net will change if the

A : Upstream and downstream heads are interchanged

B : Soil in the flow space is changed

C : Dimensions of the flow space are changed

D : Head difference causing the flow is changed.

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Q : 31) Seepage force per unit volume (j) can be expressed as

A : $i\gamma_w L$

B : iL

C : $\gamma_w h$

D : $i\gamma_w$

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Q : 32) Piping in soil occurs when

A : The soil is highly porous

B : Sudden change in permeability occurs

C : Effective pressure becomes zero

D : The soil is highly stratified

Q : 33) Along a phreatic line in an earth dam

A : The total head is constant but not zero

B : The total head is everywhere zero

C : The pressure head is everywhere zero

D : None of the above

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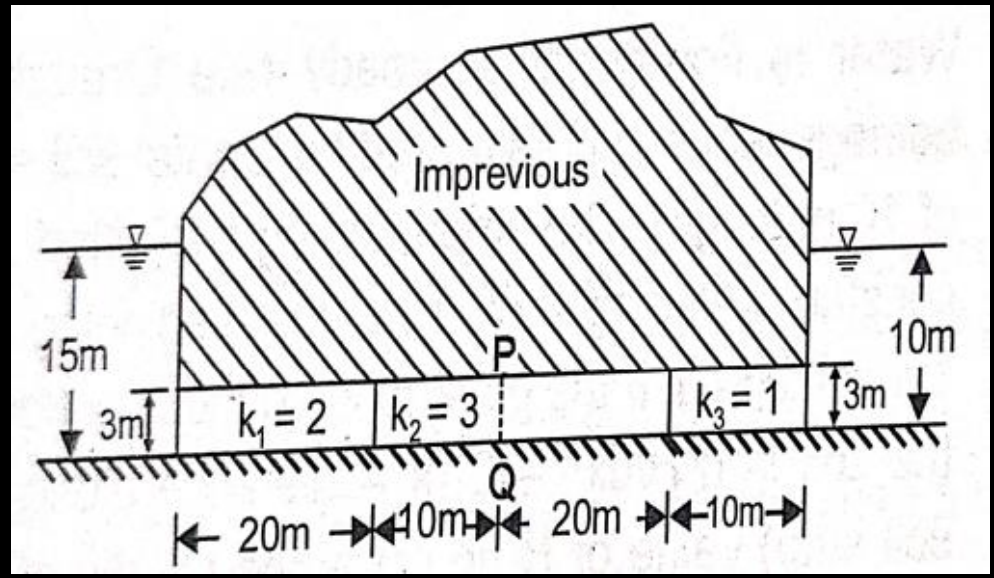
Q : 34) Seepage is occurring through a porous media shown in the figure. The hydraulic conductivity values (k_1, k_2, k_3) are in m,/day. The seepage discharge (m^3/day per m) through the porous media at section PQ is

A : $\frac{7}{12}$

B : $\frac{1}{2}$

C : $\frac{9}{16}$

D : $\frac{3}{4}$



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Q : 35) A one-dimensional consolidation test is carried out on a standard 19 mm thick clay sample. The oedometer's deflection gauge indicates a reading of 2.1 mm, just before removal of the load, without allowing any swelling. The void is 0.62 at this stage. The initial void ratio (round off to two decimal places) of the standard specimen is _____

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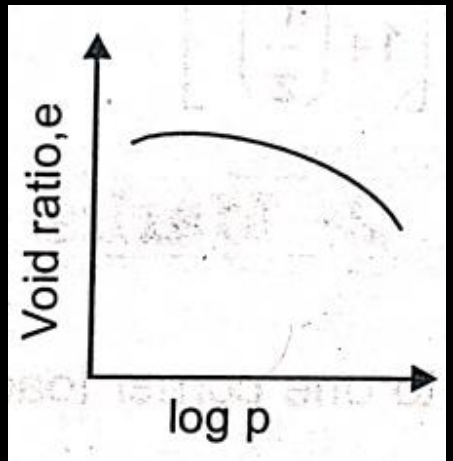
Q : 36) The e-log p curve shown in the figure is representative of

A : Normally consolidated clay

B : Over consolidated clay

C : Under consolidated clay

D : Normally consolidated clayey sand



Q : 37) Root time method is used to determine

A : T, time factor

B : C_v, coefficient of consolidation

C : a_v, coefficient of compressibility

D : m_v, coefficient of vol. compressibility

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Q : 38) Sand drains are used to

A : Reduce the settlement

B : Accelerate the consolidation

C : Increase the permeability

D : Transfer the load

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Q : 39) The coefficient of consolidation is used for

A : Establishing the duration of primary consolidation

B : Estimating the amount of settlement for a load increment

C : Determining the depth to which the soil is stressed when loads are applied on the surface of a soil deposit

D : Determining the preconsolidation pressure for soil deposits known to be over consolidated

Q : 40) Terzaghi's one-dimensional consolidation theory assumes that

A : e v_s p relationship is linear

B : ev_s $\log_{10}$ p relationship is linear

C : p v_s $\log_{10}$ e relationship is linear

D : ev_s $\log_{10} \frac{p}{p_0}$ relationship is linear

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Q : 41) The time for a clay layer to achieve 85% consolidation is 10 years. If the layer was half as thick, 10 times more permeable and 4 times more compressible, then the time that would be required to achieve the same degree of consolidation is

A : 1 year

B : 5 years

C : 12 years

D : 16 years

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Q : 42) Identify the two FALSE statements from the following four statements.

I. The consolidation of soil happens due to the change in total stress

II. When standard penetration test are performed in fine sands below the water table, the dilation correction is applied after the overburden correction is applied.

III. Over consolidated clays will have predominantly cohesive strength as compared to the frictional strength.

IV. Compaction of soils is due to expulsion of water

A : II & III B : I & IV

C : I & III D : II & IV

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