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**Q : 1) A soil sample is subjected to laboratory sieve analysis using a complete set of standard IS sieves. Out of 2 kg of soil used in the test, 800 gram was retained on IS 600 micron sieve, 1000 gram was retained on IS 500 micron sieve and the remaining 200 gram was retained on IS 425 micron sieve. The uniformity co-efficient for the soil is:**

**A : 1.412**

**B : 1.2**

**C : 0.833**

**D : 0.71**

**Q : 2) The minimum quantity of soil specimen to be taken for testing waster content by oven drying method for 2 mm IS sieve:**

**A : 200 g**

**B : 1,000 g**

**C : 50 g**

**D : 100 g**

**E : 120 g**

**Q : 3) At liquid limit, all soils possess:**

**A : Same shear strength of small magnitude**

**B : Same shear strength of large magnitude**

**C : Different shear strength of small magnitude**

**D : Different shear strength of large magnitude**

**E : None of these options**

**Q : 4) Which of the following tests is not used for measuring the in-situ density of compacted soil?**

**A : Sand-bath method**

**B : Rubber balloon method**

**C : Nuclear density gauge**

**D : Sand replacement method**

**Q : 5) Soil water content and specific gravity can be determined by**

**A : Oven drying method**

**B : Density bottle method**

**C : Pycnometer method**

**D : Alcohol method**

**Q : 6) Given the coefficient of curvature = 1.4,  $D_{30} = 3$  mm,  $D_{10} = 0.6$  mm. Based on this information of particle size distribution for use as sub grade, this soil is classified as-**

**A : Uniformly – Graded sand**

**B : Well – Graded sand**

**C : Very fine sand**

**D : Poorly – graded sand**

**Q : 7) Which of the following soil samples will have grains of almost same particle size?**

**A : Well graded**

**B : Good graded**

**C : Gap graded**

**D : Poorly graded**

**Q : 8) In the Indian standard classification system of soils**

**A : The soil are divided into three major divisions i.e. coarse grained, fine grained and highly organic soils**

**B : The soils are classified based on mineralogical composition**

**C : The soils are classified based on particle size with or without consistency limits**

**D : The soils are classified as A1 to A7 based on stability of soils under vehicle laod**

**Q : 9) Which of the following is NOT a soil classification system employed in pavements?**

**A : Burmister descriptive system**

**B : Civil aeronautics administration system**

**C : Casagrande soil classification**

**D : US department of agriculture system**

**Q : 10) According to IS classification system, the soils can be classified into**

**A : 18 Groups**

**B : 15 Groups**

**C : 3 Groups**

**D : 7 Groups**



**Q : 11) Fine aggregates are those which pass and retain on which of the following sizes of IS sieves respectively?**

**A : 6 mm and 75  $\mu$**

**B : 4.75  $\mu$  and 75  $\mu$**

**C : 75  $\mu$  and 4.75 mm**

**D : 10 mm and 4.75 mm**

**Q : 12) Porcelain is made by heating material having:**

**A : Kaolinite**

**B : Montmorillonite**

**C : Bentonite**

**D : Phyllite**

**Q : 13) In order of increasing percentage of silica, the correct sequence is:**

**A : Sandy clay, calcareous clay, Pure clay**

**B : Calcareous clay, pure clay, sand clay**

**C : Pure clay, sand clay, calcareous clay**

**D : Sandy clay, Pure clay, calcareous clay**

**E : None of these options**

**Q : 14) A soil with sand fraction = 14%, silt and clay content = 86%; Liquid limit of 55% and plasticity index of 28%.**

**According to the unified classification system, this soil is of type**

**A : CL : Clay of low plasticity**

**B : MH : Silt of high plasticity, elastic silt**

**C : OH : Organic clay, organic silt**

**D : SC : Clayey sand**

**E : CH : Clay of high plasticity, fat clay**

**Q : 15) Based on plasticity chart, a soil having liquid limit of 20% and plastic limit of 15% is classified as**

**A : CL**

**B : OL**

**C : CL-ML**

**D : OL-ML**

**Q : 16) The most essential criteria for proper soil classification using the unified soil classification or the AASHTO soil classification system are:**

**A : Water content and soil density**

**B : Atterberg limits and specific gravity**

**C : Grain-size distribution and water content**

**D : Grain-size distribution and Atterberg limits**

**Q : 17) The property of the soil mass which permits the seepage of water through its interconnecting voids, is called**

**A : Capillarity**

**B : Permeability**

**C : Porosity**

**D : None of these**

**Q : 18) Which of the following is practically impermeable?**

**A : Gravel**

**B : Sand mixture**

**C : Coarse sand**

**D : Clay**

**Q : 19) Which of the following statement is incorrect in respect to capillarity in soils**

**A : Gravitational water may be removed from soils by drainage**

**B : At the water table, the pore water pressure is greater than zero**

**C : Capillary water is held above the water table by 'surface tension'**

**D : Capillary rise is controlled by pore size and not the grain size, and that the same soil mass with the same  $D_{10}$  can have different pore size distributions depending upon soil structure and fabric, geological history etc.**

**Q : 20) The permeability of an aquifer**

**A : Increases with increase in temperature**

**B : Increases with the decrease in temperature**

**C : Is independent of temperature**

**D : Decreases with the decrease in temperature**

**Q : 21) If during a permeability test on a soil sample with a falling head permeameter, equal time intervals are noted for drop of head from  $h_1$  to  $h_2$  and again from  $h_2$  to  $h_3$  then which one of the following relation would hold good?**

**A :  $h_3^2 = h_1 \cdot h_2$**

**B :  $h_2^2 = h_1 \cdot h_3$**

**C :  $\frac{h_1+h_3}{h_2} = \frac{h_2}{h_1+h_3}$**

**D :  $h_1 \cdot h_2 = h_2 \cdot h_3$**

**Q : 22) An aquifer confined at the top and at the bottom by impermeable layers is stratified into three layers is stratified into three layers as follows:**

Layer	Thickness (m)	Permeability (m/day)
Top layer	4	30
Middle layer	2	10
Bottom layer	6	20

**The transmissivity ( $m^2/day$ ) of the aquifer is**

**A : 260**

**B : 227**

**C : 80**

**D : 23**

**Q : 23) A sample of clay and sample of sand have the same specific gravity and void ratio. Their permeabilities would differ because**

**A : Their porosities would be different**

**B : Their degrees of saturation would be different**

**C : Their densities would be different**

**D : The size ranges of their voids would be different**

**Q : 24) Average permeability ( $K_z$ ) for the flow perpendicular to the bedding planes in layered soil is**

**A :  $K_z = \frac{K_1 + K_2 + \dots + K_n}{n}$**

**B :  $K_z = \frac{K_1 H_1 + K_2 H_2 + \dots + K_n H_n}{H_1 + H_2 + \dots + H_n}$**

**C :  $K_z = \frac{\frac{K_1}{H_1} + \frac{K_2}{H_2} + \dots + \frac{K_n}{H_n}}{n}$**

**D :  $K_z = \frac{\frac{K_1}{H_1} + \frac{K_2}{H_2} + \dots + \frac{K_n}{H_n}}{n}$**

**Where  $K_1, K_2, \dots, K_n$  are coefficient of permeability of respective layer**

**$H_1, H_2, \dots, H_n$  are thickness of respective layer.**

**Q : 25) The unit-weight and viscosity of percolating fluid are reduced to 80% and 60% respectively due to rise in temperature. Other things being constant, the change in coefficient of permeability will be:**

**A : 11.1%**

**B : 22.2%**

**C : 33.3%**

**D : 44.4%**

**Q : 26) Consider the following statements:**

**The coefficient of permeability  $k$  depends upon**

**(a) Void ratio of the soil**

**(b) Duration of flow**

**(c) Equivalent diameter of the soil grains**

**(d) Shape of the particle**

**A : All four**

**B : Only B and C**

**C : Only A, C and D**

**D : Only C and D**

**Q : 27) Consider the following statements:**

- (i) Organic matter increases the permeability of a soil**
- (ii) Entrapped air decreases the permeability of a soil**

**Which of these statement is/are correct?**

**A : Only (i)**

**B : Only (ii)**

**C : Both (i) and (ii)**

**D : Neither (i) or (ii)**

**Q : 28) Which of the following is NOT an indirect method of estimating the permeability of soil in field?**

**A : Horizontal capillary tests**

**B : Calculations from grain and specific surface**

**C : Consolidation of test data**

**D : Pumping out test**

**Q : 29) The permeability of soil varies**

**A : As grain size**

**B : As square of grain size**

**C : Inversely as square of grain size**

**D : Inversely as grain size**

**Q : 30) When soil has coefficient of permeability as 1 mm/s then soil should be:**

**A : Gravel**

**B : Sand**

**C : Clay**

**D : Silt**

**Q : 31) The transmissibility,  $\gamma$ , of an aquifer is related to the thickness,  $T$ , of the saturation zone and coefficient of permeability,  $k$ , by the relation:**

**A :  $\gamma = \frac{T}{k}$**

**B :  $T = \frac{\gamma}{k}$**

**C :  $T = \frac{k}{\gamma}$**

**D :  $\gamma = \left(\frac{k}{T}\right)^2$**

**Q : 32) Radius of influence, R, can be related to draw down in a well, S, and coefficient of permeability, k, in m/s, as:**

**A :  $R = 3000 S\sqrt{k}$**

**B :  $R = 1000 S\sqrt{k}$**

**C :  $R = 3000 \sqrt{S.k}$**

**D :  $R = 1000 \sqrt{S.k}$**

**Q : 33) The coefficient of permeability of a soil is  $4 \times 10^{-5}$  cm/sec for a certain pore fluid. If the viscosity of the pore fluid is reduced to half, then the coefficient of permeability will be**

**A :  $4 \times 10^{-5}$  cm/sec**

**B :  $8 \times 10^{-5}$  cm/sec**

**C :  $2 \times 10^{-5}$  cm/sec**

**D :  $16 \times 10^{-5}$  cm/sec**

**Q : 34) Specific surface of a soil particle having particle size  $D$  is given by**

**A :  $\frac{D}{2}$**

**B :  $\frac{2}{D}$**

**C :  $\frac{6}{D}$**

**D :  $\frac{D}{6}$**

**Q : 35) The dimension of the intrinsic permeability is**

**A :  $L^2$**

**B :  $LT^{-1}$**

**C :  $L^3$**

**D : Dimensionless**

**Q : 36) Which of the following test is more suitable to conduct permeability test on granular soil in lab?**

**A : Pumping out test**

**B : Constant head permeability test**

**C : Pumping in test**

**D : Falling head permeability test**

**Q : 37) Lowering of groundwater table causes**

**A : A decrease in effective stress**

**B : An increase in effective stress**

**C : No change in effective stress**

**D : No change in pore water pressure**

**Q : 38) The pore water pressure in the capillary zone is:**

**A : Zero**

**B : Positive**

**C : Negative**

**D : Very low**

**Q : 39) The relationship between discharge velocity  $V$  and seepage velocity  $V_s$  is**

**A :  $V_s = V/n$**

**B :  $V_s = V/e$**

**C :  $V_s = Vn$**

**D :  $V_s = Ve$**

**Q : 40) During seepage through an earth mass, the direction of seepage is**

**A : Parallel to equipotential lines**

**B : Perpendicular to the stream lines**

**C : Perpendicular to the equipotential lines**

**D : Along the direction of gravity**

**Q : 41) The piping in soil occurs when:**

**A : Soil is highly porous**

**B : Sudden change in permeability occurs**

**C : Effective pressure becomes zero**

**D : Soil is highly stratified**

**Q : 42) The compactive energy given to a soil sample in modified proctor test is X times that of standard proctor test. What is the value of X?**

**A : 4.5**

**B : 5.5**

**C : 2.5**

**D : 3**

**Q : 43) Match List-I (Test) with List-II (property) and select the correct answer using the codes given below the lists:**

List-I (Test)	List-II (property)
A. Proctor test	1. Grain size analysis
B. Vane test	2. Shear strength
C. Penetration test	3. Bearing capacity
D. Hydrometer test	4. Compaction

**Code:**

**A : 2, 4, 1, 3**

**B : 4, 2, 1, 3**

**C : 4, 2, 3, 1**

**D : 2, 4, 3, 1**

**Q : 44) When there is a reduction in amplitude over every cycle of vibration, then the body is said to have**

**A : Free vibration**

**B : Forced vibration**

**C : Damped vibration**

**D : Underdamped vibration**

**Q : 45) The natural stress is**

**A : Transmitted through the points contact of the interconnected particles of soil**

**B : Transmitted to the soil base through the pore water**

**C : Independent of the depth of water above the soil mass**

**D : Due to weight of soil particles**

**Q : 46) Pressure meter test is performed on the site to measure which property of the soil?**

**A : Skin friction**

**B : Shear modulus**

**C : Modulus of subgrade reaction**

**D : Relative density**

**Q : 47) Trenching machines can not be used for:**

**A : Rocks**

**B : Hard clay**

**C : Muddy clay**

**D : Loose material**

**Q : 48) Bottom-dump wagons are suitable for handling which of the following?**

**A : Wet sticky clay**

**B : Sand and gravel**

**C : Quarry rocks**

**D : Any type of material**

**Q : 49) Statement (I): Fine-grained soils are difficult to drain**

**Statement (II): Capillary forces act on pore water:**

**A : Both statements-I and statement-II are individually true and statement-II is the correct explanation of statement-I.**

**B : Both statements-I and statement-II are individually true but statement-II is NOT the correct explanation of statement-I.**

**C : Statement-I is true but statement-II is false**

**D : Statement-I is false but statement-II is true.**

**Q : 50) Consider the following effects as indicative of complete saturation of a soil sample:**

- 1. Pore water pressure is positive**
- 2. Volume of water to volume of voids is equal to 1.**
- 3. Relative density is equal to 1.**

**Which of the above statements are correct?**

- |                         |                         |
|-------------------------|-------------------------|
| <b>(a) 1 and 2 only</b> | <b>(b) 1 and 3 only</b> |
| <b>(c) 2 and 3 only</b> | <b>(d) 1, 2 and 3</b>   |

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