



**SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR**

Siddharth Nagar, Narayanavanam Road – 517583

**QUESTION BANK (DESCRIPTIVE)**

**Subject with Code : SS & SM(16CE155) Course & Branch: B.Tech – AG Engg**

**Year & Sem: II-B.Tech & I-Sem**

**Regulation: R16**

**UNIT –I**

**SOIL GENESIS AND CLASSIFICATION, SOIL COLLOIDS, MINERAL NUTRITION OF PLANTS**

- 1) Define soil profile. Describe the soil profile and its development. [12M]
- 2) What are the different steps involved in soil formation process? [12M]
- 3) (a) Discuss the roll of any five nutrients in plant growth [06M]  
(b) Write a detail account on soil Biology. [06M]
- 4) (a) Define weathering? Describe different kinds of weathering? [06M]  
(b) How the soil moisture constants play an important role in agriculture? [06M]
- 5) (a) Define soil erosion? Describe different kinds of soil erosion? [06M]  
(b) Write Agro climatic zones of Andhra Pradesh? [06M]
- 6) Classify the problem soils based on the constraints? and write two important Characteristics of problem soils [12M]
- 7) (a) Differentiate between Eluviation and Illuviation [06M]  
(b) Differentiate between soil productivity and soil fertility. [06M]
- 8) (a) Write about Black soils of India [06M]  
(b) What is weathering? Explain in detail about chemical weathering of rocks and minerals along with chemical reactions. [12M]
- 9) List and Explain the general properties of soil colloids [12M]
- 10) What are the measures to be adopted for the use of saline water in Agriculture? [12M]

**UNIT-II**

**PHYSICS OF SOIL, SOIL TILLAGE, SOIL MANAGEMENT**

- 1) Explain type's tillage and influence on soil properties. [12M]
- 2) (a) What are the physical properties of tillage [06M]  
(b) What is the importance tillage on crop performance? [06M]
- 3) Explain briefly the role of weather on crop production. [12M]

- 4) (a) How do you reclaim saline and alkali soils? [06M]  
 (b) What is meant by ion exchange? What are the different factors affecting ion Exchange? [06M]
- 5) (a) Enumerate different objectives of Tillage? [06M]  
 (b) How Tillage influences soil physical properties? Explain briefly [06M]
- 6) Explain thermal properties of soil. [12M]
- 7) Explain Texture, structure and basic physical properties of soil. [12M]
- 8) Briefly explain soil management. [12M]
- 9) Briefly Types of tillage and their influence on soil physical properties and crop Performance. [12M]
- 10) Define permeability and explain Darcy's law and factors effecting effecting Permeability [12M]

**UNIT-III**  
**SOIL THREE PHASE SYSTEM AND PROPERTIES**

- 1) (a) Explain the phenomena of formation and transportation of soils. [6M]  
 (b) A sample of sand with the specific gravity of solids of 2.65 has a porosity of 40 percent. Find the dry unit weight, saturated unit weight, submerged unit weight and bulk unit weight when degree of saturation is 50%.. [6M]
- 2) With the help of sketches explain the following: [12M]  
 i. well graded soil,  
 ii. Uniformly graded soil,  
 iii. Gap graded soil.
- 3) The Atterberg limits of a soil sample are: liquid limit = 50%, plastic limit = 30% and shrinkage limit = 15%. If the specimen of this soil shrinks from a volume of 10 cm<sup>3</sup> at liquid limit to 5.94 cm<sup>3</sup> when oven dried, calculate the shrinkage ratio and specific gravity of soil solids. [12M]
- 4) Establish the relationship between degree of saturation, moisture content, specific gravity of soil particles and void ratio. What is meant by weathering? Describe its agents, process and effects on rocks. [12M]
- 5) What is plasticity chart? Explain its use in soil classification. [12M]
- 6) (a) Write notes on texture and structure of soils. [6M]  
 (b) A sample of clay soil of volume  $1 \times 10^{-3}$  m<sup>3</sup> and weight 17.62 N, after being dried out in an oven had a weight of 13.68 N. If the specific gravity of the particle was 2.69, find:  
 i. water content,  
 ii. Void ratio,  
 iii. Saturated unit weight, and  
 iv. Dry unit weight. [6M]
- 7) A natural soil deposit has a bulk unit weight of 19 kN/m<sup>3</sup> and water content of 5%. Estimate the amount of water required to be added to 1 m<sup>3</sup> of soil to raise the water content to 15%.

- Assume the void ratio to remain constant. The specific gravity of solids is 2.67. [12M]
- 8) (a) Define: degrees of saturation; porosity; air content and density index. [6M]  
 (b) A partially saturated soil sample has a moisture content of 14% and bulk unit weight of 20kN/m<sup>3</sup>. Given that the specific gravity of solids is 2.70, determine the degree of saturation and void ratio. What will be the unit weight of the sample on complete saturation? [6M]
- 9) Define the terms: [12M]  
 (i) Liquidity index (ii) Flow index and (iii) Toughness index (iv) Plasticity Index (v) density index
- 10) (a) A saturated soil sample has a water content of 25% and unit weight of 20 KN/m<sup>3</sup>. Determine the specific gravity of the solid particles, dry unit weight and void ratio. [6M]  
 (b) A sample of saturated soil has a water content of 32%. The specific gravity of solids is 2.62. Determine the void ratio, porosity, saturated unit weight. [6M]

**UNIT-IV**

**PERMEABILITY AND SEEPAGE**

- 1(a) what is quick sand condition? Derive the expression for the critical hydraulic gradient. [06M]  
 (b) Discuss the factors that influence the value of coefficient of permeability of a soil. [06M]
- 2) A soil sample 90 mm high and 6000 mm<sup>2</sup> in cross-section was subjected to a falling head Permeability test. The head fall from 500 mm to 300 mm in 1500 sec. The permeability of the soil was  $2.4 \times 10^{-3}$  mm/s. Determine the diameter of the stand pipe. [12M]
3. (a) Explain Westergaard's theory for the determination of the vertical stress at a point. How is it Different from Bossiness's solution? [06M]  
 (b) A point load of 3000 KN is acting at the ground surface. Determine the vertical stress at a point 'P' which is 5m directly below the load. What will be the vertical stress at a point which is at a depth of 5m and at a horizontal distance of 3m from the axis of the load? Use Boussinesq's theory. [06M]
- 4.(a) How do you determine the permeability of a clayey soil in the laboratory? Derive the formula you use.  
 (b) Estimate the quantity of flow of water through a soil mass in a 300 sec period when a constant head of 1m is maintained. The length of the sample is 150 mm and the cross sectional area is 100×100 mm. The coefficient of permeability of the soil sample is  $1 \times 10^{-1}$  mm/s. [12M]
5. In a variable head permeameter, the cross sectional area of the sample was 850 sq. cm and its length was measured as 11.2 cm. The head was noted to fall from 90 to 62 cm in 2 minutes. If the cross sectional area of the stand pipe was 2.8 sq.cm, find out the coefficient of permeability of the soil. If a drop of head is measured from 58 to 37 cm in the same experiment, determine the time required for the drop of head. [12M]
- 6) Define permeability and explain Pumping out test and factors effecting effecting Permeability[12M]

- 7) (a) Derive an expression for coefficient of permeability for use in variable head method [06M]  
 (b) A constant head permeability test has been run on a sand sample 25 cm length and 30 sq.cm in area under a head of 40cm. The discharge was found to be 200 cc in 116 sec. The specific gravity of grains 2.65 the dry weight of sand is 1320 gms. Determine (i) Coefficient of permeability  
 (ii) Seepage velocity (iii) Discharge velocity. [06M]
- 8) What are the properties and uses of a flow net? If  $K_1$ ,  $K_2$  are the permeability's of layers  $h_1$ ,  $h_2$ ,  $h_3$  thick, what is its equivalent permeability in the horizontal and vertical directions? Derive the formulae used. [12M]
- 9) Explain the construction and use of new mark's influence chart. [12M]
- 10) State Darcy's law. Show how the law is useful in determining the coefficient of permeability of a fine grained soil by the falling head method. Derive expression use [12M]

**UNIT-V**  
**COMPACTION, CONSOLIDATION, SHEAR STRENGTH**

- 1) (a) What are the differences between compaction and consolidation? [06M]  
 (b) What are the factors that affect the compaction of soil in the field? How will you measure? The compaction in the field? Describe a method with its limitation. [06M]
- 2) (a) Describe a method to determine the pre-consolidation pressure of soil. Explain its Significance. [06M]  
 (b) Explain the principle of direct shear test. What are the advantages of this test? What are Its limitation? [06M]
- 3) (a) Write a detailed note on 'Proctors needle' [06M]  
 (b) Proctor compaction test was conducted on a soil sample and the following observations were made  
 Water Content (%)      7.7 11.5 14.6 17.5 19.5 21.2  
 Weight of wet soil, Kg 1.70 1.89 2.03 1.99 1.96 1.92  
 Take the volume of mould = 945cc and specific gravity of solids = 2.65. Make necessary calculations and draw. i. Compaction curve and. ii. 80% saturation line. [06M]
- 4) (a) Classify and explain the shear tests according to drainage conditions. [06M]  
 (b) What are the advantages of triaxial test over direct shear test. [06M]
- 5) (a) Explain with suitable analogy Terzaghi's theory of one-dimensional consolidation of soils. [12M]

- ( b) Define : i. Compression index.      ii. Coefficient of volume change.  
 iii. Coefficient of consolidation.      iv. Degree of consolidation and.      v. Secondary consolidation.
- 6) (a) Differentiate between Compaction and consolidation and Standard proctor test and modified proctor test. [06M]
- (b) Following are the results of a standard compaction test performed on a sample of soil.
- |                                   |       |       |       |       |       |
|-----------------------------------|-------|-------|-------|-------|-------|
| Water content (%)                 | 5     | 10    | 13    | 18    | 24    |
| Bulk density (KN/m <sup>3</sup> ) | 17.80 | 20.00 | 21.00 | 21.60 | 20.80 |
- Determine the OMC and maximum dry density; calculate the water content necessary to Completely saturate the sample at its maximum dry density assuming no change in volume. Take  $G=2.72$ . [06M]
- 7) (a) Explain the mechanism of compaction. Explain the effects of compaction on physical and engineering properties of soils. [06M]
- (b) What is optimum moisture content? How will you determine the optimum moisture content of a soil sample in the laboratory? [06M]
- 8) What is coefficient of consolidation? What is its use in the settlement analysis? How is it Determined? [12M]
- 9) (a) What is Mohr's strength theory for soils? Sketch typical strength envelopes for a clean sand?  
 (b) What are the advantages of triaxial shear test over the direct shear test? [12M]
- 10) What is the significance of compaction of soils Describe how quality control is ensured in Constructing an earthen embankment? [12M]

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**UNIT –I**

**SOIL GENESIS AND CLASSIFICATION, SOIL COLLOIDS, MINERAL NUTRITION OF PLANTS**

- 1 On mass bases among the three spheres of the earth the highest proportion is accounted by [     ]
  - A) Atmosphere
  - B) Lithosphere
  - C) Hydrosphere
  - D) Ionosphere
  
2. Highly fertile soil is [     ]
  - A) Red Soils
  - B) Black Soils
  - C) Alluvial Soils
  - D) Lateral Soils
  
3. The strength of soil crust is measured with help of [     ]
  - A) Voltmeter
  - B) Radiometer
  - C) Texture
  - D) Hydrometer
  
4. The physical soil classification is based on [     ]
  - A) Consistency
  - B) Structure
  - C) Texture
  - D) Lime Content
  
5. Soil containing almost equal proportions of sand , silt and clay particles are set to be [     ]
  - A) Sandy Soils
  - B) Loamy Soils
  - C) Clayey Soils
  - D) Silty Soils
  
6. Denitrification is favoured in [     ]
  - A) Well aerated soils
  - B) Dry Soils
  - C) Water logged soils
  - D) Well grained soils
  
7. The weight of 5 m.eq of calcium is [     ]
  - A) 5 mg.ca
  - B) 100 mg.ca
  - C) 200 mg.ca
  - D) 10 mg.ca
  
8. Cations exchange property of soils was first report by [     ]
  - A) Thomas Graham
  - B) Jenny
  - C) Thomas Way
  - D) Justus Vor
  
9. Most favourable structure for most of the crops is [     ]

- |   |   |  |  |
|---|---|--|--|
| <p>A) Crumb<br/>C) Platy</p>  | <p>B) Granular<br/>D) Prismatic</p>             |  |  |
| 10. Alluvial Soils are formed due to action of <span style="float: right;">[     ]</span>                           |   |  |  |
| <p>A) Wind<br/>C) Glacial</p>   | <p>B) Water<br/>D) Snow</p>                     |  |  |
| 11. The Soil forming process is known as <span style="float: right;">[     ]</span>                                 |   |  |  |
| <p>A) Pedogenic<br/>C) Cryogenic</p>  | <p>B) Heterogenic<br/>D) Tetragenic</p>         |  |  |
| 12. The colour of muscovite mica is <span style="float: right;">[     ]</span>                                      |   |  |  |
| <p>A) Red<br/>C) Black</p>  | <p>B) White<br/>D) Green</p>                    |  |  |
| 13. The most dominant cation on exchanging complex of the normal soil is <span style="float: right;">[     ]</span> |   |  |  |
| <p>A) Mg<sup>2+</sup><br/>C) K<sup>+</sup></p>  | <p>B) Na<sup>+</sup><br/>D) Ca<sup>2+</sup></p> |  |  |
| 14. Orthoclase is a good source of plant nutrient <span style="float: right;">[     ]</span>                        |   |  |  |
| <p>A) K<sup>+</sup><br/>C) Ca<sup>2+</sup></p>  | <p>B) Mg<sup>2+</sup><br/>D) Na<sup>+</sup></p> |  |  |
| 15. The downward entry of water into soil at the surface is called <span style="float: right;">[     ]</span>       |   |  |  |
| <p>A) Perculation<br/>C) Drainage</p>   | <p>B) Infiltration<br/>D) Inter flow</p>        |  |  |
| 16. The crops that are efficient accumulators of heavy metals are <span style="float: right;">[     ]</span>        |   |  |  |
| <p>A) Leafy vegetables<br/>C) Oil Seeds</p>   | <p>B) Fiber crops<br/>D) Cereals</p>            |  |  |
| 17. The fraction of humus that is insoluble in both acid and alkaline <span style="float: right;">[     ]</span>    |   |  |  |
| <p>A) Fulvic acid<br/>C) Fulvin</p>   | <p>B) Humic acid<br/>D) Humin</p>               |  |  |
| 18. The process of weathering is <span style="float: right;">[     ]</span>   |   |  |  |
| <p>A) Constructive<br/>C) Obstructive</p>   | <p>B) Destructive<br/>D) None of the above</p>  |  |  |
| 19. An example of Soda Feldspar is <span style="float: right;">[     ]</span>                                       |   |  |  |
| <p>A) Orthoclase<br/>C) Anorthite</p>   | <p>B) Albit<br/>D) None Of the Above</p>        |  |  |
| 20. Acids soils are reclaimed by applying <span style="float: right;">[     ]</span>                                |   |  |  |

- |           |               |
|-----------|---------------|
| A) Lime   | B) Gypsum     |
| C) Silver | D) Good Water |

- |  |   |                      |
|--|---|----------------------|
| 21. Due to the compaction , the bulk density of the soil                                   | [ | ]                    |
| A) Decreases   |   | B) Increases         |
| C) Remains unchange  |   | D) None of the above |
|  |   |                      |
| 22. An example for mineral containing Sulphur is   | [ | ]                    |
| A) Orthoclase  |   | B) Calcite           |
| C) Gypsum  |   | D) Quartz            |
|  |   |                      |
| 23. The Heat required to raise the temperature of 1gm weight of the body by 1° C is called |   |                      |
| A) Thermal Capacity  |   | B) Specific Heat     |
| C) Thermal Conductivity  |   | D) All the above     |
|  |   |                      |
| 24. Peeling away of surface mass of rock due to variation in temperature is known as       |   |                      |
| A) Detachment  |   | B) Adhesion          |
| C) Exfoliation   |   | D) Adsorption        |
|  |   |                      |
| 25. Wind Erosion is more distractive on  | [ | ]                    |
| A) Cropped Surface   |   | B) Rough Surface     |
| C) Smooth Surface  |   | D) Mulched Surface   |
|  |   |                      |
| 26. Heavy soil management is difficult because of its colloidal property of                | [ | ]                    |
| A) Plasticity  |   | B) Cohesion          |
| C) Adhesion  |   | D) Stickiness        |
|  |   |                      |
| 27. State is a rock that belongs to the class of   | [ | ]                    |
| A) Igneous   |   | B) Sedimentary       |
| C) Metamorphic   |   | D) None of the Above |
|  |   |                      |
| 28. Red colour of soils is due to the presence of compounds of                             | [ | ]                    |
| A) Mg  |   | B) Ca                |
| C) Fe  |   | D) Si                |
|  |   |                      |
| 29. The Most abundant element in earth crust is  | [ | ]                    |
| A) Oxygen  |   | B) Silicon           |
| C) Calcium   |   | D) Aluminum          |
|  |   |                      |
| 30. Acid Rain is caused due to accumulation of oxides that belongs to                      | [ | ]                    |
| A) S   |   | B) Ca                |
| C) Mg  |   | D) Na                |
|  |   |                      |
| 31. The Micro organisms that produce antibiotics in the soil are                           | [ | ]                    |



- A) Fungi      B) Bacteria      C) Actinomycetes      D) Virus
32. Slate is a rock that belongs to the class of [      ]  
 A) Igneous      B) Sedimentary      C) Metamorphic      D) None of the above
33. The crops that are efficient accumulation of heavy metals are [      ]  
 A) Leafy vegetables      B) Fiber crops      C) Oil Crops      D) Cereals
34. The soil forming process is known as [      ]  
 A) Heterogenic      B) Pedogenic      C) Cryogenic      D) Tetragenic
35. The soil particles whose diameter is less than 0.002 mm are [      ]  
 A) Sand      B) Silt      C) Clay      D) All the above
36. In soil aeration pores between the crumbs is called [      ]  
 A) Crumb Pores      B) Inter Crumb Pores      C) A & B      D) All of these
37. State is a rock that belongs to the class of [      ]  
 A) Igneous      B) Sedimentary  
 C) Metamorphic      D) None of the Above
38. An example of Soda Feldspar is [      ]  
 A) Orthoclase      B) Albit  
 C) Anorthite      D) None Of the Above
39. Acids soils are reclaimed by applying [      ]  
 A) Lime      B) Gypsum  
 C) Silver      D) Good Water
40. Due to the compaction , the bulk density of the soil [      ]  
 A) Decreases      B) Increases  
 C) Remains unchange      D) None of the above

**UNIT-II**

**PHYSICS OF SOIL, SOIL TILLAGE, SOIL MANAGEMENT**

1. Which of the following reservoirs contains the most water [      ]  
 (A) Atmosphere (B) biosphere (C) groundwater (D) lakes and rivers
2. How much of the Earth's water is stored in underground aquifers [      ]  
 (A) Less than 5% (B) about 5% (C) about 10% (D) about 20%
3. What is the process by which water enters the small pore spaces between particles in soil  
 Or rocks [      ]  
 (A) Transpiration (B) infiltration (C) precipitation (D) sublimation

- 4 Which of the following terms is a measure of the amount of water vapor in the air as a Proportion of the maximum amount the air could hold at the same temperature  
(A) Dew point (B) Sub limitation point (C) Evaporation Point (D) Relative Humidity
- 5 The percentage of a rock's total volume that is taken up by pore space is called the  
(A) Permeability (B) recharge (C) Aquifer (D) Porosity [ ]
- 6 Permeability is [ ]  
(A) The ability of a solid to allow fluids to pass through  
(B) The process by which plants release water vapor to the atmosphere  
(C) The amount of water vapor in the air relative to the maximum amount of water vapor the air can hold.  
(D) The percentage of pore space in the rock
- 7 The best groundwater reservoirs have [ ]  
(A) low permeability and low porosity (B) low permeability and high porosity  
(C) High permeability and low porosity (D) High permeability and high porosity
- 8 The ability of an Earth material to transmit water is a measure of it's: [ ]  
(A) Porosity (B) aquifer characteristics (C) chemical cement (D) permeability
- 9 The lowering effect on the water table about the base of the well stem is called [ ]  
(A) Aquiclude (B) artesian surface (C) cone of depression (D) speleothem
- 10 A local water table positioned above the regional water table is said to be [ ]  
(A) Stranded (B) perched (C) displaced (D) depressed
- 11 Constituents of the producer gas contributing to its heating value are GATE 2018 [ ]  
(A) CO and CO<sub>2</sub> (B) CH<sub>4</sub> and CO<sub>2</sub> (C) CO and H<sub>2</sub> (D) CO<sub>2</sub> and H<sub>2</sub>
- 12 One of the key assumptions made by Dupuit-Forchheimer about the flow behavior in the Porous medium towards subsurface drains is GATE 2018 [ ]  
(A) Homogeneous medium (B) isotropic medium  
(C) Horizontal streamlines (D) uniform recharge
- 13 If the void ratio of a soil column is 0.43, the soil porosity is GATE 2018 [ ]  
(A) 0.30 (B) 0.40 (C) 0.70 (D) 0.75
- 14 A cross regulator is usually provided [ ]  
(A) In the watercourse to regulate the outlets. (B) At the head of the off taking channel.  
(C) In the main channel downstream of the off taking channel.  
(D) In the main channel of the off taking channel.
- 15 The most abundant, natural acid is [ ]  
(A) Nitric (B) hydrochloric (C) carbonic (D) none
- 16 Most groundwater withdrawn in the United States is used for [ ]  
(A) Industry (B) Irrigation (C) Drinking Water (D) None
- 17 In what types of rock do most caves form [ ]  
(A) Granite (B) Shale (C) Lime stone (D) Sand stone
- 18 Which of the following rocks has the highest permeability? [ ]

- (A) an fractured shale (B) a cemented sandstones (C) an unfermented sandstone (D) All
- 19 Which of the following materials has the lowest porosity? [     ]  
 (A) shale (B) Granite (C) sand stone (D) gravel
- 20 In what type of rock do most caves form? [     ]  
 (A) shale (B) Granite (C) Lime stone (D) gravel
- 21 Sinkholes are a possible danger in regions underlain by what type of bedrock? [     ]  
 (A) shale (B) Granite (C) Lime stone (D) gravel
- 22 Water that is good enough to drink is called [     ]  
 (A) Portable water (B) Ground water (C) Surface water (D) none
- 23 Which of the following can contaminate an aquifer? [     ]  
 (A) Landfills (B) agricultural regions (C) gas stations (D) all of these
- 24 What is the difference between the saturated and the unsaturated zones of ground water?  
 (A) the saturated zone has a higher porosity than the unsaturated zone [     ]  
 (B) the saturated zone has a lower porosity than the unsaturated zone  
 (C) the pore spaces in the saturated zone are completely full of water; the pore spaces in the unsaturated zone are not completely full of water  
 (D) none
- 25 When soil structure is destroyed, the soils porosity, and its bulk density [     ]  
 (A) Decrease/Increase (B) Increase/Decrease (C) Increase/Increase (D) none
- 26 Iron Sesquioxides in soils impart [     ]  
 (A) A black color due to oxidation of Aluminum  
 (B) A yellow-orange color due to iron reduction  
 (C) A yellow-orange color due to iron oxidation  
 (D) A brown-black color due to organic matter
- 27 Species richness is generally greatest near  
 (A) The Polar Regions (B) High altitudes (C) The equator (D) All of the above
- 28 Oceanic islands are formed by [     ]  
 (A) Sea level rising (B) Undersea volcanos (C) Climate change (D) None of the above
- 29 What is an ozone hole [     ]  
 (A) Holes in the mesosphere blanketing layer  
 (B) Reduction in concentration of ozone in the ozone layer  
 (C) Vortex of air circulating over the Antarctica from the ozone layer  
 (D) All the above
- 30 Which of the following is a control of incoming radiation? [     ]  
 (A) Distance from the sun (B) Albedo (C) solar output (D) All the above
- 31 Terracing is an effective method of soil conservation [     ]

- (A) Plains (B) Desert areas (C) Hilly areas (D) Riverine areas
- 32 Deforestation causes [ ]  
 (A) Pollution (B) No floods (C) Soil erosion (D) none of the above
- 33 Which is the main causative factor for desertification? [ ]  
 (A) Tourism (B) Overgrazing (C) Irrigated agriculture (D) Developmental activities
- 34 One of the following crops is the most effective in controlling soil erosion: [ ]  
 (A) Maize (B) Cotton (C) Green gram (D) Pigeon pea
- 35 Sheet erosion is caused by [ ]  
 (A) Wind (B) Glaciers (C) Heavy rains (D) Fast running rivers
- 36 Soil conservation means [ ]  
 (A) Prevention of spread of desert (B) To check soil erosion by afforestation  
 (C) To check soil erosion by wind and rains (D) All of these
- 37 Soil conservation can best achieved by having: [ ]  
 (A) Wind screens (B) Low rainfall (C) Good plant covers (D) Restricted human activity
- 38 When soil structure is destroyed, the soils porosity, and its bulk density [ ]  
 (A) Decrease/Increase (B) Increase/Decrease (C) Increase/Increase (D) none
- 39 Contour binding is done to check: [ ]  
 (A) Sheet erosion  
 (B) Rill erosion  
 (C) Gully erosion  
 (D) Ravine formation
- 40 The soil binding is done in the best way by [ ]  
 (A) Algae (B) Grasses (C) Mycorrhizae (D) All of the above

**UNIT-III**

**SOIL THREE PHASE SYSTEM AND PROPERTIES**

- 1) To what category do the gravel and sand belong (GATE1998) [ ]  
 A) Cohesion less soils (B) Cohesive soils (C) Marine soils (D) Expansive soils
- 2) If a soil sample has a void ratio of 0.5 then porosity (GATE 2000) [ ]  
 A) 50% (B) 66% (C) 100% (D) 33%
- 3) The shape of the clay particle is (GATE 1997) [ ]  
 A) Angular (B) flaky (C) tabular (D) rounded
- 4) China clay is an example for (APPSC-AEE2009) [ ]  
 A) Kaolinite (B) Illite (C) Montmorillonite (D) Halloysite
- 5) Stoke's law is valid for size in mm (APPSC1998) [ ]  
 A) 0.002 to 0.0002 (B) 0.2 to 0.0002 (C) 0.02 to 0.0002 (D) 2.00 to 0.02
- 6) The relation between void ratio  $e$ , specific gravity  $G$ , water content  $W$  and degree of saturation  $S$  is given by (APPSC-2003) [ ]  
 A)  $e = \frac{wG}{S}$  (B)  $e = \frac{SG}{w}$  (C)  $e = \frac{wS}{G}$  (D)  $e = wGS$
- 7) A Soil has LL of 40% and PI of 20% then PL (GATE-2002) [ ]  
 A) 20% (B) 30% (C) 40% (D) 60%
- 8) A sand deposit porosity 0.0375 and  $G=2.6$  then critical hydraulic gradient [ ]

- A) 2.975                      B) 2.225                      C) 1                      D) 0.75
- 9) Which of the following soils has largest permeability (**APPSC-2002**) [     ]  
 A) Sand                      B) Gravel                      C) Silt                      D) Clay
- 10) The Black cotton soils exhibit high shrinkage and expansive qualities due to the presence of clay minerals of group (**GATE-IES 2006, 1999**) [     ]  
 A) Halloy sile                      B) Lllile                      C) Kaolinile                      D) Montmorillonite
- 11) The correct increasing order of specific surface i.e surface area per mars of the given soils is  
 (A) Silt, sand, colloids, clay                      B) Sand, silt, colloids, clay [     ]  
 C) Sand, silt, clay, colloids                      D) Clay, silt, sand, colloid.
- 12) A soil sample is having a specific gravely of 2.60 and void ration of 0.78. The water content in percentage required to fully saturate the soil at that void ratio would be? [     ]  
 A) 10                      B) 30                      C) 50                      D) 70
- 13) Lacustrine soils deposited in---- (**IES-1995**) [     ]  
 A) Sea                      B) wind                      C)lake                      D) Vegetation matter
- 14) Liquid & Plastic limit exists in (**RRB-2012**) [     ]  
 A) Sandy soils                      B) Silty soils                      C) Gravel soils                      D) Clayey soils
- 15) The ratio of volume of voids to the total volume of a given soil is [     ]  
 A) Void ratio                      B) Porosity                      C) Air content                      D) Air ratio
- 16) Hydrometer is a device which is used to measure(**DRDO-2001**) [     ]  
 A) Temperature of liquid                      B) Density of liquids C) Specific gravity of liquids D) All of these
- 17) At liquid limit a soil has [     ]  
 A) High shear strength                      B) No shear strength                      C) Negligible shear                      D) None of these
- 18) The degree of saturation for oven dry soil is [     ]  
 A) Zero                      B) Less than zero                      C) More than zero                      D) (A) & (B)
- 19) Constant head permeability test is used for (**APPSC-2008**) [     ]  
 A) Silt                      B) Clay                      C) Peat                      D) Sand
- 20) Soil size more than 4.75 mm IS sieve is(**APPSC-2001**) [     ]  
 A) Sand                      B) Gravel                      C) Clay                      D) Silt
- 21) Aeolian soils are-----(**GATE-1995**) [     ]  
 A) Residual soils                      B) Wind deposit                      C) Gravity deposits                      D) Water deposits
- 22) Black cotton soil exhibits large swelling and shrinkage in the following clay mineral(**GATE93**) [     ]  
 A) Oxidation                      B) Carbonation                      C) Hydration                      D) All of these
- 23) An agent responsible for the transportation of soil is (**APPSC-2011**) [     ]  
 A) Wind                      B) Water                      C) Gravity                      D) All of these
- 24) The father of Soil Mechanics is (**APPSC-2011**) [     ]  
 A) Gravels                      B) Coarse sands                      C) Fine sills and clays D) Highly plastic clays
- 25) Lacustrine soils deposited in---- (**IES-1995**) [     ]  
 A) Sea                      B) wind                      C)lake                      D) Vegetation matter
- 26) The relation between void ration e, specific gravity G, water content W and degree of salutation S is given by (**APPSC-2003**) [     ]  
 A)  $e = \frac{wG}{s}$                       B)  $e = \frac{SG}{w}$                       C)  $e = \frac{wS}{G}$                       D)  $e = wGS$
- 27) Soil is considered as---system(**APPSC-2011**) [     ]  
 A) one                      B) Two                      C) Three                      D) Four
- 28) The porosity of a soil is 20%,its void ratio is (**APPSC-2001**) [     ]  
 A) 0.167                      B) 0.205                      C) 0.80                      D) 0.25

- 29) A Soil sample has a  $w=15\%$ ,  $G=2.67$ ,  $e=0.49$  what will be Degree of saturation **APPSC-2001** [ ]  
 A) 85%                      B) 60%                      C) 40%                      D) 81.70%
- 30) In a soil mass if  $v_v = v_s$ , then values of void ratio & porosity is (**APPSC-2002**) [ ]  
 A) 0.5,1                      B) 1,0.5                      C) 1.5,0.5                      D) 0.5,1.5
- 31) Submerged unit weight is based on principle of -----(**DRDO-1999**)  
 (A) Darcy    B) Terzaghi    C) Archimedes    D) Reynolds [ ]
- 32) The consistency of a saturated cohesive soil is (**GATE 1995**) [ ]  
 A) Water content    B) Density Index    C) Effective size    D) Permeability
- 33) For a soil  $G=2.5$ ,  $e=1$  then value of  $\gamma_{sat}/\gamma_{sub}$  (**SSC JE2001**) [ ]  
 A) 2.5                      B) 2.0    C) 2.33                      D) none
- 34) Which of the following material is impervious (**APPSC-2001**) [ ]  
 A) Sand                      B) Silty Clay                      C) Gravel                      D) Stiff Clay
- 35) Capillary force is dependent on (**APPSC-2001**) [ ]  
 A) Pore pressure    B) Water content    C) Depth of water    D) Surface Tension
- 36) Coefficient of permeability of soil varies approximately as (**AEE-1999**) [ ]  
 A)  $D_{10}^2$                       B)  $\sqrt{D_{10}}$     C)  $D_{30}^3$                       D) All of these
- 37) Which of the following in an effective pressure [ ]  
 A) Pore water pressure    B) Capillary    C) Water load                      D) None of these
- 38) Piping occurs when [ ]  
 A) Effective stress 0    B) Flow is down word    C) Flow is up word    D) Flow is horizontal
- 39) Space between two adjacent flow lines is called (**ISRO JE 1998**) [ ]  
 A) Flow potential    B) Flow path                      C) Flow field                      D) Flow length
- 40) Magnitude of capillary rise is more in (**APPSC2001**) [ ]  
 A) Sand                      B) Gravel                      C) Clay                      D) Silt

**UNIT-IV**

**PERMEABILITY AND SEEPAGE**

- 1) The units of permeability is [ ]  
 A) no units    B) cm/sec    C) cm                      D) kg/m<sup>3</sup>
- 2) The property soil which permits water to percolate through it is known as (**AEE-2007**) [ ]  
 A) Plasticity                      B) Elasticity                      C) Permeability                      D) Capillary
- 3) For a given soil mass the average permeability is  $10^{-3}$  cm/sec and coefficient of permeability in horizontal direction is  $5 \times 10^{-3}$  cm/sec, then permeability in vertical direction is—cm/sec [ ]  
 A)  $2 \times 10^{-4}$                       B)  $5 \times 10^{-4}$                       C)  $4 \times 10^{-3}$                       D)  $6 \times 10^{-3}$  (**AEE2009**)
- 4) For large engineering projects the permeability is determined by (**TS TRANSCO-2015**) [ ]  
 A) Constant head    B) Variable head    C) Pumping in test    D) Pumping out test
- 5) Capillary force is dependent on (**AEE-2011**) [ ]  
 A) Pore pressure    B) Water content    C) Depth of water                      D) Surface tension
- 6) In a saturated soil deposit having a density of  $25 \text{ kN/m}^3$ , the effective normal stress on a horizontal plane at 4m depth will be--- $\text{kN/m}^3$  (**AEE-2009**) [ ]  
 A) 20    B) 40    C) 60                      D) 80
- 7) Phreatic line in an earth dam may be (**AEE-2007**) [ ]

- A) Straight B) Parabolic C) Circular D) Elliptical
- 8) A soil has a discharge velocity of  $6 \times 10^{-7}$  m/s and a void ratio is 0.5 then seepage velocity in m/s  
 A)  $12 \times 10^{-7}$  B)  $18 \times 10^{-7}$  C)  $24 \times 10^{-7}$  D)  $36 \times 10^{-7}$  (Lecturers-2013) [ ]
- 9) Flow net is used to find out (APPSC AEE 2007) [ ]  
 A) Permeability B) Strength of soil C) Quantity of seepage D) Bearing capacity
- 10) Flow net is used to find out (AEE-2008) [ ]  
 A) Permeability soils B) Strength of soil C) Quantity of seepage D) both A& B
- 11) A soil has discharge velocity  $6 \times 10^{-7}$  m/s and void ratio 0.5 then seepage velocity (AEE-2013) [ ]  
 A)  $12 \times 10^{-7}$  m/s B)  $18 \times 10^{-7}$  m/s C)  $24 \times 10^{-7}$  m/s D)  $36 \times 10^{-7}$  m/s
- 12) The shape of the phreatic line is (TSPSC AEE-2015) [ ]  
 A) Parabola B) Cylindrical C) Circular D) Straight line
- 13) The seepage (q) through earth dam can be calculated by using (TSPSC AEE-2015) [ ]  
 A)  $kh \left( \frac{Nd}{Nf} \right)$  B)  $kh \sqrt{\left( \frac{Nf}{Nd} \right)}$  C)  $kh(NdxNf)$  D)  $kh \left( \frac{Nf}{Nd} \right)$
- 14) The seepage velocity  $V_s$  and Darcy's velocity  $v$  is related (Observers 2013) [ ]  
 A)  $v = V_s/n$  B)  $V_s = v/n$  C)  $V_s = vn$  D)  $V_s = n/v$
- 15) Magnitude of capillary rise more in [ ]  
 A) Silts B) Sands C) Clays D) Gravel
- 16) In a coarse grained soil having  $e=0.75, G=2.75$ , the critical hydraulic gradient is (AEE1987,96) [ ]  
 A) 0.25 B) 0.5 C) 1.0 D) 0.75
- 17) For large engineering projects the permeability is determined by using (TS TRANSCO-15) [ ]  
 A) Constant head B) Falling head C) pumping in D) Pumping out
- 18) As per IS Soil classification organic soils are represented (TSPSC AE 2015) [ ]  
 A) MH B) SL C) ML D) OL
- 19) The group symbols assigned to Silty sand and clayey sand (Research Asst 2013) [ ]  
 A) SS & CS B) SM & CS C) SM & SC D) MS & CS
- 20) Submerged unit weight is based on principle of ----- (DRDO-1999) [ ]  
 (A) Darcy B) Terzaghi C) Archimedes D) Reynolds
5. Coefficient of permeability of soil varies approximately as (AEE-1999) [ ]  
 A)  $D_{10}^2$  B)  $\sqrt{D_{10}}$  C)  $D_{30}^3$  D) All of these
- 21) Which of the following is an effective pressure (AEE-1999) [ ]  
 A) Pore water pressure B) Capillary C) Water load D) None of these
- 21) 22). Piping occurs when DRDO-1999 [ ]  
 A) Effective stress 0 B) Flow is down word C) Flow is up word D) Flow is horizontal
- 23) Space between two adjacent flow lines is called (ISRO JE 1998) [ ]  
 A) Flow potential B) Flow path C) Flow field D) Flow length
- 24) The poisons ratio for a saturated clay will be [ ]  
 A) 0 B) 0.25 C) 0.5 D) 0.15
- 25) A point load of 2000kN is applied on the ground surface then the vertical stress at a depth of 7 m below the load as per boussisensqs equation --kN/m<sup>2</sup> [ ]  
 A) 40.80 B) 140 C) 20 D) 81.60
- 26) The vertical cross section of an isobar is [ ]  
 A) Parabolic curve B) Circle C) Hyperbola D) None
- 27) The construction of New marks influence chart ,if the number of annular are selected is 10 and each annular area is divided in to 10 sectors, the influence value of for the chart is [ ]  
 A) 0.005 B) 0.05 C) 0.01 D) 0.001

- 28) The possibility of quick sand condition will be there when flow of water to soil [ ]  
 A) Horizontal      B) Up word      C) Down word      D) Radial
- 29) The law used in permeability test is used [ ]  
 A) Stoke's      B) Pascal      C) Darcy's      D) Newton's
- 30) New marks influence chart can be used for-----loading condition [ ]  
 A) Rectangular      B) Any shape      C) Strip loading      D) Circular
- 31) The main difference b/n westergard's and Boussinesq's solution for  $r/z \geq 1.5$  is [ ]  
 A) Marked      B) not different      C) negligible      D) not compared
- 32) The vertical stress below point load oh 100 kg at ground surface [ ]  
 A) 0      B) infinity      C) some finite value      D) con't determined
- 33) For Small engineering projects the permeability is determined by [ ]  
 A) Constant head      B) Variable head      C) Pumping in test      D) both A & B
- 34) Select the incorrect statement [ ]  
 (A) Pressure bulb is nothing but isobar      B) Isobar is contour equal stress  
 C) Isobar of higher intensities will lie outside      D) None of the above
- 35) Westergards theory is more appropriate for -----soils [ ]  
 A) Layered      B) Homogeneous      C) Anisotropic      D) None
- 36) Drainage conditions during test can be controlled best in [ ]  
 A) Direct shear test      B) Vane shear test      C) both A&B      D) Triaxial shear test
- 37) Vane shear test is [ ]  
 A) Field test      B) Laboratory test      C) both A&B      D) None
- 38) Stress distribution on the failure plane in the case of triaxial test [ ]  
 A) Zig-Zag      B) Non uniform      C) Uniform      D) Can't say
- 39) Compaction of soil is aimed at [ ]  
 A) Decreasing dry density      B) Increasing Porosity      C) Decreasing Void ratio      D) None
- 40) Mathematically speaking the time taken for 100% consolidation is [ ]  
 A) 5years      B) 10 years      C) Zero      D) infinite

**UNIT-V**

**COMPACTION, CONSOLIDATION, SHEAR STRENGTH**

- 1) Clay soils are compacted effectively by the action of [ ]  
 A) Vibration      B) Kneading      C) Tamping      D) Any of the above
- 2) The number of blows required for light compaction in each layer [ ]  
 A) 25      B) 56      C) 75      D) 45
- 3) The factors effecting compaction is [ ]  
 A) Water content      B) Compactive energy      C) Soil type      D) All the above
- 4) Consolidation of a soil due to load which is--term [ ]  
 A) Static & Short      B) Dynamic & Short      C) Dynamic & Long      D) Static & Long
- 5) Time is an important parameter in the consolidation of [ ]  
 A) Sands only      B) Clays only      C) Both A & B      D) Silt
- 6) Total number of strees components at a point within a soil mass loaded at its boundary [ ]



- A) 3    B) 6                    C)9                                    D) 12
- 7) The maximum contact pressure for a rigid footings on a cohesion less soils will be  
 (A) Edges                    B) Center                    C) between centre & Edge D) None                    [    ]
- 8) The value of compression index is for a LL of remolded soil is 50%                    [    ]  
 A) 0.028                    B) 0.28                    C) 0.36                    D) 0.036
- 9) Compared to normal soils over consolidated soils are                    [    ]  
 A) Stiff but weaker    B) Less stiff but stronger    C) Stiffer & Stronger                    D) None
- 10) The units of coefficient of volume compressibility                    [    ]  
 A) Dimensionless    B)  $m^2/kN$     C)  $m^3/kN$     D)  $kN/m^2$
- 11) The units of coefficient of consolidation is                    [    ]  
 A) cm/sec                    B)  $cm^2/sec$                     C)  $cm/sec^2$                     D) No units
- 12) The sensitivity normal clay is                    [    ]  
 A) 10 to 12    B) 8 to 10 C) 4 to 6    D) 1 to 4
- 13) Shearing strength of cohesion less soils depends on                    [    ]  
 A) Dry density                    B) Void ratio    C) Loading rate                    D) Normal stress
- 14) The maximum shear occurs on the filament which makes angle with the horizontal plane is  
 A) Zero                    B) 60    C) 30    D) 45                    [    ]
- 15) The equation of direct shear test was formed by                    [    ]  
 A) Rankine                    B) Mohr                    C) Coulombs                    D) Culman
- 16) In a consolidation testing curve fitting method is used to determine                    [    ]  
 A) Compression index                    B) Swelling index  
 C) Co efficient of consolidation                    D) None of the above
- 17) In a soil sample of a consolidation test, pore water pressure is                    [    ]  
 A) Minimum at centre B) Minimum at top    C) Maximum at the bottom    D) Maximum at centre
- 18) In a saturated clay layer consolidating with single drainage isochrones shape                    [    ]  
 A) Triangle                    B) Square                    C) Rectangle                    D) Parabola
- 19) Optimum moisture content is the moisture content which                    [    ]  
 A) Settlement is maximum                    B) K is more    C) Dry density is maximum    D) A&B
- 20) What is the effect of increasing the compaction energy the characteristics of soil                    [    ]  
 A) Decrease MDD increase OMC    B) MDD,OMC decrease    C) MDD,OMC increase    D) none
- 21) A dense dry sand sample under triaxial test has a confining pressure of 020Mpa the angle of internal friction is 30,the sample fails at normal pressure of about ---Mpa                    [    ]  
 A) 0.32                    B) 0.60                    C) 3.00                    D) 0.40
- 22) The angle of internal friction of sandy soil is 30,if the major principle stress is 50kpa,the corresponding minor principle stress                    [    ]  
 A) 12.20                    B) 16.66                    C) 20.80                    D) 27.20
- 23) The angle that coulomb's failure envelope makes horizontal angle is called  
 (A) Cohesion    B) angle of internal friction    C) Adhesion    D) Angle of repose                    [    ]
- 24) The tendency of dense sand to expand on application of shearing load is known as                    [    ]  
 A) Thixotrophy    B) Liquefaction    C) Critical density    D) Dilatancy
- 25) Vane shear test is used for measuring the -----                    [    ]  
 A) Shear strength                    B) Void ratio of soil sample    C) Bearing Capacity    D) all above
- 26) Terzaghi's theory of one dimensional consolidation assumes                    [    ]  
 A) Soil is homogeneous    B) Isotropic                    C) Obey Darcy's law                    D) All the above
- 27) The un-drained test is carried out on sample of clay, silt, and peat to determine                    [    ]

- A) Pore pressure B) Shear Strength of natural ground and Sensitivity C) None D) All the above
- 28) The consolidated-un drained test can be performed in-----methods [ ]  
 A) 1 B) 2 C) 3 D) 4
- 29) Which of the following in an effective pressure [ ]  
 A) Pore water pressure B) Capillary C) Water load D) None of these
- 30) For a vertical centred load acting on the surface of a semi infinite elastic soil mass, the vertical stress at a depth z is proportional to [ ]  
 A) z B)  $z^2$  C)  $1/z$  D)  $1/(z^2)$
- 31) If a saturated soil sample is consolidated, the degree of saturation will be [ ]  
 A) Reduce B) Increase C) Remains constant D) becomes zero
- 32) Reduction in volume in soil primary due to squeezing out of water from the voids is [ ]  
 A) Primary consolidation B) Plastic law C) Creep D) Secondary consolidation
- 33) Secondary consolidation caused by [ ]  
 A) Creep B) Hydrodynamic lag C) Highly plastic clays D) Under dynamic load
- 34) Vibratory roller are use full for compacting [ ]  
 A) Clay soil B) Cohesion less soils C) Gravel D) Crushed rock
- 35) Compaction of soil mass measured in terms of [ ]  
 A) Dry density B) Specific gravity C) Relative density D) Permeability
- 36) Optimum moisture content is the moisture content at which the [ ]  
 (A) Settlement is max B) Permeability is more C) Density is more D) Shear strength is less
- 37) Primary consolidation due to [ ]  
 A) Expulsion of water B) compression of air C) expulsion of air D) both B & C
- 38) Coefficient of consolidation used for calculating [ ]  
 A) Time rate B) Total settlement C) Pre consolidation pressure D) Stress in the soil
- 39) Sheep foot rollers are recommended for compacting ----soils [ ]  
 A) Granular B) Cohesive C) Hard Rock D) Any type of soil
- 40) The untrained plastic clay the shear strength is due to [ ]  
 A) Internal friction B) Water content C) Cohesion D) tension

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