C.E

4664

November - 2022

404/4(N)

GEOTECHNICAL ENGINEERING

Time Allowed : 2.5 Hours *Full Marks : 60*

Answer to Question No. 1 & 2 are compulsory and to be answered first. This answer is to be made in separate loose script(s) provided for the purpose. Maximum time allowed is 30 minutes, after which the loose answer scripts will be collected and fresh answer scripts for answering the remaining part of the question will be provided. On early submission of answer scripts of Question No. 1 & 2, a student will get the remaining script earlier.

Answer any Eight (08) Questions from the rest.

1. Choose the correct answer from the given alternatives (*any ten*): 1x10 = 10

(i) Soil transported and deposited by running water is called (a) Lacustrine deposit (b) Aeoline deopsit (c) Alluvial deposit (d) None of the above.

(ii) The ratio of volume of void to the total volume of soil sample is called (a) Water content (b) Void ratio (c) Porosity (d) Degree of saturation .

(iii) The minimum water content at which soil can still remain in a saturated condition is called (a) Liquid limit (b) Shrinkage limit (c) Plastic limit (d) Plasticity Index.

(iv) A soil sample has Void ratio 0f 0.67 . Its porosity is (a) 0.3 (b) 0.4 (c) 0.5 (d) 0.55 .

(v) Unit of Coefficient of permeability is (a)cm^2/sec (b)cm^3/sec (c)cm/sec (d) Unitless.

(vi) The laboratory test used to determine the value of coefficient of permeability of fine grained soil is (a) Constant head permeability test (b) Falling head permeability test (c) Pumping out test (d) None of the above.

(vii) In a flownet we can find (a) Stream lines (b) Equipotential lines (c) Fields (d) All of the above.

(viii) As per Mohr-Coulomb theory, Shear stress on failure plane depends on (a) Cohesion (b) Angle of internal friction (c) Normal stress on failure plane (d) All of the above.

(ix) In Plate load test , the minimum width of test pit should be (a) 2 times the width of test plate(b) 4 times the width of test plate (c) 5 times the width of test plate (d)10 times the width of test plate.

(x) As per Static method, the load carried by a Pile is borne by (a) End bearing resistance (b) Skin friction (c) Both (a) and (b) (d) None of the above.

(xi) When the retaining wall tends to move away from backfill, the minimum Earth pressure is called (a) Active earth pressure (b) Passive earth pressure (c) Earth pressure at rest (d) None of the above.

(xii) The weight of hammer used in laboratory Light compaction test is (a) 1.6 kg (b) 2.6 kg (c) 3.89 kg (d) 4.89 kg .

(xiii) The process of soil compression resulting from expulsion of pore water is called (a) Compaction (b) Consolidation (c) Soil exploration (d) None of the above .

(xiv) The roller used for compaction of soil is (a) Smooth wheeled roller (b) Sheep foot roller (c) Vibratory roller (d) All of the above.

(xv) The minimum depth of soil exploration for shallow foundations below the base of footing is equal to (a) Width of footing (b) Twice the width of footing (c) Thrice the width of footing (d) None of the above .

2. Fill in the blanks with appropriate words (*any ten*) 1x10=10

(i) The process of soil formation includes weathering , transportation , deposition and _____ .

(ii) The maximum size of clay particles is _____ mm .

(iii) The difference between Liquid limit and Plastic limit of soil is called _____ .

(iv) Particle size distribution of _____ grained soil is done by Sieve analysis .

(v) For a completely saturated soil the value of degree of saturation is _____ .

(vi) Constant head permeability test is particularly suitable for _____ grained soil .

(vii)In a Flownet _____ lines are the lines along which individual liquid particles percolates through the soil .

(viii) Cohesion and _____ of soil are called Shear strength parameters .

(ix) The maximum net pressure intensity which the soil can carry without shear failure is called _____ of soil .

(x) The weight of hammer used in Standard penetration test is _____ kg .

(xi) If the value of Coefficient of passive earth pressure of a backfill is 3 , the value of Coefficient of active earth pressure is _____ .

(xii) The height of free fall of hammer used in Heavy compaction test is _____ mm .

(xiii) In laboratory compaction test , the water content of soil at which Dry density becomes maximum is called _____ .

(xiv) Terzaghi's theory of bearing capacity is valid for _____ foundations .

(xv) When depth of soil exploration is high , _____ are dug by various boring methods .

3. Draw the Phase diagrams of soil when the soil is (a) Partially saturated (b) Fully saturated 2.5x2

4. Briefly discuss the various Field applications of Geotechnical Engineering. 5

5. A soil sample has Void ratio of 0.67 and water content of 20% . If Specific gravity of soil solids be 2.70, Determine (a) Degree of saturation (b) Dry density and (c) Bulk density of soil sample . 5

6. Explain the terms ' Uniformity Coefficient ' and 'Coefficient of curvature ' of soil . 2.5×2

7. In a Constant head permeability test , if a quantity of 750 ml of water is collected in graduated measuring jar in 5 minutes under a constant head of 40 cm , calculate the value of Coefficient of permeability of the soil . The length of soil sample is 8 cm and total cross sectional area of soil is 50 cm^2 . 5

8. What is 'Flownet ' ? State the Characteristics of flownet . 2+3

9 . A pile is being driven with a drop hammer weighing 2000 kg and having a free fall of 1.0 m.The average penetration per blow for last 5 blows is 5 mm. Determine the Ultimate and Allowable load carrying capacity of the pile by ENR formula . Take Factor of safety = 6 5

10. Briefly discuss the factors affecting Compaction of soil . 5

11. What is' Consolidation of soil ' ? State the differences between Compaction and Consolidation of soil . 2+3

12. Define 'Soil stabilization' . State the various purposes of Soil Exploration . 2+3