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Question Paper Code: 94102

B.E./B.Tech. DEGREE EXAMINATION, MAY 2022

Fourth Semester

Civil Engineering

19UCE402- SOIL MECHANICS

(Regulation 2019)

Duration: Three hours

Maximum: 100 Marks

PART A - (5x 1 = 5 Marks)

Answer All Questions

1. The soil deposit transported through to lake CO1- U
(a) lacustrine soil (b) Alluvial soil (c) Both b And d (d) Marine soil
2. The permeability is inversely proportional to _____ CO1- U
(a) Viscosity (b) Specific gravity (c) Temperature (d) None of the above
3. Weight of Hammer used in Standard Proctor Test CO1- U
(a) 2.6 Kg (b) 4.6 Kg (c) 8 Kg (d) 12.5 Kg
4. The expansion of soil due to shear at constant value of pressure is CO1- U
called
(a) apparent cohesion (b) true cohesion (c) dilatancy (d) consistency
5. Failure of the stability of slopes, generally occurs along CO1- U
(a) Curved surface (b) Slip plane (c) All the surfaces (d) A horizontal surface

PART – B (5 x 3= 15Marks)

6. Draw the particle size distribution curve for a soil CO2- App
7. Determine the value of critical hydraulic gradient for a loose sand deposit CO6- E
having void ratio of 0.67 and specific gravity of 2.67.
8. Illustrate the test methods for compaction CO1- U
9. The laboratory results obtained from direct shear test. The normal stress at CO2-App

failure is 200 kPa and shear stress is 50 kPa. Calculate the angle of internal friction of the soil.

10. Illustrate the forces acting on sliding wedge in friction circle method. CO2- App

PART – C (5 x 16= 80Marks)

11. (a) Describe in detail about the grain size distribution method use for coarse grained soil ($>75\mu$), And also for fine grained soil ($<75\mu$) CO1-U (16)
- Or
- (b) Soil is to be excavated from a borrow pit which has a density of 2 gm/cc and water content of 14%. The specific gravity of soil particles is 2.7. the soil is compacted so that water is 20% and dry density 1.9 gm/cc for 1000m^3 of soil in fill, estimate CO6-E (16)
- i) the quantity of soil to be excavated from the pit in m^3 ;
- ii) The amount of water to be added.
- Also determine the void ratio of soil in borrow pit and fill
12. (a) Describe in detail the laboratory methods used for determination of coefficient of permeability of soil CO1- U (16)
- Or
- (b) Discuss about quick sand condition and State the reason for Quick sand condition and its effect CO1- U (16)
13. (a) Describe about the standard proctor compaction test and modified proctor compaction test CO1- U (16)
- Or
- (b) Derive the expression for coefficient of consolidation using Terzaghi's one dimensional consolidation theory CO1- U (16)
14. (a) Demonstrate the Triaxial shear test. State advantages of triaxial test CO1- U (16)
- Or
- (b) The properties of soil in a 3m high embankment are $C' = 50\text{kN/m}^2$, $\phi' = 20^\circ$ and $\gamma = 16\text{ kN/m}^3$. Skempton's pore water pressure parameters are found from triaxial test as $A = 0.5$ and $B = 0.9$. The height of embankment was raised from 3m to 6m. Assuming that the dissipation of pore pressure during this stage of construction is negligible and that lateral pressure is half of vertical pressure, Estimate the shear strength of soil at base of embankment just after increasing the height of embankment. CO6- E (16)

15. (a) (i) A canal is excavated to a depth of 6m below ground level, CO5-U (10)
through a soil having the following characteristics $C = 20\text{KN/m}^2$, $\Phi = 15^\circ$, $e = 0.7$ and $G = 2.7$. The slope of bank is 1 in 1. Evaluate the factor of safety with respect to cohesion
- i) When the canal runs full.
 - ii) If it is suddenly and completely emptied.
- (ii) Determine the factor of safety with respect to cohesion, of a CO6-E (6)
clay slope laid at 1 in 2 to a height of 10m, if the angle of internal friction, $\Phi = 10^\circ$, $C = 25\text{KN/m}^2$ and $\gamma = 19\text{kN/m}^3$. What will be the critical height of slope in this soil?
- Or
- (b) Interpret the stability analysis of an infinite slopes of Cohesion CO6-E (16)
less soils

