BRAINWARE UNIVERSITY

Term End Examination 2022
Programme – B.Tech.(CE)]-2021
Course Name – Soil Mechanics
Course Code - PCC-CE302
(Semester III)

Full Marks : 60
Time : 2:30 Hours
[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A
(Multiple Choice Type Question)

1 x 15=15

1. *Choose the correct alternative from the following :*

(i) The direct shear test can also be called as _____
   a) Simple shear test
   b) Stress test
   c) Strain controlled shear box test
   d) All of the mentioned

(ii) The capillary tension or capillary potential can also be called as _____
   a) Pressure deficiency
   b) Pressure reduction
   c) Negative pressure
   d) All of the mentioned

(iii) Volume change in soil is due to which of the following factor?
   a) Water content is changed
   b) Increase in soil density
   c) Change in pressure
   d) Change in particle size

(iv) The zero air void line shows the _____
   a) dry density as a function of water content for soil containing no air voids
   b) saturated density as a function of water content
   c) partially saturated density as a function of water content
   d) dry density as a function of specific gravity

(v) Every process involving a decrease in the water content of a saturated soil without replacement of water by air is called _____
   a) compression
   b) compressibility
   c) tension
   d) consolidation

(vi) In fixed ring cell of consolidation, _____ is permitted to move in _____ direction.
   a) only top porous stone, downward
   b) only bottom porous stone, downward
   c) only bottom porous stone, upward
   d) only top porous stone, upward

(vii) Water present in the voids of soil mass is called _____
   a) Soil water
   b) Free water
   c) Ground water
   d) Pore water

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(viii) The height of solids method is applicable for _____

    a) only dry specimens

    b) only fully saturated specimens

    c) both saturated and unsaturated samples

    d) only partially saturated specimens

(ix) Coefficient of absolute permeability (K) depends on _____

    a) Permeant

    b) Properties of soil mass

    c) Degree of saturation

    d) All of the mentioned

(x) Which of the following is a disadvantage of the shear box test?

    a) Stress condition of soil is complex

    b) The test cannot be used for coarse grained soil

    c) No control on the drainage of soil

    d) The shear box test is more complex test

(xi) Which of the following test are used in the laboratory, for compaction?

    a) Vibration test

    b) Standard proctor test and Jodhpur-mini compactor test

    c) None of the mentioned

    d) All of the mentioned

(xii) When the soil is in loosest form, density index is zero and its relative compaction Rc is _____

    a) 0.7

    b) 0.8

    c) 0.85

    d) 0.9

(xiii) Darcy's law is valid for only _____

    a) Laminar flow

    b) Turbulent flow

    c) Hydraulic flow

    d) All of the mentioned

(xiv) During the laboratory test of consolidation, each pressure increment is maintained constant until the compression virtually ceases and it generally takes _____

    a) 2 minutes

    b) 30 minutes

    c) 24 hours

    d) 1 hours

(xv) Gravels are _____ permeable.

    a) Highly

    b) Least

    c) Partially

    d) All of the mentioned

Group-B
(Short Answer Type Questions)

3 x 5=15

2. In stress distribution in soil, state Boussinesq's assumptions and Explain the concept of pressure bulb. (3)

3. A cylindrical mould of diameter 7.5cm contains a 15cm long sample of fine sand. When water follows through the soil under constant head at a rate of 58c.c/min, the loss of heat between two points 8cm apart is found to be 12.1cm. Determine the coefficient of permeability of the soil. (3)

4. Differentiate between normally consolidated soil and pre consolidated soil. (3)

5. A constant head permeability test was carried out on a cylindrical sample of sand 10 cm dia and 15 c. height. 160 cm³ of water was collected in 1.75 min, under a head of 30 cm. Compute coefficient of permeability in m/year and flow velocity in m/sec. (3)

OR

State and explain the various factors that affect coefficient of permeability. (3)

6. Sand lying below masonry dam has a porosity of 40% and a specific gravity of 2.67. Find out the values of the critical hydraulic gradient. (3)

OR

Explain relation between void ratio and density or porosity ? (3)

Group-C
(Long Answer Type Questions)

5 x 6=30

7. What is consolidated undrained strength or CU test? Explain it with Mohr envelope. How does (5) it differ from CD test?

8. What do you understand by Critical hydraulic gradient and find out the value of critical (5) hydraulic gradient for the soil, having its specific gravity equal to 2.68 and void ratio equal to 0.67.

9. Explain UU test, CU test and CD test. (5)

10. Define compression index, Co-efficient of compressibility and coefficient of volume change. (5)

OR

Explain what are the factors on which field compaction depends? (5)

11. Define the terms 'seepage, seepage pressure, flow nets, flow lines, equipotential lines, (5) hydraulic gradient, flow path, piezometric level'.

OR

Define total, effective and pore water pressure in soil. (5)

12. In a laboratory consolidation test, a 2.5 cm thick sample of clay reached 60% consolidation in (5) 17 minutes under double drainage condition. Determine the time required for 60% consolidation of a layer of this soil in the field under the following conditions:i) When a 3 m thick layer of the given soil is sandwitched between two sand layers. ii) When a 5 m thick layer of the soil is overlain by a sand layer and underlain by a deep layer of intact shale.

OR

Write Terzaghi's theory of consolidation, stating the various assumptions and their validity. (5)

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