17616

BRAINWARE UNIVERSITY

Term End Examination 2025-2026
Programme – Dip.CE-2024
Course Name – Soil Mechanics
Course Code - DCE30105
(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) Select the rock formed from magma cooling.
a) Sedimentary b) Igneous
c) Metamorphic d) Loess

(ii) Select the rock formed from existing rock under heat and pressure.
a) Igneous b) Sedimentary
c) Metamorphic d) Laterite

(iii) Select the correct classification based on origin.
a) Geological b) Agricultural
c) Preliminary d) Structural

(iv) Select the most porous rock among the following.
a) Sandstone b) Granite
c) Marble d) Basalt

(v) Select the major component of geotechnical engineering.
a) Heat transfer b) Soil mechanics
c) Pipe design d) Aesthetics

(vi) Select the layer where rock gets metamorphosed.
a) Mantle b) Core
c) Crust d) Atmosphere

(vii) Choose the key factor in soil as a supporting medium.
a) Density b) Plasticity
c) Porosity d) Shear strength

(viii) Select the instrument used in oven drying method.
a) Thermometer b) Digital scale
c) Hot air oven d) Hydrometer

(ix) Select the property defined as ratio of voids to solids.

a) Porosity
b) Void Ratio
c) Degree of Saturation
d) Specific Gravity

(x) Select the property represented by volume of voids to total volume.

a) Porosity
b) Void Ratio
c) Saturation
d) Water content

(xi) Select the type of soil with only internal friction.

a) Saturated clay
b) Gravel
c) Wet silt
d) Humus

(xii) Choose the primary use of permeability tests.

a) Determine plasticity
b) Measure compressibility
c) Assess water flow
d) Analyze capillary rise

(xiii) Choose the soil most likely to fail by shear.

a) Dense gravel
b) Hard rock
c) Loose saturated sand
d) Dry silt

(xiv) Choose the compaction equipment for confined trenches.

a) Roller
b) Vibrator
c) Sheep foot roller
d) Core cutter

(xv) Choose the component plotted on x-axis in compaction curve.

a) Dry density
b) Moisture content
c) Void ratio
d) Relative density

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Define weathering and describe its role in soil formation. (3)
3. Write the significance of Atterberg limits and explain each briefly. (3)
4. Define flow net and describe its characteristics. (3)
5. Classify pile foundations and explain their uses in deep foundations. (3)
6. Calculate the coefficient of permeability for a soil using constant head test. Given: discharge = 120 cm³, time = 60 s, head = 30 cm, length = 10 cm, area = 25 cm². (3)

OR

Calculate the permeability from a falling head test. Given: a = 1 cm², L = 10 cm, A = 50 cm², h_1 = 40 cm, h_2 = 20 cm, t = 60 s. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Classify types of soil as a three-phase system and explain with diagram. (5)
8. Write the method of determining specific gravity using pycnometer and explain its importance. (5)
9. Classify types of foundations and explain when to use pile, caisson, and well foundations. (5)
10. Differentiate igneous, sedimentary, and metamorphic rocks based on formation and provide one engineering use for each. (5)
11. Calculate the dry density of a soil compacted using Modified Proctor test. Bulk density = 2.05 g/cm³, water content = 15%. (5)
12. Calculate the bulk and dry density of a soil sample using core cutter method. Cutter volume = 1000 cm³, total weight = 1800 g, water content = 15%. (5)

OR

A soil has a plastic limit of 18%, liquid limit of 45%, and natural water content of 30%. Calculate the plasticity index, liquidity index and consistency index. (5)