SAMPLE PAPERS

DIPLOMA FIFTH SEMESTER EXAMINATION 2025 (JUT)

GEO TECHNICAL ENGINEERING

DIPLOMA WALLAH

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Full Marks: 70 marks | Time: 3 Hours

Instructions:

- Question No. 1 is compulsory.
- Answer any **FOUR** questions from the remaining (Q.2 to Q. 7 marks).

Q.1 Multiple Choice Questions (Compulsory)

(i) The ratio of the volume of voids to the volume of solids is called:

(a) Porosity

(b) Void Ratio

(c) Degree of Saturation

(d) Air Content

(ii) According to IS Classification, the size of Silt particles ranges from:

(a) 4.75 mm to 75 micron

(b) 75 micron to 2 micron

(c) < 2 micron

(d) > 4.75 mm

(iii) The instrument used to determine the Liquid Limit of soil is:

(a) Casagrande's Apparatus

(b) Core Cutter

(c) Vane Shear Apparatus

(d) Permeameter

(iv) Which of the following factors reduces the permeability of soil?

(a) High temperature

(b) Large grain size

(c) Entrapped air

(d) High void ratio

(v) In a compaction curve, the peak point represents:

(a) Zero Air Voids

(b) Maximum Dry Density (MDD)

(c) Minimum Dry Density

(d) Saturation Limit

(vi) Standard Penetration Test (SPT) is a:

(a) Laboratory Test

(b) Field Test

(c) Model Test

(d) Theoretical Analysis

(vii) Rankine's Theory deals with:

(a) Bearing Capacity

(b) Earth Pressure

(c) Settlement

(d) Permeability

SECTION B (Theory)

Q.2

(A) Define Rock. Explain the classification of rocks based on their genesis (Igneous, Sedimentary, and Metamorphic) with examples. (7 Marks)

(B) Explain the Particle Size Distribution Curve. Define Uniformity Coefficient (C_U) and Coefficient of Curvature (C_C). (7 Marks)

Q.3

(A) Explain the laboratory procedure to determine the coefficient of permeability by the Falling Head Method. (7 Marks)

(B) What is the necessity of Site Investigation? Explain the Standard Penetration Test (SPT) procedure. (7 Marks)

Q.4

(A) Explain the procedure to determine the dry density of soil in the field by the Sand Replacement Method. Draw a neat diagram. (7 Marks)

(B) Write a short note on the importance/application of Geotechnical Engineering in Civil Engineering (Dams, Roads, Foundations). (7 Marks)

Q.5

(A) Define Consistency of Soil. Explain Liquid Limit, Plastic Limit, and Plasticity Index. (7 Marks)

(B) Explain the Direct Shear Test procedure. What are the advantages of this test? (7 Marks)

Q.6

(A) Define Ultimate Bearing Capacity, Safe Bearing Capacity, and Allowable Bearing Pressure. (7 Marks)

(B) What are the different types of Shear Failures in soil? Explain General, Local, and Punching shear failure. (7 Marks)

Q.7 Write Short Notes on (Any FOUR): (4 × 3.5 = 14 Marks)

(A) Factors affecting Permeability

(B) California Bearing Ratio (CBR)

(C) Zero Air Voids Line

(D) Dry Strength Test (Field Identification)

(E) Sedimentary Rocks

SOLUTIONS & KEY (PAPER 2)

MCQ Answer Key:

(i) b (Void Ratio)

(ii) b (75 micron to 2 micron)

(iii) a (Casagrande's Apparatus)

(iv) c (Entrapped air)

(v) b (MDD)

(vi) b (Field Test)

(vii) b (Earth Pressure)

Model Hints for Long Questions:

- **Q2(B):** Draw the S-curve (Percentage finer vs Log of particle size). Define $C_u = D_{60} / D_{10}$.
- **Q3(A):** Sand pouring cylinder diagram is essential. Mention calibration of sand.
- **Q4(B):** Draw three small load-settlement curves showing the distinct failure patterns.
