

Scheme - G  
**Sample Test Paper-I**

**Course Name : Diploma in Civil Engineering Group**

**Course Code : CE/CS/CR/CV**

**Semester : Fourth**

**Subject Title : Geotechnical Engineering**

**Marks : 25**

**17420**

**Time: 1 Hours**

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**Instructions:**

1. All questions are compulsory.
2. Illustrate your answers with neat sketches wherever necessary.
3. Figures to the right indicate full marks.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.

**Q1. Attempt any THREE**

**(9 Marks)**

- a) State geological classification of rock. Give one example of each.
- b) Write three types of faults.
- c) Define focus, epicenter and intensity of earthquake.
- d) Define specific gravity, degree of saturation and moisture content of soil.

**Q2. Attempt any TWO**

**(8 Marks)**

- a) State eight properties of minerals.
- b) State any four types of joints in rock structure.
- c) Define seismogram and seismograph.

**Q3. Attempt any TWO**

**(8 Marks)**

- a) State any four field applications of Geotechnical engineering
- b) Calculate dry unit weight of soil having bulk unit weight of  $18 \text{ kN/m}^3$  at moisture content of 20%.
- c) State the procedure of determination of specific gravity by Pycnometer in eight steps.

Scheme - G  
Sample Test Paper-II

Course Name : Diploma in Civil Engineering Group  
Course Code : CE/CS/CR/CV  
Semester : Fourth  
Subject Title : Geotechnical Engineering  
Marks : 25

**17420**

**Time: 1 Hours**

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**Instructions:**

1. All questions are compulsory.
2. Illustrate your answers with neat sketches wherever necessary.
3. Figures to the right indicate full marks.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.

**Q1. Attempt any THREE**

**(9 Marks)**

- a) Define liquid limit, plastic limit and shrinkage limit.
- b) Define  $D_{10}$ ,  $D_{30}$  and  $D_{60}$  of soil.
- c) Define coefficient of permeability.
- d) State any three assumptions of Terzaghi's bearing capacity theory.

**Q2. Attempt any TWO**

**(8 Marks)**

- a) Write step by step procedure of determination of plastic limit of soil.
- b) Calculate coefficient of uniformity and coefficient of curvature for the given soil sample data.  
 $D_{10} = 0.07 \text{ mm}$                        $D_{30} = 0.21 \text{ mm}$                        $D_{60} = 0.43 \text{ mm}$
- c) State any four factors affecting permeability, stating effect of each.

**Q3. Attempt any TWO**

**(8 Marks)**

- a) Soil is tested for shear strength using vane shear test. The observations are as given below. Diameter of vane = 12 mm, height of vane = 12 mm and torque measured at failure = 15 N-mm. Calculate shear strength of soil.
- b) Draw neat labeled sketch of Plate load test set up using gravity load method.
- c) Differentiate between active and passive earth pressure.

**Scheme - G**

**Sample Question Paper**

**Course Name : Diploma in Civil Engineering Group**

**Course Code : CE/CS/CR/CV**

**Semester : Fourth**

**Subject Title : Geotechnical Engineering**

**Marks : 100**

**17420**

**Time: 3 Hours**

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**Instructions:**

1. All questions are compulsory.
2. Illustrate your answers with neat sketches wherever necessary.
3. Figures to the right indicate full marks.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.

**Q.1 (A) Attempt any SIX**

**12 Marks**

- a. State four branches of Geology.
- b. State any two engineering applications of igneous rock.
- c. Define Structural Geology.
- d. Define outcrop and faults.
- e. Explain Significance of density index
- f. Define soil as per I.S.
- g. State any four field applications of Geotechnical engineering.
- h. Soil is called as three phase system, why?

**Q.1 (B) Attempt any TWO**

**08 Marks**

- a. Draw neat labeled internal structure of Earth.
- b. State any four types of folds and explain any one.
- c. State any four applications of soil as construction material and foundation bed.

**Q.2 Attempt any FOUR**

**16 Marks**

- a. Define weathering and erosion of rock.
- b. State Geological classification of soil.
- c. State any four causes of earthquake.
- d. State any four effects of earthquake.

- e. Explain any two types of weathering
- f. State consistency stages and consistency limits of soil.

**Q.3 Attempt any FOUR**

**16 Marks**

- a. Define well graded and uniformly graded soil. Draw standard partial size distribution curve for well graded and uniformly graded soil.
- b. Define coefficient of permeability and state Darcy's law.
- c. Draw flow net and write four properties of flow net.
- d. Draw graph showing failure envelope for C-soil and C- $\phi$  soil and write their failure envelope equation giving meaning of each term.
- e. Draw neat labeled sketch of shear box with soil sample.
- f. Define ultimate bearing capacity and safe bearing capacity of soil.

**Q.4 Attempt any FOUR**

**16 Marks**

- a. State any four assumptions of Terzaghi's bearing capacity theory.
- b. State effects of water table on bearing capacity of soil.
- c. Write four differences between compaction and consolidation.
- d. State four factors affecting compaction with their effect.
- e. State any four methods of soil stabilization and write procedure of any one.
- f. State necessity of soil exploration. What is the criteria for deciding the number of test pits site investigation

**Q.5 Attempt any TWO**

**16 Marks**

- a. Calculate the void ratio, porosity and degree of saturation of a soil sample if it is having wet unit weight  $20 \text{ kN/m}^3$  and dry unit weight  $18 \text{ kN/m}^3$  and specific gravity is 2.7.
- b. Calculate shrinkage limit for the given soil sample from the observations given below.
  - i) Mass of empty container ( $W_1$ ) = 13 gm.
  - ii) Mass of container with wet soil ( $W_2$ ) = 44.2 gm
  - iii) Mass of container with dry soil ( $W_3$ ) = 32.6 gm.
  - iv) Volume of wet soil ( $V_1$ ) =  $20.8 \text{ cm}^3$
  - v) Volume of dry soil pat ( $V_2$ ) =  $10.2 \text{ cm}^3$
- c. Explain I. S. classification of soil.

**Q.6 Attempt any TWO**

**16 Marks**

a. In direct shear test following observations were taken.

Normal stress $\text{N/cm}^2$	2	4	6	8	10
Shear stress $\text{N/cm}^2$	3.6	4.4	5.2	6.0	6.8

Plot failure envelope and find angle of internal friction and cohesion.

- b. A retaining wall with a vertical back of height 8 m supports cohesionless soil of dry unit weight  $17.5 \text{ kN/m}^3$  and angle of repose  $30^\circ$ . The surface of soil is horizontal. By Rankin's concept determine the thrust per meter length of wall when the soil is absolutely dry.
- c. State four equipment used for field compaction giving their suitability for different soil.

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