GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY, ODISHA, GUNUPUR
(GIET UNIVERSITY)

B. Tech (Fourth Semester - Regular) Examinations, April – 2025

23BCVPC24002 – Geotechnical Engineering-I

(Civil Engineering)

Time: 3 hrs Maximum: 60 Marks

Answer ALL questions
(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a. Define three-phase system in soil mechanics.	CO1	K1
b. What are the factors affecting soil permeability?	CO2	K2
c. Define effective stress.	CO3	K1
d. What is the difference between compaction and consolidation?	CO4	K2
e. What are the shear characteristics of cohesive soils?	CO5	K2

PART – B **(10 x 5 = 50 Marks)**

Answer ***ALL*** the questions		Marks	CO #	Blooms Level
2. a.	Describe the procedure of determining the consistency limits of soil.	5	CO1	K2
b.	A sample has dry unit weight of 16.5 kN/m³ and specific gravity of solids is 2.65. Determine void ratio and degree of saturation for water content of 12%.	5	CO1	K2
	(OR)			
c.	Differentiate between IS and Unified Soil Classification System.	5	CO1	K2
d.	Write short notes on clay mineralogy and soil structure.	5	CO1	K2
3.a.	Derive Darcy's law and explain its significance in permeability.	5	CO2	K2
b.	A falling head permeability test gave the following results: Standpipe diameter = 1 cm, sample length = 10 cm, sample area = 50 cm², h1 = 50 cm, h2 = 25 cm, time = 60 sec. Determine permeability.	5	CO2	K2
	(OR)			
c.	What are the applications of flow nets in geotechnical engineering?	5	CO2	K2
d.	Discuss the effect of stratification on permeability.	5	CO2	K2
4.a.	What is quick condition? How does it affect foundation stability?	5	CO3	K2
b.	Compute total, pore and effective stresses at 6 m depth. Assume water table at 3 m depth. Use γ = 18.5 kN/m³ above water table and γ_{sat} = 20.5 kN/m³ below the water table.	5	CO3	K2
	(OR)			
c.	Explain how effective stress concept helps in understanding soil behavior under different loading conditions.	5	CO3	K2
d.	Define seepage pressure and explain its influence on stability.	5	CO3	K2
5.a.	Describe the one-dimensional consolidation process and spring analogy.	5	CO4	K2
b.	What are the factors affecting compaction of soil? Discuss how compaction influences soil properties.	5	CO4	K2
	(OR)			

c.	Draw and explain the relationship between dry density and moisture content. How is the Optimum Moisture Content (OMC) determined?	5	CO4	K2
d.	A soil has a compression index of 0.3. It is subjected to a load increment from 100 to 300 kPa. Compute the settlement of a 4 m thick clay layer.	5	CO4	K2
6.a.	What are the factors influencing shear strength of soil?	5	CO5	K2
b.	Differentiate between drained and undrained shear strength.	5	CO5	K2
	(OR)			
c.	Explain Mohr's stress circle and failure theories for soils	5	CO5	K2
d.	Explain the shear characteristics of sand and normally loaded clays.	5	CO5	K2

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