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BTECH
(SEM V) THEORY EXAMINATION 2024-25
GEOTECHNICAL ENGINEERING

TIME: 3 HRS**M.MARKS: 100**

Note: Attempt all Sections. In case of any missing data; choose suitably.

SECTION A**1. Attempt all questions in brief.****2 x 10 = 20**

Q no.	Question	CO	Level
a.	What is IS classification of soil and the principle of soil classification?	1	K1
b.	Define optimum moisture content.	1	K1
c.	State Darcy's law of permeability	2	K1
d.	What do you mean by Quick sand condition?	2	K1
e.	What is Flow net?	2	K1
f.	List the factors affecting compaction.	3	K1
g.	Define the three stages of consolidation	4	K1
h.	What are the merits and demerits of vane shear test?	4	K1
i.	What are the important characteristics of Mohr's circle	5	K1
j.	List the various assumptions in Terzaghi's bearing capacity theory.	5	K1

SECTION B**2. Attempt any three of the following:****10 x 3 = 30**

Q no.	Question	CO	Level
a.	Define the following with the help of three phase diagram. i) Air content ii) Specific Gravity iii) Water content iv) Degree of Saturation	1	K1+K5
b.	Differentiate between absorbed and capillary water in soils.	2	K3
c.	Explain pre consolidated, normally consolidated and under consolidated soil	3	K4
d.	Explain the advantages of triaxial shear test over direct shear test.	4	K5
e.	Derive the formula to calculate earth pressure at rest.	5	K4

SECTION C**3. Attempt any one part of the following:****10 x 1 = 10**

Q no.	Question	CO	Level
a.	A soil has been compacted in an embankment, at a bulk unit weight of 21.5kN/m ³ and water content of 12%. Taking G = 2.65, calculate dry density, void ratio, degree of saturation and air content.	1	K6
b.	Define Liquid limit, plastic limit and Shrinkage limit.	1	K1

4. Attempt any one part of the following:**10 x 1 = 10**

Q no.	Question	CO	Level
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a.	Distinguish between Standard Proctor and Modified Proctor compaction tests.	1	K5
b.	Explain in detail the laboratory methods for grain size distribution of fine and coarse soil.	1	K5

5. Attempt any one part of the following:**10 x 1 = 10**

Q no.	Question	CO	Level
a.	Describe the electrical analogy of flow net construction.	3	K4
b.	In a site reclamation project, 2.5m of graded fill ($\gamma = 22\text{kN/m}^3$) were laid in compacted layers over an existing layer of silty clay ($\gamma = 18\text{kN/m}^3$) which was 3m thick. This was underlain by a 2m thick layer of gravel ($\gamma = 20\text{kN/m}^3$). Assuming that the water table remains at the surface of the silty clay draw the effective stress profiles for cases (i) before fill is placed (ii) after the fill has been placed.	3	K5

6. Attempt any one part of the following:**10 x 1 = 10**

Q no.	Question	CO	Level
a.	Explain how pre consolidation pressure is determined by Casagrande's method.	4	K4
b.	A clay layer whose total settlement under a given load is expected to be 250mm, settles by 50mm in 15 days after the application of a load increment How many days will be required for it to reach a settlement of 125mm. How much settlement will occur in 300days? The layer has double drainage.	4	K6

7. Attempt any one part of the following:**10 x 1 = 10**

Q no.	Question	CO	Level
a.	Explain Mohr – Coulomb failure theory of soil.		
b.	Derive the formula to calculate factor of safety for cohesion less soil for submerge condition having infinite slope.		