BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: BTECH **SEMESTER: V**
BRANCH: CEE **SESSION: MO/2022**

SUBJECT: CE303 GEOTECHNICAL ENGINEERING

TIME: 2 HOURS **FULL MARKS: 25**

INSTRUCTIONS:
1. The total marks of the questions are 25.
2. Candidates attempt for all 25 marks.
3. Before attempting the question paper, be sure that you have got the correct question paper.
4. The missing data, if any, may be assumed suitably.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

				CO	BL
Q1	(a)	Density index varies between zero and one. Justify the statement	[2]	1	5
Q1	(b)	Soil is to be excavated from a borrow pit which has a density of 1.75 gm/cc and water content of 12%. The specific gravity of soil particles is 2.7. The soil is compacted so that water content is 18% and dry density is 1.65 gm/cc. Estimate the quantity of soil to be excavated from the pit for 1000 cum of soil in fill.	[3]	1	3
Q2	(a)	Identify the soil from the symbols -GW, SP, CH, MI	[2]	1	2
Q2	(b)	In a hydrometer analysis, 50 gm of soil of specific gravity 2.7 is mixed with distilled water to make 1000 cc of suspension. An appropriate quantity of deflocculating agent is also added. Reading of the hydrometer after 30 sec is 1. 015.Volume of hydrometer and area of the jar containing suspension is 60 cm^3 and 60 cm^2. The depth of suspension below the reading is 14 cm. Calculate the smallest particle size which would have settled during this interval. Y_w= 1g/cc, $\eta = 10 \times 10^{-6}$ gm/sec/cm^2	[3]	1	3
Q3	(a)	Differentiate between adsorbed water and capillary water in soil	[2]	2	1
Q3	(b)	A layer of sand 12m thick overlies a layer of clay 6m thickness. The water table which was originally at the ground surface lowered by drainage to a depth of 4m where upon the degree of saturation above the lowered water table reduces to 20%. Determine the increase in magnitude of effective pressure at the middle of clay layer due to lowering of water table. The saturated densities of sand and clay are 2.05 gm/cm^3 and 1.85 gm/cm^3 respectively and dry density of sand is 1.76 gm/cm^3	[3]	2	3
Q4	(a)	Derive the relation between coefficient of permeability and coefficient of percolation	[2]	2	4
Q4	(b)	How does the seepage discharge obtain from a flow net	[3]	2	4
Q5	(a)	Explain zero-air voids line	[2]	2	2
Q5	(b)	A saturated soil stratum6 m thick lies above an impervious stratum and below a pervious stratum. It has a compression index of 0.28 and coefficient of permeability 3.5×10^{-9} cm/sec. Its voids ratio at a stress of 150 KN/m^2 is 1.95. Determine a) the change in voids ratio due to an increase in stress to 210 KN/m^2 b) settlement of the stratum due to above increase c) time required for 50% consolidation. T_v = 0.197	[3]	2	3

:::::: 27/09/2022 M ::::::