

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION SP/2025)**

**CLASS: BTECH
BRANCH: CEE**

**SEMESTER : IV/ADD
SESSION : SP/2025**

SUBJECT: CE303 GEOTECHNICAL ENGINEERING

TIME: 02 Hours

FULL MARKS: 25

INSTRUCTIONS:

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates
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		CO	BL
Q.1(a)	Derive a relation between voids ratio, degree of saturation, water content and specific gravity	[2] 1	2
Q.1(b)	An oven dry soil sample of volume 250 cc weighs 430 g. If the specific gravity of solids is 2.70, what is the water content when the soil becomes fully saturated without any change in its volume? What will be the water content which will fully saturate the sample and cause an increase in volume equal to 10% of the original dry volume?	[3] 1	2
Q.2(a)	Differentiate between well-graded, poorly graded, uniformly graded and gap-graded soil.	[2] 1	1
Q.2(b)	The values of liquid limit, plastic limit and shrinkage limit of a soil were reported as follows $w_L = 60\%$, $w_P = 30\%$ $w_S = 20\%$. If the sample of this soil has a volume of 40 cc at liquid limit and 23.5 cc at shrinkage limit, determine specific gravity and shrinkage ratio.	[3] 1	2
Q.3(a)	Why does meniscus correction apply to hydrometer reading?	[2] 1	1
Q.3(b)	Derive the expression for average permeability for stratified layers of soil when the water is flowing perpendicular to bedding plane	[3] 2	2
Q.4(a)	The soil at the toe of a dam is fully saturated and has a water content of 32% and specific gravity of soil grains is 2.65. for safety measures against piping, the exit gradient is restricted to 17% of the critical hydraulic gradient. Calculate the permissible exit gradient.	[2] 2	2
Q.4(b)	Explain the phenomena of piping under a dam	[3] 2	1
Q.5(a)	Distinguish between Compaction and Consolidation	[2] 2	1
Q.5(b)	How is pre-consolidation pressure determined?	[3] 2	2

:27/02/2025:E