

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)**

CLASS: M.TECH
BRANCH: CEE

SEMESTER : II
SESSION : SP/2024

SUBJECT: CE554 ENVIRONMENTAL GEOTECHNICS

TIME: 3 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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		CO	BL
Q.1(a)	Enumerate the techniques which increase carbon sink in soils	[5]	1 2
Q.1(b)	Discuss the effect of contamination on geoenvironment.	[5]	1 2
Q.2(a)	Sketch a soil-water characteristic curve and explain the significant points.	[5]	2 2
Q.2(b)	What are the various processes in which reduction in contaminant concentration during fluid transport? Explain	[5]	2 4
Q.3(a)	What are the contributions of soil in an engineered landfill?	[5]	3 2
Q.3(b)	A column test was conducted to determine dispersion coefficient. The soil used was a silty clay with specific gravity 2.5. The diameter and height of the saturated soil column is 4 cm and 8 cm, respectively with a water content of 30%. Calculate the pore volume of the soil column. An advective flux equal to 0.002 kg/day/m ² of 1000 mg/l SrCl ₂ has flown through the soil column for 4 hrs. Determine the total pore volume and number of pore volume for 4 hrs. The longitudinal hydrodynamic dispersion coefficient is $1.321 \times 10^{-9} \text{ m}^2/\text{s}$ with a tortuosity coefficient of 0.6. The molecular diffusion coefficient of Sr ⁺² is $7.5 \times 10^{-10} \text{ m}^2/\text{s}$. Determine the longitudinal dispersivity for the soil-contaminant system.	[5]	3 3
Q.4(a)	Explain the role of PRB and air sparging in soil and ground water remediation	[5]	4 2
Q.4(b)	Cite an example for in-situ remediation and discuss on it.	[5]	4 4
Q.5(a)	Discuss how various factors influence soil thermal resistivity.	[5]	5 4
Q.5(b)	A constant head permeability test is conducted in centrifuge. Area of soil column- 50 cm ² , length of soil column-6 cm. Quantity of water flowing through the column in 10 mts is 430 ml under a constant head of 40 cm. The centrifuge is rotated at 600 RPM and effective radius is 55 cm. Determine prototype permeability, prototype length, model velocity and prototype velocity	[5]	5 3

:::29/04/2024:::E