Roll No: | | | | | | | | |

The Assam Royal Global University, Guwahati

Royal School of Engineering and Technology
B. Tech. (Civil Engineering) 5th Semester
Special Supplementary Examination, August 2024
Course Title: Geotechnical Engineering
Course Code: CEE022C504

Time: 3 Hours **Maximum Marks: 70**

Note: Attempt all questions as per instructions given.
The figures in the right-hand margin indicate marks.

Section – A

Q.1. Attempt **all questions**. (Maximum word limit 50) **2x8**

a. What are residual soils?
b. Differentiate between specific gravity and mass specific gravity.
c. What is plasticity index? Under what condition plasticity index is reported as non -plastic (NP)?
d. What do you mean by permeability of soil? What is its unit?
e. Mention few points to differentiate the concept of compaction & consolidation.
f. What is pore water pressure? Which condition marks the end of consolidation process?
g. What do you understand by Mohr circle of stress?
h. Write a brief note on auger boring.

Section – B

Q.2. Attempt **any two** of the following **6 x 2**

a. What is bulk unit weight? Express bulk unit weight in terms of specific gravity, void ratio, water content and unit weight of water.
b. A partially saturated sample from a borrow pit has a natural moisture content of 20% and bulk unit weight of 2.0 g/cc. The specific gravity of solids is 2.80. Determine the degree of saturation and void ratio. What will be the unit weight of the sample on saturation?
c. A 1000cc core cutter weighing 946.8g was used to find out the in-situ unit weight of an embankment. The weight of core cutter filled with soil was noted to be 2770.60g. Laboratory tests on the sample indicated a water content of 10.45% and specific gravity of solids of 2.65. Determine the bulk unit weight, dry unit weight, void ratio and degree of saturation of the sample.

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Q.3. Attempt **any two** of the following **7 x 2**

a. Explain the various factors affecting permeability of soil.

b. In a falling head permeameter test on a silty clay sample, the following results were obtained: sample length 12mm; sample diameter 80mm; initial head 1200mm; final head 400mm; time for fall in head 6 minutes; stand pipe diameter 4mm.Find the coefficient of permeability of the soil in mm/sec.

c. Discuss the Constant Head Test for measurement of co-efficient of permeability with the help of suitable diagram.

Q.4. Attempt **any two** of the following **7 x 2**

a. With the help of a suitable plot of logarithm of effective stress and void ratio, explain the compressibility behavior of clayey soil.

b. Consolidation test was carried out on layer of clayey soil 4.5 m height. The initial void ratio is 0.80 and pre-consolidation stress 122kN/m^2. The recompression index and compression index were found to be 0.02 and 0.30 respectively. Evaluate the consolidation settlement if the present average overburden stress of the layer is 70kN/m^2 and increase in average stress in the layer is 85kN/m^2.

c. A clay soil tested in a consolidometer showed a decrease in void ratio from 1.20 to 1.10 when the pressure was increased from 0.27 to 0.49kgf/cm^2.Calculate the coefficient of compressibility and the coefficient of volume compressibility. If the coefficient of consolidation determined in the test for the stress increment was 10m^2/ year, compute the coefficient of permeability in cm/sec.

Q.5. Attempt **any two** of the following **7x2**

a. Explain elaborately Coulomb's Equation and Mohr Coulomb Criterion.

b. Evaluate the shear strength in terms of effective stress on a plane with a saturated soil mass at a point where the normal stress is 220kN/m^2 and the pore water pressure is 85 kN/m^2. The effective shear strength parameters for the soil are c'=17kN/m^2 and ϕ' =30^0

c. Explain in detail the Standard Penetration Test(SPT) with a neat sketch.

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The Assam Royal Global University
Royal School of Engineering and Technology
B. Tech. (Civil Engineering) 8th Semester
Special Supplementary Examination, August 2024
Course: Foundation Engineering
Code: CEE022D801

Time: 3 hours **Maximum Marks: 70**

Attempt all questions as per instructions given
The figures in the right-hand margin indicate marks

Section-A

Q. No.	Answer the following in brief (within 50 words)	Marks	CO	BT Level
1(a)	List out the factors which influence choice of any particular method of boring.	2	CO 1	BT 1
1(b)	Interpret the suitability of using split spoon sampler in Standard Penetration Test.	2	CO 2	BT 2
1(c)	What is a continuous footing?	2	CO 1	BT 1
1(d)	Explain the effectiveness of useful width in Meyerhof's analysis of bearing capacity.	2	CO 2	BT 2
1(e)	Distinguish between test pile and working pile.	2	CO 4	BT 4
1(f)	What is pile group efficiency?	2	CO 1	BT 1
1(g)	Identify different types of retaining wall.	2	CO 3	BT 3
1(h)	What is the importance of ground improvement methods with reference to soil engineering?	2	CO 1	BT 1

Section-B

Q. No.	Answer any two of the following (Within 300 words each)	Marks	CO	BT Level
2 (a)	What are disturbed and undisturbed soil samples? Explain the various ratios related to a sampler.	2+4	CO 1 CO2	BT 1 BT 2
2 (b)	Explain the working principle of auger boring with a neat sketch. Outline the suitability of auger boring and its limitations.	4+2	CO 2 CO2	BT 2 BT 2
2 (c)	Simplify the procedure of conducting Standard Penetration test (SPT) as per IS :2131-1981 with necessary precautions to be taken for test set up.	6	CO 4	BT 4

Q. No.	Answer any two of the following (Within 300 words each)	Marks	CO	BT Level
3 (a)	Analyze Terzaghi's bearing capacity theory to arrive at bearing capacity equation for a strip footing.	7	CO 4	BT 4
3 (b)	A RCC column footing 2.5mx2.5m size is founded at a depth of 1.8m below the ground level; the soil is silty sand having soil	7	CO 3	BT 3