21CV54

USN

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
Geotechnical Engineering

Time: 3 hrs.

Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Define the following with the help of three phase diagram :
    i) Specific gravity
    ii) Air content
    iii) Degree of saturation
    iv) Voids ratio
    v) Water content. **(10 Marks)**
   b. With usual notations prove that $eS = wG$. **(04 Marks)**
   c. An undistrabed sample of soil has volume of $100cm^3$ and mass of 100 g. On oven drying for 24 hours, the mass is reduced to 160 g, if the specific gravity of grains is 2.68. Determine the water content, voids ratio and degree of saturation of the soil. **(06 Marks)**

OR

2 a. Explain determination of in situ – density by sand replacement method. **(10 Marks)**
   b. Explain soil classification according to BIS classification. **(06 Marks)**
   c. Explain the particle size distribution curve. **(04 Marks)**

Module-2

3 a. Explain factors affecting permeability of soil. **(10 Marks)**
   b. With neat sketch explain constant head permeability and falling head permeability test. **(10 Marks)**

OR

4 a. Explain permeability of stratified soil deposits for both the cases. **(10 Marks)**
   b. Write short notes on following :
    i) Effective stress
    ii) Total stress
    iii)Neutral stress. **(06 Marks)**
   c. In a falling head permeatmeter test, the initial head (t = 0) is 40 cm. The head drops by 5 cm in 10 minutes. Calculate th time required to run the test for the final head to be at 20 cm. If the sample is 6 cm is height and 50 cm^2 in cross – sectional area, Calculate the co-efficient of permeability, taking area of stand pipe is 0.5 cm^2. **(04 Marks)**

Module-3

5 a. Explain factors affecting compaction of soil. **(10 Marks)**
   b. With neat sketch explain standard proctor test. **(10 Marks)**

OR

6	a.	Explain mass spring analogy.	(10 Marks)
	b.	With a neat sketch explain laboratory consolidation test.	(10 Marks)

Module-4

7	a.	With a neat sketch explain direct shear test.	(10 Marks)
	b.	Explain Mohr – coulomb failure theory.	(10 Marks)

OR

8	a.	With a neat sketch explain Triaxial compression test.	(10 Marks)
	b.	Explain factors affecting shear strength of soils.	(05 Marks)
	c.	Explain Thixotrophy and sensitivity.	(05 Marks)

Module-5

9	a.	Explain the assumptions of Terzagh's analysis for bearing capacity of soil.	(07 Marks)
	b.	Explain effect of water table on bearing capacity of soil	(08 Marks)
	c.	Explain factors affecting bearing capacity of soil.	(05 Marks)

OR

10	a.	Explain types of settlements.	(10 Marks)
	b.	Estimate the immediate statement of a concrete footing 1.5m × 1.5 m in size founded at a depth of 1 m in silty soil whose modulus of elasticity is 90 kg/cm^2. The footing is expected to transmit a unit pressure of 200 kN/m^2.	(05 Marks)
	c.	Explain effect of eccentricity of loading for bearing capacity of soil.	(05 Marks)

* * * * *

b. Construct a regression tree using the following Table.Q8(b) which consists of 10 data instances and 3 attributes 'Assessment', 'Assignment' and 'Project'. The target attribute is 'Result' which is a continuous attribute.

SL. No.	Assessment	Assignment	Project	Result (%)
1	Good	Yes	Yes	95
2	Average	Yes	No	70
3	Good	No	Yes	75
4	Poor	No	No	45
5	Good	Yes	Yes	98
6	Average	No	Yes	80
7	Good	No	No	75
8	Poor	Yes	Yes	65
9	Average	No	No	58
10	Good	Yes	Yes	89

Table.Q8(b) (12 Marks)

Module-5

9 a. Explain the simple model of Artificial Neuron. (06 Marks)
   b. Explain the types of Artificial Neural Network. (08 Marks)
   c. Explain the partitional clustering algorithm. List the advantages and disadvantages. How to choose the value of K? (06 Marks)

OR

10 a. Explain clustering. List the applications of clustering. (08 Marks)
    b. Write an algorithm for learning in a multilayer perceptron. (06 Marks)
    c. Consider learning in a multi-layer perceptron. The given MLP consists of an input layer, one hidden layer and an output layer. The input layer has 4 neurons, the hidden layer has 2 neurons and the output layer has a single neuron. Train the MLP by updating the weights and biases in the network.

x_1	x_2	x_3	x_4	0 desired
1	1	0	1	1

Learning rate = 0.8. (06 Marks)

* * * * *