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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Seventh Semester, B.E. - Civil Engineering

Semester End Examination; February - 2022

Applied Geotechnical Engineering

Time: 3 hrs *Max. Marks: 100*

Course Outcomes

The Students will be able to:

CO1: Apply the knowledge of Science and Geology to estimate Engineering properties of soil.

CO2: Prepare the flow nets for soil structures.

CO3: Analyze earth pressure and stability of slopes for design of earth Retaining structures.

CO4: Evaluate and interpret bearing capacity and settlement data for design of footings.

Note: ***I) PART - A*** *is compulsory.* ***Two*** *marks for each question.*

II) PART - B*: Answer any* ***Two*** *sub questions (from a, b, c) for Maximum of* ***18 marks*** *from each unit.*

Q. No.	Questions	Marks	BLs	COs	POs
	I : PART - A	**10**			
I a.	Explain types of samplers used for soil samplers.	2	L1	CO1	PO1
b.	Explain assumptions and limitations of Laplace equation.	2	L1	CO2	PO1
c.	Differentiate active and passive earth pressure.	2	L1	CO3	PO1
d.	List the types of slopes.	2	L1	CO3	PO1
e.	Define ultimate, net and safe bearing capacities.	2	L1	CO4	PO1
	II : PART - B	**90**			
	UNIT - I	**18**			
1 a.	Explain the objectives of soil exploration program. Explain electric resistivity method with neat sketch.	9	L2	CO1	PO1
b.	Explain determination of ground water table by Hvorselev's method, with a neat sketch.	9	L2	CO1	PO1
c.	Explain methods to stabilize the borehole. Also, write borelog presentation.	9	L2	CO1	PO1
	UNIT - II	**18**			
2 a.	Explain determination of vertical stress using Newmark's method.	9	L2	CO2	PO1,2
b.	A rectangular foundation, 2 m × 4 m transmits a uniform pressure 450 kN/m^2 to underlying soil. Determine the vertical stress at depth 1 meter below the foundation at a point within loaded area, 1 meter away from short edge and 0.5 meter away from a long edge. Use Bousinique's theory.	9	L2	CO2	PO1,2
c.	List and explain characteristics and uses of flow nets. Also, explain method to determine the phreatic line in the earthen dam.	9	L2	CO2	PO1,2

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	UNIT - III	**18**			
3 a.	A 6 m high retaining wall is to support a soil with unit weight $\gamma = 17.4\ kN/m^3$, soil friction angle $\phi' = 26°$ and cohesion, C = 5 kN/m^2. Determine the Rankine active force per unit length of the wall both before and after the tensile crack occurs, and determine the line of action of the resultant in both cases.	9	L2	CO3	PO1,4
b.	Explain Coulumb's passive earth pressure theory with neat sketch.	9	L2	CO3	PO1,4
c.	Explain Culmann's graphical method to find active earth pressure, with neat sketch.	9	L2	CO3	PO1,4
	UNIT - IV	**18**			
4 a.	List and explain various causes for slope failures. Also, explain stability analysis of finite slope by method of slices.	9	L2	CO3	PO1,2
b.	A new canal is excavated to a depth of 5 m below the ground level through a soil tracing the following conditions, C′ = 15 kN/m^2, ϕ' = 15°, e = 0.80, G = 2.70 The slope of canal is lies. Calculate the factor of safety with respect to cohesion, when canal runs full (S_n = 0.083), if it is completely emptied what will be the factor of safety (S_n = 0.122).	9	L2	CO3	PO1,2
c.	Explain stability of slope by friction circle method.	9	L2	CO3	PO1,2
	UNIT - V	**18**			
5 a.	Explain effect of ground water table on the bearing capacity of soil with neat sketches.	9	L2	CO4	PO1, 2
b.	For a continuous footing, gross allowable load per unit area (q_{all}) that the footing can carry. Assume general shear failure. Given: $\gamma = 19$ kN/m^3; c′ = 31 kN/m^2; $\phi' = 28°$ $D_f = 1.5$ m; B = 2 m; Fos = 3.5 Use, $N_c = 31.61$; $N_g = 17.81$; $N_\gamma = 13.70$	9	L3	CO4	PO1.2
c.	Explain standard penetration test with neat sketch.	9	L2	CO4	PO1.2

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