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

(An Autonomous Institution affiliated to VTU, Belagavi)

Sixth Semester, B.E. - Civil Engineering

Semester End Examination; May/June - 2019

Applied Geotechnical Engineering

Time: 3 hrs *Max. Marks: 100*

***Note**: Answer **FIVE** full questions, selecting **ONE** full question from each unit.*

UNIT - I

1 a. What are the objectives of soil exploration? 4

b. Differentiate between : 8

i) Area ratio and Recovery ratio ii) Disturbed and Undisturbed samples

c. Explain with neat sketch the seismic refraction method of exploration. 8

2 a. List the different methods of ground water control during excavation, explain any two methods. 10

b. How do you determine ground water level in a clayey soil? Explain any one method. 10

UNIT - II

3 a. What are the basic assumptions in Boussinesq's theory of stress distribution in soil? 4

b. Explain construction of New Mark's chart. 8

c. Derive the equation for vertical stress below the centre of a circular area with uniform load intensity '*q*'. 8

4 a. Mention the properties and uses of flownets. 6

b. Explain the method of loading phreatic line in an earth dam on impermeable boundary with downstream horizontal filter. 8

c. An earth Dam is built on an impervious foundation with a horizontal filter at the base near the toe. The permeability of the soil is in horizontal and vertical directions are 3×10^{-2} mm/s and 1×10^{-2} mm/s respectively. The full retervoir level is 30 m above the filter. A flow net was constructed for the transformed section of the dam and there are 4 transformed section of the dam and 4 flow channels and 16 head drops. Estimate the seepage loss per meter length of the dam. 6

UNIT - III

5 a. List the assumption and limitations of Raulcine's theory. 4

b. Explain Culmann's graphical method of finding the active earth pressure as a retaining wall with grannular backfill. 8

c. A Retaining wall 8 m high supports a sandy backfill with e = 0.6, G = 2.65, $\phi = 30°$. Ground water table is 2 m below the ground surface. Draw the active pressure diagram and determine the magnitude and point of application of total active earth pressure. Assume soil above the ground water table has a degree of saturation of 50%. 8

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6 a. Explain in brief active earth pressure, passive earth pressure and earth pressure at rest condition 6

b. Explain the graphical method of estimating active earth pressure of cohesionless soil by Rebhann's counstructon. 6

c. A retaining wall 4 m height supports a backfill have the following properites : C = 200 kN/m^2. $\phi = 30°$ and $\gamma = 20$ kN/m^3 with horizontal to flush with the top of the wall. If the wall is pushed towards the backfill, compute the total passive pressure on the wall and its point of application. 8

UNIT - IV

7 a. Mention the various causes of slope failure? What are the types of slope failure? Explain with neat sketches. 6

b. Obtain the expression for factor of safety against failure for a C-ϕ soil by method of slices. 8

c. An embankment of 10 m height is constructed in a soil having C = 0.02 N/mm^2, $\phi = 20°$ and $\gamma = 16$ kN/m^3. Find the factor of safety with respect to cohesion and also the critical height of the embankment. Assume stability Number = 0.05. 6

8 a. What is Taylor's stability number? Explain its significance. 6

b. Explain the friction circle method of stability analysis for slopes with a neat figure. 8

c. An embankment is to be constructed with C = 20 kN/m^2, $\phi = 20°$ and $\gamma = 18$ kN/m^3. F.S = 1.25, Height = 10 m. Estimate required side slope. Taylor's stability numbers are as follows. 6

Slope angle	90	75	60	45	30	20	0
Stability Number	0.182	0.134	0.097	0.062	0.025	0.005	0

Also find the factor of safety, if the slope is 1 V: 2 H, for $\phi = 20°$.

UNIT - V

9 a. Explain the three types of faiures that occure below a footing. 6

b. How do you conduct plate load test as per I.S. code of practice. 8

c. How do you conduct standard penetration test according I .S. code of practice. 6

10 a. Explain the immediate settlement, consideration settlement, secondary settlement and differential settlement. 8

b. Estimate the immediate settlement of a footing of size (2 × 3 m) m resting at a depth of 2 m is sandy soil whose compression modulus is 10 N/mm^2 and the footing is expected to transmit a unit pressure of 16 kN/m^2. Assume $\mu = 0.28$ and $I_f = 1.06$. 4

c. A square footing (1.2 m × 1.2 m) rests as a saturated clay of 4 m deep. The soil properties are $W_L = 30\%$, $\gamma_{sat} = 17.8$ kN/m^3, $\omega = 28\%$ and G = 2.68. Determine the primary consolidation settlement if the footing carries a load of 300 kN. 8

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