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

(An Autonomous Institution affiliated to VTU, Belgaum)

First Semester, M. Tech – Civil Engineering (MCAD)

Make-up Examination; Feb - 2017

Stability Analysis of Slopes and Earth Retaining Structures

Time: 3 hrs *Max. Marks: 100*

***Note**: i) Answer **FIVE** full questions, selecting **ONE** full question from each unit.*
ii) IS code and charts are permitted. iii) Missing data if any assume suitably.

UNIT - I

1 a. Explain Rankine's active earth pressure for cohesive soil with neat sketch. 10

b. A retaining wall, 6 m high retains dry sand with an angle of friction of 30^0 and unit weight of 16.2 kN/m^2. Determine the earth pressure at rest. If the water table rises to the top of the wall, determine the increase in the thrust on the wall. Assume the submerged unit weight of sand as 10 kN/m^2. 10

2 a. Explain the uses and types of sheet pile wall with neat figure. 10

b. Compute the depth of embankment for the cantilever sheet piling system shown in the Fig.Q2b. 10

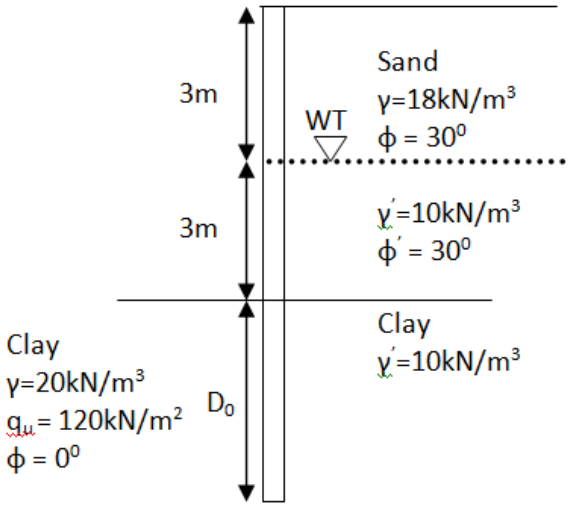

Fig Q2b.Cantilever sheet piling

UNIT - II

3 a. With the help of neat sketch explain the types of slope failure and their sequence. 10

b. Describe the effect of seepage under different conditions. 10

4 a. With the help of neat sketch practical applications of slope failure. 10

b. List the types of landslides and slope movements. Explain them in brief. 10

Contd….2

UNIT - III

5 a. With the help of neat sketch explain friction circle method. 10

b. A new canal is excavated to a depth of 5m below ground level, through a soil having the following characteristics: c = 14 kN/m^2; $\phi = 15^0$; e = 0.8 and G = 2.70. The slope of banks is 1 in 1. Calculate the factor of safety with respect to cohesion when the canal runs full. If it is suddenly and completely emptied, what will be the factor of safety? 10

6 a. Derive and explain Bishop's method of stability analysis with neat sketch. 10

b. Explain the stability analysis of infinite slope with respect to cohesive soils. 10

UNIT - IV

7 a. Explain the basic mechanics of reinforced earth of soil reinforcement. 10

b. With neat sketch explain the reinforced earth retaining wall. 10

8 a. Describe the reinforced earth embankment with neat sketch. 10

b. Explain reinforced earth slab with neat sketch. 10

UNIT - V

9. Design an annular raft for an overhead tank to carry 20000 kN load having staging height of 22.0 m. The depth of raft below ground surface is 2.5 m. The earthquake force results a moment of 8670 kN-m at the base of footing. The soil is cohesion less and the allowable soil pressure is 85 kN/m^2. 20

Use only annular raft and ring beam without check for shear for outer dia as 22.6 m and inner dia as 6.4 m. Use M_r = 1026 kN-m, M_θ = - 485 kN-m and Q_r = 479 kN.

10. Design a strap beam footing for two columns A and B spaced 5m c/c. Column A is 300 mm x 300 mm in size carries a load of 600 kN and is on the property line. Column B is 400 mm x 400 mm in size carries a load of 900 kN. SBC = 120 kN/m^2. Use M15 mix and σ_{st} = 140N/mm^2. 20

Design footing slab and strap beam only. Draw SFD and BMD.

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