USN ☐☐☐☐☐☐☐☐☐☐

10CV64

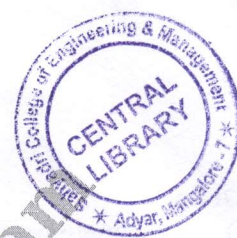**Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020**
Geotechnical Engineering – II

Time: 3 hrs.   Max. Marks:100

Note:1.Answer any FIVE full questions, selecting at least TWO full questions from each part.
2. Missing data may be assumed suitably.

PART – A

1 a. What are the objectives of subsurface exploration?   (04 Marks)
   b. What is stabilization of bore holes? What are the various methods and explain them briefly?
                                                                                                    (10 Marks)
   c. Estimate the position of the ground water table from the following data obtained from the field. Depth upto which water is boiled out is 30m. Raise in water levels: on first day 2.2m, second day 1.8m and third day 1.5m.   (06 Marks)

2 a. Distinguish between Boussinesq's and Westergaard's theory of stress distribution.
                                                                                                    (06 Marks)
   b. Explain the construction and uses of Newmarks chart.   (08 Marks)
   c. A load 1000kN acts as a point load at the surface of a soil mass. Estimate the stress at a point 3m below and 4m away from the point of action of the load by Boussinesq's formula. Compare the value with the result from Westergaard's theory.   (06 Marks)

3 a. Define phreatic line in an earthen dam. Explain the graphical method of determining phreatic line in homogeneous earthen dam with horizontal drainage filter.   (10 Marks)
   b. A soil stratum with permeability $K = 5 \times 10^{-7}$ cm/s overlies an impermeable stratum. The impermeable stratum lies at a depth of 18m below the ground surface. A sheet pile wall penetrates 8m into the permeable soil stratum. Water stands to a height of 9m on upstream side and 1.5m on downstream side, above the surface of soil stratum. Sketch the flow net and determine the quantity of seepage.   (10 Marks)

4 a. Derive the equations for the earth pressure coefficients K_a and K_p.   (08 Marks)
   b. A retaining wall with a smooth vertical back retains sand backfill for a depth of 6m. The back fill has a horizontal surface and having the following properties:
      $C = 0$; $\phi = 28°$; $\gamma = 16$ kN/m^3 and $\gamma_{sat} = 20$kN/m^3. Calculate the magnitude of the total active thrust against wall for the conditions given below and show the earth pressure distribution.
      i)   Backfill drained but top of the wall restrained against yielding.
      ii) Backfill fully drained and the wall is free to yield.
      iii) Wall free to yield, water table is at 3m depth and there is no drainage.   (12 Marks)

PART – B

5 a. Differentiate between infinite and finite slopes. List the causes for failure of slopes.
                                                                                                    (06 Marks)
   b. Explain the method of slices for the analysis of stability of slopes.   (08 Marks)
   c. An embankment is inclined at an angle of 35° and its height is 15m, the angle of shearing resistance is 15° and the cohesion intercept is 20kN/m^2. The unit weight of soil is 18kN/m^3 and Taylors stability number is 0.06. Determine the factor of safety with respect to cohesion.   (06 Marks)

10CV64

6 a. Define:
   i)   Ultimate bearing capacity
   ii) Safe bearing capacity   (04 Marks)
   b. Discuss the effect of water table on the bearing capacity of footing. (04 Marks)
   c. What will be the net ultimate bearing capacity of sand having $\phi = 36°$ and dry unit weight of 18 kN/m^3 for the following cases:
   i)   1.5m strip footing
   ii) 1.5m × 1.5m square footing
   iii) 1.5m diameter circular footing.
   The footings are placed at a depth of 1.5m from the ground surface. Use Terzghi's bearing capacity equations and bearing capacity factors are given below:

ϕ	N_c	N_q	N_γ
35°	57.8	41.4	42.4
40°	95.7	81.3	100.4

                                                                            (12 Marks)

7 a. Distinguish between uniform and differential settlements.   (04 Marks)
   b. A 4m radius ground level water tank is proposed to carry 10m height of water on a soil with soil modulus of 10MPa and Poisson's ration of 0.2. If the influence factor is 0.9, estimate the settlement.   (08 Marks)
   c. A structure is proposed on a layered soil comprising of 5m thick soft saturated normally consolidated clay. The effective confining pressure at the middle of clay layer is 300kN/m^2. Due to the introduction of structure, the pressure at the middle of clay layer increases by 120kN/m^2 and if the liquid limit, dry density and specific gravity of soil solids of clay are 50%, 16kN/m^3 and 2.6 respectively, determine the settlement.   (08 Marks)

8 a. Explain the factors influencing in the selection of depth of foundation. (06 Marks)
   b. Discuss the proportioning of combined footings.   (06 Marks)
   c. Write a note on classification of pile foundations.   (08 Marks)

* * * * *