VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY (VSSUT), ODISHA
Odd Mid Semester Examinationfor Academic Session 2024-25

COURSE NAME:B.Tech (**Sec A and B**) SEMESTER:4th

BRANCH NAME:Civil Engineering

SUBJECT NAME:Geotechnical engineering – II

FULL MARKS: **30** TIME: **90 Minutes**

Answer **All** Questions. Assume necessary data if needed
The figures in the right-hand margin indicate Marks. *Symbols carry usual meaning.*

Q1. Answer all Questions. **[2 × 3]**

a) What is Isobar Diagram? - CO1
b) Define different types of Lateral earth pressures. - CO2
c) Define Net ultimate bearing capacity and Net safe bearing capacity. - CO3

Q2. **[8]**

(a) Explain the vertical stress distribution on a vertical plane with the help of a neat sketch. **[5+3]-CO1**

(b) A concentrated load of 1000kN is applied at the ground surface. Determine the vertical stress at a point P which is 5 m directly below the load. Also calculate the vertical stress at a point R which is at a depth of 5 m but at a horizontal distance of 4 m from the axis of the load.

OR

(a) Explain the Newmark's method to determine vertical stress due to non-uniform loaded area. **[4+4]-CO1**

(b) A line load of 200 kN/metre run extends to a long distance. Determine theintensity of vertical stress at a point, 3 m below the surface and (i) directly under the line load,and (ii) at a distance of 3 m perpendicular to the line. Use Boussinesq's theory.

Q3. **[8]**

(a) Mention the assumptions made by Rankine for the derivation of Earth pressure. **[3+5]-CO2**

(b) Determine the Rankine passive force per unit length of the wall as shown in Fig. 1. The water table is at the level of B. Take $\gamma_w = 10$ kN/m^3.

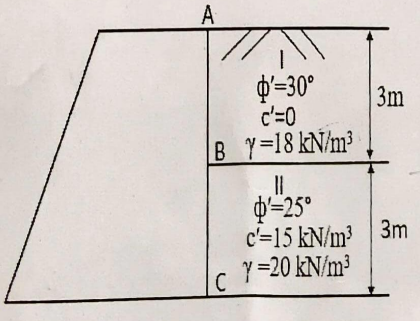

Fig.1

OR

(a) Determine the stresses at the top and bottom of the cut shown in Fig.2.Also determine the maximum depth of potential crack and the maximum depth of unsupported excavation. [3+5]-CO2

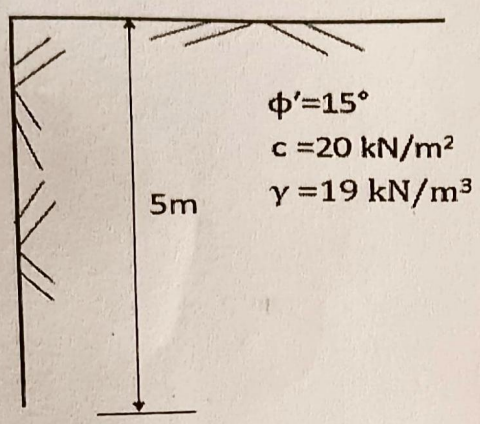

Fig. 2

(b) Explain the stability conditions for a retaining wall with the help of a neat sketch.

[8]

Q4.

(a) Differentiate between the general shear failure and local shear failure. [3+5]-CO3

(b) A column footing of 1.8m x 1.8m is buried 1.5m below the ground surface in a dense cohesionless soil. The unit weight of soil is 21kN/m^{3}and φ =35°.Determine the safe bearing capacity of the footing assuming a factor of safety =3. Groundwater was not encountered during subsurface soil exploration.Take N_c= 57.8, N_q=41.4 andN_γ=42.4. Considerthe general shear failure condition.

OR

(a) What are the assumptions made in the derivation of Terzaghi's bearing capacity theory? [4+4]-CO3

(b) Determine the allowable gross load and the net allowable load for a square footing of 2m side and with a depth of foundation of 1.1m. UseTerzaghi's theory and assume local shear failure. Take factor of safety of 3.0. The soil at the site has γ= 19 kN/m^3, c' = 16 kN/m^2 and ϕ' = 25^0. Take N_c'= 14.8, N_q'= 5.6 and N_γ'=3.2