Registration No :

3rd Semester Back Examination 2019-20
GEOTECHNICAL ENGINEERING
BRANCH : CIVIL
Max Marks : 100
Time : 3 Hours
Q.CODE : HB818
Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO
from Part-III.
The figures in the right hand margin indicate marks.

Part- I

Q1   **Only Short Answer Type Questions (Answer All-10)**   (2 x 10)
a)   State the relation between void ratio and porosity.
b)   What is mass specific gravity?
c)   Write the relationship between consistency limits.
d)   What are the methods used in laboratory to measure hydraulic conductivity?
e)   What is the height of capillary rise in a soil with an effective size of 0.06 mm and void ratio of 0.63?
f)   Write any two use of flow net.
g)   What is Boussinesq's influence factor?
h)   State the relation between compression index and void ratio.
i)   What is Thixotropy of clay?
j)   Draw the types of slip surface.

Part- II

Q2   **Only Focused-Short Answer Type Questions- (Answer Any Eight out of   (6 x 8)
      Twelve)**
a)   1 cubic meter of wet soil weighs 19.80 kN. If the specific gravity of soil particles is 2.70 and water content is 11%, find the void ratio, dry density and degree of saturation.
b)   Show the soil-phase diagram considering volume and weights.
c)   The liquid limit of a clay soil is 56% and its plasticity index is 15%. (a) In what state of consistency is this material at a water content of 45 %? (b) What is the plastic limit of soil? (c)The void ratio of this soil at the minimum volume reached on shrinkage, is 0.88. What is the shrinkage limit, if its grain specific gravity is 2.71?
d)   What are the characteristics of soil which affect permeability?
e)   Determine the natural and effective stress at a depth of 16 m below the ground level for the following conditions.
      Water table is 3 m below the ground level, G = 2.68, e = 0.72, average water content of soil above water table is 8%.
f)   Discuss the change in soil properties when it undergoes compaction.
g)   In a consolidation test the following results have been obtained. When the load was changed from 50 kN/m^2 to 100 kN/m^2, the void ratio changed from 0.70 to 0.65. Determine the coefficient of volume decrease, m_v and the compression index, C_c.
h)   Illustrate the procedures of plotting an isobar.

i)   A concentrated load of 22.5 kN acts on the surface of a homogeneous soil mass of large extent. Find the stress intensity at a depth of 15 meters: (i) directly under the load, and (ii) at a horizontal distance of 7.5 meters. Use Boussinesq's equations.

j)   Derive the principle of construction of Newmark's chart and explain its use.

k)   Explain the vane shear test used in study of shearing strength of soil.

l)   A cylindrical specimen of a saturated soil fails under an axial stress 150 kN/m^2 in an unconfined compression test. The failure plane makes an angle of 52° with the horizontal. Calculate the cohesion and angle of friction of internal friction of the soil.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)   **(16 X 2)**

Q3   Establish the relationship between degree of saturation, soil moisture content, specific gravity of soil particle and void ratio.

The volume of an undisturbed clay sample having a natural water content of 40 % is 25.6 cm^3 and its wet weight is 0.435 N. Calculate the degree of saturation of the sample if the grain specific gravity is 2.75.

Q4   Compare the Standard and modified proctor test.

Q5   Discuss the stress due to uniform load on circular area.

Q6   Describe the merits of Triaxial compression test.