III B. Tech II Semester Supplementary Examinations, February-2022
GEOTECHNICAL ENGINEERING – I
(Civil Engineering)

Time: 3 hours   Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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PART –A   (14 Marks)

1. a) Explain about hygroscopic water. [2M]

   b) What is coefficient of curvature? [2M]
   c) Explain a flow net. [2M]
   d) Explain about pressure bulb and its importance or application. [3M]
   e) Explain about over-consolidated clay and OCR. [3M]
   f) Explain the smear effect in a vane shear test. [2M]

PART –B   (56 Marks)

2. a) Discuss the structure of montmorillonite. [7M]
   b) The in situ-percentage voids of a sand deposit is 30%. For determining the density index, dried sand from the stratum was first filled loosely in a 1000 cm^3 mould and was then vibrated to give a maximum density. The loose dry mass in the mould was 1600 g and the dense dry mass at maximum compaction was found to be 1950 g. Determine the density index, if the specific gravity of the sand particles is 2.68. [7M]

3. a) Explain the mechanical analysis of soils using a set of sieves. [7M]
   b) An oven-dry soil sample of volume 220 cm^3 weighs 4 N. If the grain specific gravity is 2.70. What will be the water content which will fully saturate the sample and also cause an increase in volume equal to 8% of the original dry volume? [7M]

4. a) Explain in detail, the characteristics of a flow net. [7M]
   b) The water table is lowered from a depth of 3m to a depth of 6m in a deposit of silt. The silt remains saturated even after the water table is lowered. What would be the increase in the effective stress at a depth of 3m and at 10m on account of lowering of the water table? Assume the water content as 25% and grain specific gravity 2.65. [7M]

5. a) Explain the Newmark's method. [7M]
   b) A circular area on the surface of an elastic mass of great extent carries a uniformly distributed load of 100 kPa. The radius of the circle is 2 m. Compute the intensity of vertical pressure at a point 4metres beneath the centre of the circle using Boussinesq's method. [7M]

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6. a) Explain the procedure to determine the preconsolidation pressure. [7M]

    b) A saturated clay layer of 4 m thickness takes 2 years for 50% primary [7M]
consolidation when drained on both sides. Its coefficient of volume change is
2×10^{-3} m^2 /kN. Determine the coefficient of compressibility (in m^2/yr) and the
coefficient of permeability (in m/yr) Assume $\gamma_w = 10$ kN/m^3.

7. a) Explain about the construction of plots of the results from a triaxial test using
the total stress analysis and effective stress analysis approaches. [7M]

    b) A dry sand sample is subjected to a triaxial test. The angle of internal friction is [7M]
35^0. If the minor principal stress is 300 kPa, at what value of major principal
stress will the soil fail?

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