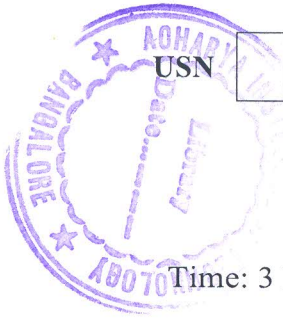


CBCS SCHEME



USN

--	--	--	--	--	--	--	--	--	--

17CT53

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020 Geotechnical Engineering

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define Soil Mechanics. Briefly explain Origin and Formation of Soil. (04 Marks)
- b. A soil sample weighs 16.5kN/m^3 as the water content of 28%. The specific gravity of soil partial is 2.7. Determine the dry unit weight, void ratio Porosity and degree of saturation. (10 Marks)
- c. With usual notation derive the expression.
- $$\gamma_d = \frac{G\gamma_w}{1+e} \quad (06 \text{ Marks})$$

OR

- 2 a. Explain with neat sketch procedure to determine specific gravity of Soil Solids with formula. (08 Marks)
- b. With the help of particle size distribution curve, Explain: i) Well graded soil ii) Co- efficient of curvature (C_c) iii) Co-efficient of uniformity (C_u) iv) Uniformly graded. (05 Marks)
- c. The maximum and minimum dry unit weight of sand determined in the lab are 20kN/m^3 and 15kN/m^3 respectively. If the relative density of sand is 74%. Determine the porosity of sand. (07 Marks)

Module-2

- 3 a. With the help of sketch, explain the following soil structure:
- i) Dispersed
 - ii) Flocculent
 - iii) Single grained
 - iv) Honey comb. (08 Marks)
- b. Write a short note on Electrical diffuse double layer with figure. (06 Marks)
- c. Explain with neat sketch of following clay mineral:
- i) Kaolinite
 - ii) Illite
 - iii) Montmorillonite. (06 Marks)

OR

- 4 a. Define compaction. List the principle of compaction. (04 Marks)
- b. Explain standard protor test, with Neat sketch. (10 Marks)
- c. List the factors affecting compaction. Briefly explain any two. (06 Marks)

Module-3

- 5 a. Define permeability. List out the assumption and limitations of Darcy's law. (10 Marks)
- b. Obtain an expression $K = 2.303 \frac{aL}{At} \log_{10} \frac{h_1}{h_2}$ falling head permeability test. (10 Marks)

1 of 2

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 6 a. Derive Laplace equation $v_x = \frac{\partial \phi}{\partial x}$, $v_z = \frac{\partial \phi}{\partial z}$. (10 Marks)
- b. Calculate the coefficient of permeability of a soil sample 6cm in height and 50cm^2 in cross-section area, if a quantity of water is equal to 430cc passed down in 10 minutes under an effective constant head of 40cm.
On oven drying the list specimen weighed 4.98N. Taking $G = 2.65$. Calculate the seepage velocity of water during test. (10 Marks)

Module-4

- 7 a. Explain the mass-spring analogy of consolidation of soil. (06 Marks)
- b. In a consolidation test a soil sample 20mm in thickness took 28m to reach 90% consolidation under two way drainage conditions for the same soil in the field. What would be the time taken in days for 50% and 90% consolidation. If the thickness of soil layer is 4m and if then i) On way drainage ii) Two way drainage. (10 Marks)
- c. List the assumption of Terzaghi one dimensional consolidation theory. (04 Marks)

OR

- 8 a. With a help of neat sketch, explain determination of consolidation characteristic of soil by logarithm of time fitting method. (10 Marks)
- b. In a consolidation test the void ratio decreased from 0.70 to 0.60. When pressure changed from 50kN/m^2 to 100kN/m^2 . Determine: i) Compression Index ii) Co-efficient of permeability iii) Coefficient of volume change. (10 Marks)

Module-5

- 9 a. What are the factors affecting shear strength of soil? (04 Marks)
- b. Explain with neat sketch, unconfined compression test. (06 Marks)
- c. An unconfined compression strength of a soil is found to be 150kN/m^2 . A sample of the same soil failed at a deviator stress of 200kN/m^2 . When tested in a consolidated undrained triaxial compression test with a cell pressure of 50kN/m^2 . Determine the shear strength of soil. (10 Marks)

OR

- 10 a. Write the advantage and disadvantages of direct shear test. (04 Marks)
- b. A shear bore test is carried out and the following results are obtained:

Normal stress (kN/m^2)	200	250
Shear stress (kN/m^2)	100	125

- i) Find shear parameters.
- ii) What would be the deviator stress at failure if a triaxial test is carried out from the same soil with cell pressure of 100kN/m^2 ? (10 Marks)
- c. Briefly explain the procedure for Direct shear test along with suitable figure. (06 Marks)

* * * * *