TCE 506

Roll No.												

Odd Semester Examination, 2019-20

B. Tech: Civil (5th Semester)

Soil Mechanics and Engineering Geology -

Time: 3:00hr   M.M:100

Total no. of printed pages: 2

Note : (i) Attempt ALL questions.

(ii) In case of numerical problems assume data whenever not provided.

Q1. Attempt **any four** of the following   4X5=20

   a) Discuss in brief soil type: Bentonite, peat, alluvial and Aeolian.

   b) Derive the functional relationship between Gs, γ_w, e and γ_{sub}.

   c) Write causes of landslides and their remedial measures.

   d) What are different methods of in situ unit weight determination?

   e) Explain various classification system of soil.

   f) Explain diffuse double layer theory.

Q2. Attempt **any four** of the following   4X5=20

   a) Compare the compactive energy used in the IS heavy compaction test with that of the IS light compaction test.

   b) A soil sample exhibits following properties on the basis of lab tests:

Sieve analysis results

Sieve size (mm)	4.75	2.0	1.0	425micron	212micron	150micron	75micron
% finer than	100	100	99.8	99.65	98.95	97.95	96.85

   c) An airport runway fill needs 600,000 m³ of soil compacted to a void ratio of 0.75. How much soil with void ratio 1.70 from a borrow pit can be transported to fill the required site?

   d) Define dip and strike. What are the importance of topographic maps and geological maps to civil engineers?

P.T.O

e) A soil sample is partially saturated. Its natural moisture content was found to be 22% and bulk density is 2 g/cc. If specific gravity of solid is 2.65. Find out degree of saturation and void ratio.

f) Explain the reasons for the functional failures of tube wells. Discuss the methods for the reducing these failures.

2x10=20

Q3. Attempt **any two** of the following

a) In an in-situ vane shear test on saturated clay, a torque of 35 N-m was required to shear the soil. The diameter of the vane was 50 mm and length 100 mm. Calculate the undrained shear strength of the clay. The vane was then rotated rapidly to cause remolding of the soil. The torque required to shear the soil in the remolded state was 5 N-m. Determine the sensitivity of the clay.

b) Explain CD, CU and UU tests in a triaxial test.

c) Determine the average coefficient of permeability in the horizontal and vertical direction for a deposit consisting of three layers of thickness 5m, 1m and 2.5m and having the coefficient of permeability of 0.003 mm/s, 0.00003 mm/s and 0.004 mm/s respectively.

2x10=20

Q4. Attempt **any two** of the following

a) What is permeability? Explain method of determining the permeability in lab for clay soil. Also derive formula for permeability for clay soil in lab.

b) Explain the physical properties of Quartz group Minerals.

c) Classify the soil as per Indian Standard:

Soil	Liquid Limit	Plastic Limit	% passing 75micron sieve	% gravel > 4.75 mm	% sand (4.75 to 0.075mm)
A	450	50	100	0	0
B	34	20	80	0	20
C	60	30	90	0	10
D	-	Non Plastic	100	0	0
E	35	20	20	60	20

2x10=20

Q5. Attempt **any two** of the following

a) Explain the method of determining the value of coefficient of compression index Cc.

b) An 8 m thick layer with single drainage settles by 120 mm in 2yrs. The coefficient of consolidation for this clay was found to be 6×10^{-3} cm^2/s. Calculate the ultimate consolidation settlement and find how long it takes to undergo 90% of this settlement.

c) Explain the following

(i) Stress paths
(ii) Skempton's pore water pressure coefficients
(iii) Casagrande's Logarithm of Time fitting Method