Roll No. | | | | | | | | | | | | |

Total No. of Questions: 09 **Total No. of Pages: 02**

B. Tech. (CE) (Sem. 5)
GEOTECHNICAL ENGINEERING
Subject Code: BTCE-502
Paper ID: A2079

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATES:

1. **Section A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **Section B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **Section C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) Give classification of transported soil.

b) What is the particle si1e for which Strokes law is applicable? Give reasons

c) What do you understand by Index properties of soil?

d) Differentiate between Standard Proctor and Modified Proctor Test

e) What do mean by steady and unsteady flow.

f) Name the curves generated by Laplace equation

g) What is the basic difference in compression behavior of granular and fine grained soils?

h) Explain the term principal stresses.

i) What are work hardening materials?

j) Name the various conditions for which stability analysis of earth dams is carried out.

SECTION B

2. What are the factors affecting compaction? Explain in detail.

3. What are the various methods for obtaining flow nets?

4. A 8m thick clay layer with single drainage settles by 120mm in 2 years. The coefficient of consolidation for this clay was found to be 6 x $10^3 cm^2$/ s. Calculate the likely ultimate consolidation settlement and find out how long it will take to undergo 90% of this settlement.

5. In a $\overline{CU}$ test on a normally consolidated clay, a sample consolidated under a stress of 200 kN/ m^2 failed at an additional axial stress of 150kN/m^2. The pore pressure at failure was 75 kN/m^2. Determine analytically the shear strength parameters both in terms of total and effective stresses. What are the values of principal stress ratio $\sigma 1/\sigma 3$ and $\sigma'1/\sigma'3$ at failure? Calculate the value of A_f.

6. Differentiate between compaction and consolidation?

SECTION C

7. Explain various tests to measure shear strength.

8. Explain Bishop's method of stability anal analysis in detail

9. A compacted fill is to constructed using one of the two potential borrow areas A and B. The in situ properties of the soil at these sites are as follows:

Borrow area A: e_n = 0.80; W_n =17.5%, Gs= 2.65
Borrow area B: e_n = 0 .68; W_n = 14.0%, Gs-c 2.65

The compacted volume of the embankment will be 50000 cum, its unit weight 20 kN/ m^3 at a placement water content of 20%. Soil from the borrow area is to be excavated and transported to the site in trucks of 10m^3 capacity. During excavation and dumping of soil in the trucks, the soil increases in volume by 10%. At the site, the required addition al amount of water is added to the soil and compacted to the desired extent by rollers. The cost of excavation, transportation and compaction is Rs. 400 per truck for borrows area A and Rs 500 per truck for borrow area B. Water charges per truck is Rs 150. Which of the two borrow area is more economical?