Roll No. .....

Total No. of Questions : 09] [Total No. of Pages : 02

Paper ID [A0619]

(Please fill this Paper ID in OMR Sheet)

B.Tech. (Sem.-6th)

GEOTECHNICAL ENGINEERING (CE-304)

Time : 03 Hours **Maximum Marks :60**

Instruction to Candidates:

1) Section - A is **Compulsory.**
2) Attempt any **Four** questions from Section - B.
3) Attempt any **Two** questions from Section - C.

Section - A

Q1) *(10 ×2 = 20)*

a) Given: e (void ratio) = 0.86, w = 28 %, G = 2.72 Calculate γ_{bulk} and γ_{sat}.

b) If at e = 0.4, k (co-efficient of permeability) = 0.001 cm/sec. Then, at e = 0.6, k =?

c) Given: H = 2 m, C_v = 0.0002 sq. cm/sec. (double drainage) How long it will take to attain half of the total settlement?

d) If G = 2.68, w = 17 %. Calculate theoretical maximum dry density.

e) A soil sample consists of *Gravel* 30 %, *sand* 40 %, *silt + clay* 30 % *LL* = 33 %, *PI* = 12 %.
Write down soil classification as per 1498-1970.

f) Define critical hydraulic gradient.

g) Give the statement of Darcys law.

h) Write down particle size ranges of sand, silt and clays.

i) What is earth pressure at rest? Define it.

j) Define over-consolidation ratio.

Section - B

(4 × 5 = 20)

Q2) Differentiate between :
(a) Standard and modified Proctor tests for compaction.
(b) Compaction and Consolidation.

Q3) The following data are given for a soil sample. Porosity = 0.45, Sp. Gr of soil solids = 2.68, Moisture content = 10 % Determine the mass of water to be added to $10m^3$ of soil for full saturation.

Q4) The time required for 50 % consolidation of 25 mm thick clay layer (double drainage) in the laboratory is 2 min 20 sec. How long (in days) will it take for a 3m thick clay layer of the same clay in the field under the same pressure increment to reach 50 % consolidation? In the field, there is a rock layer at the bottom of the clay.

Q5) Enumerate and briefly explain the factors affecting permeability of soils.

Q6) Differentiate and compare Rankine's and Coulomb's theories of earth pressure.

Section - C

(2 × 10 = 20)

Q7) Derive Terzaghi's differential equation governing one - dimensional primary consolidation.

Q8) A retaining wall 6 m high with vertical back supports a cohesive backfill having unit weight 18 kN/m^3, apparent cohesion 26 kN/m^2 and angle of internal friction zero. Calculate.
(a) Internal pressure intensity at the top of the wall.
(b) Depth of tension crack.
(c) Lateral pressure intensity at the base.

Q9) Write short notes on the followings:
(a) Quick sand condition.
(b) Drainage conditions in shear strength tests.