Student Exam No:

GANPAT UNIVERSITY
B.TECH SEM V CIVIL ENGINEERING
REGULAR EXAMINATION DEC- 2013
2CI503 GEOTECHNICAL ENGINEERING - I

Time: 3 Hours **Max Marks: 70**

Instructions: - (1) Answer to the two sections must be written in separate answer books.
(2) Figures to the right indicate full marks.
(3) Assume suitable data if required.

SECTION - I

Q1(A) Derive a relationship between (i) discharge velocity and seepage velocity (ii) Co-efficient of permeability (k) and Co-efficient of percolation (k_p). **(4)**

(B) Explain the equivalent point load method. **(4)**

(C) What do you mean by earth pressure at rest? Derive an equation for determining the magnitude of earth pressure at rest backfill. **(4)**

OR

Q1(A) Write a short note on determination of pre-consolidation pressure by Casagrande method. **(4)**

(B) Discuss the various methods for improving stability of slopes. **(4)**

(C) Explain Westgaard's theory for the determination of vertical stress at a point. **(4)**

Q2(A) Derive an expression for the vertical stress at a point due to a point load using Boussinesq's theory. **(6)**

(B) What are the different factors of safety used in the stability of slopes? **(5)**

OR

Q2(A) Write down the assumptions for Rankine's theory? Derive the expressions for active earth pressure for both cohesive and cohesionless dry soil conditions. **(6)**

(B) Explain laboratory consolidation test in details with figure. **(5)**

Q3(A) A constant head permeability test was carried out in a cylindrical sample of sand 10cm diameter and 15 cm height. 160cm^3 of water was collected in 1.75 minutes under a head of 30cm. Compute the coefficient of permeability and the velocity of flow in m/sec. (4)

(B) A saturated clay layer of 5m thickness takes 1.5 years for 50% consolidation when drained on both sides. Its co-efficient of volume change is 1.5 x 10^{-3} m^2/kN. Determine the co-efficient of consolidation in m^2/yr and co-efficient of permeability in m/yr. Assume $\gamma_w = 10$kN/m^3. (4)

(C) Compute the intensities of active and passive earth pressure at depth of 8m in dry cohesionless sand with an angle of internal friction of 30^0 and with unit weight of 18kN/m^3. What will be the intensities of active and passive pressure if the water level rises to the ground level? Take saturated unit weight of sand as 22kN/m^3. (4)

SECTION – II

Q4(A) What is Geology cycle? Explain the phenomena of formation and transportation of soil. (4)

(B) Define: (a)Void ratio (b)Porosity (c)Degree of saturation (d)Air content (4)

(C) Derive the relation between Water content, Void ratio, Specific Gravity and Degree of saturation. (4)

OR

Q4(A) Discuss field identification method for soil. (4)

(B) Enlist the different methods for the determination of liquid limit in laboratory. Describe any one in detail. (4)

(C) How many cubic meters fill can be constructed at a void ratio of 0.8 from 150000 m^3 of borrow material that has a void ratio of 1.2? (4)

Q5(A) What are the different methods of compaction adopted in the field? How would you select the type of roller to be used? (4)

(B) A borrow area soil has a natural water content of 12% and bulk unit weight 18.33 kN/m^3. The soil is used for an embankment to be compacted at 20% moisture content to a dry unit weight of 19.64 kN/m^3.Determine how many cubic meters of excavation is required for 1 m^3 of compacted embankment? Also calculate amount of water to be added to 1 m^3 of borrow soil? (4)

(C) Derive the relation between Porosity and Void ratio. (3)

OR

Q5(A) A natural soil sample has a bulk density of 2 gm/cm^3 with a water content of 6 %. Calculate the amount of water required to be added to 1 m^3 of soil to raise the water content to 15 %. While the void ratio remains constant. What is than the degree of saturation? Take G = 2.67. (6)

(B) Describe in detail standard proctor test. (5)

Q6(A) Describe the triaxial test with sketch. What are the advantages of triaxial shear test over the direct shear test? (6)

(B) The following results of undrained triaxial compression test on two identical soil specimens at failure are obtained. (6)

	SP-1 (kN/m^2)	SP-2 (kN/m^2)
Cell pressure	300	500
Deviator Stress	410	590
Pore water pressure	68	168

Determine effective shear parameters if a sample of clay is tested in unconfined compression test, what strength is expected at failure?

END OF PAPER