Registration No :

Total Number of Pages : 02   **B.Tech.**
PCCE4206

4th Semester Back Examination 2017-18
GEO TECHNICAL ENGINEERING
BRANCH : CIVIL
Time : 3 Hours
Max Marks : 70
Q.CODE : C1107
Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.
Answer all parts of a question at a place.

Q1   **Answer the following questions :**   **(2 x 10)**
 a) Distinguish between Bulk density and bulk unit weight?
 b) Define soil water? What are its main types?
 c) Write the relation between γ_d, γ and w where notations have their usual meanings?
 d) What do you mean by sensitivity and thixotropy of clay?
 e) Explain slaking of clay?
 f) Write some applications of flow net?
 g) What is relation between OMC and MDD? Draw the graph for zero air voids?
 h) What are the strength parameters of soil?
 i) What is quick sand condition? Write the expression?
 j) What is Isobar? Write expression for Boussinesq's equation?

Q2 **a)** How to determine coefficient of consolidation? Briefly explain the methods.   **(5)**
 b) An undisturbed sample of a clay stratum of 2 m thickness was tested in laboratory and the average value of coefficient of consolidation was found to be 2×10^{-4} cm²/sec. If a structure is built on this clay stratum, how long will it take to attain half the ultimate settlement under load of structure? Assume double drainage.   **(5)**

Q3 **a)** What do you mean by shear strength of a soil? Explain Mohr-coulomb theory.   **(5)**
 b) A cylindrical specimen of saturated clay, 4cm in diameter and 9 cm in overall length is tested in an unconfined compression tester. Find the unconfined compressive strength of clay, if the specimen fails under an axial load of 46.5 N. The change in length of specimen at failure is 1cm.   **(5)**

Q4 **a)** What are the assumptions in two dimensional flow of water through a saturated soil mass? Derive the Laplace equation.   **(5)**
 b) For a homogenous earth dam 50 m high and 2 m free board, a flow net was constructed. The number of equipotential drops and flow channels obtained were 25 and 4 respectively. The dam has horizontal filter of 40 m length at its downstream end. Calculate the discharge per meter length of the dam if coefficient of permeability of dam material is 3×10^{-3} cm/sec   **(5)**

Q5 **a)** Explain HRB classification of soil. **(5)**

b) A soil sample has a porosity of 40%. The specific gravity of solids is 2.70. Calculate (a) void ratio (b) dry density (c) unit weight if the soil is 50% saturated and (d) unit weight if soil is completely saturated. **(5)**

Q6 **a)** What do you mean by pore pressure? Find the effective pressure in a submerged soil mass. **(5)**

b) What is permeability? Explain falling head permeability test. **(5)**

Q7 The water table in a deposit of sand 8 m thick is at a depth of 3 m below the surface. Above water table, the sand is saturated with capillary water. The bulk density of sand is 19.62 kN/m^3.Calculate the effective pressure at 1 m, 3 m, and 8 m below the surface .Hence plot the variation of total pressure, neutral pressure and effective pressure over the depth of 8 m. **(10)**

Q8 **Write short answer on any TWO :** **(5 x 2)**

a) Index properties of soil

b) Shrinkage and swelling of soil

c) Triaxial test.

d) Friction circle method.