Paper Code: CE-501	**Roll No.**									

B. TECH.
FIFTH SEMESTER EXAMINATION, 2016-2017
GEOTECHNICAL ENGINEERING

[Time: 3 Hours] [Total Marks: 100]

Note: Attempt ALL questions. Assume suitable data, if required. All question carry equal marks.

1. Attempt any *four* parts of the following:- **(5x4=20)**

(a) 1000 m^3 of earth fill is to be constructed. How many cubic mt of soil is to excavated from borrow pit in which the void ratio is 0.95, if the void ratio of earth fill is to be 0.7.

(b) Why the montmorillonite clay has very high water absorption. Discuss with reasons.

(c) Discuss various field and laboratory methods of water content determination of soils.

(d) Explain the following
- (i) Activity of soil
- (ii) Thixotropy of clays
- (iii) Corrections in hydrometer analysis
- (iv) Difference between unified and Indian soil classification
- (v) Honeycombed and flocculent structures of soil particles

(e) Write notes on the following:-
- (i) Residual soils and give examples?
- (ii) Flocculated and honeycomb structure of soil.

(f) The natural density of a soil deposit was found to be 17.5KN/m3. A sample of soil was brought and minimum and maximum dry densities were found 16.0KN/m3 and 19 KN/m3 .Calculate density index

2. Attempt any *four* parts of the following:- **(5x4=20)**

(a) Explain following terms
- (i) Horizontal and vertical permeability of soils
- (ii) Properties of flow nets

(b) Derive the equation for finding discharge through a unconfined aquifer.

(c) What are various types of field compacting equipments? Which types of rollers are suited for clayey and gravel soils. Also give specifications of such rollers?

(d) Discuss factors affecting permeability.

(e) A cylindrical mould of dia 75mm contains 150mm long sample of sand. When water flows through the soil under constant head at rate of 55cc/minute, the loss of head between two points 80mm apart is found to be 125mm. Find k of soil

(f) A concentrated load of 800KN acts at ground surface. Fond vertical stress at depth of 8m at axis of load and 2m away from axis

3. Attempt any *two* parts of the following:- **(10x2=20)**

(a) In a laboratory consolidation test, the void ratio of the sample reduced from 0.85 to 0.73 as the pressure was increased from 1 to 2 kg/cm^2. If the co-efficient of permeability of the soil be 3.3×10^{-4} cm/sec, determine:

(i) co-efficient of volume change
(ii) co-efficient of consolidation

(b) Explain square root of time fitting method for determining coefficient of consolidation. In laboratory a 2cm thick soil sample takes 25 minutes to reach 30% consolidation. Find the time taken for 5m thick clay layer in field to reach 40% consolidation if layer is surrounded by sand on both sides in both cases

(c) Describe a suitable procedure for determining pre consolidation pressure? Also Explain the difference between normally consolidated and over consolidated soils and give examples of geologic conditions that would form each type.

4. Attempt any *two* parts of the following: - **(10x2=20)**

(a) A quick unconfined (σ_3 =0) compression test is conducted on a cylindrical soil specimen. If the axial stress at failure is 110 kPa and the effective strength parameters are c´ = 0 and ϕ' = 23^o, determine the pore pressure at failure.

(b) A cylindrical specimen of dry sand was tested in a tri axial test. Failure occurred under a cell pressure of 1.2 Kg/Cm2 and at deviator stress of 4.0 Kg/cm2.

(i) What is the angle of shearing resistance of soil?
(ii) What are normal & shear stresses on failure plane and angle of failure plane with minor principal plane?
(iii) What was maximum shear stress on any plane in the specimen at time of failure and how the plane in question be oriented with major principal plane?

(c) A vertical wall 9 m high retains soil level with the top of the wall. If the soil is a saturated clay with c_u = 20 kN/m^2, saturated unit wt 19 kN/m^3, use Rankine's method to calculate the magnitude and line of action of the active earth force on the wall, and draw pressure diagram . Also find depth of no tension.

5. Attempt any *four* parts of the following:- **(5x4=20)**

(a) Write notes on the following

(i) Seismic Refraction method
(ii) Electrical resistivity method

(b) A SPT was conducted at a depth of 2m in sand deposit with a unit wt of 20 KM/m3 .The water table at this site was at 1 m below GL. The N value was found 5. What would be corrected N value. If SPT was conducted at 15 m below GL the N obtained was 21. What is corrected N.

(c) Explain boring methods in soil investigations

(d) A vane used to test a deposit of soft alluvial clay required a torque 72 m-newton. The vane dimension were D= 100mm. H= 200mm.Find a value for the undrained shear strength of clay.

(e) Differentiate between SPT and CPT

(f) Classify different types of piles on basis of function.