40+40+40+40+30+7

13.12.16

2

T. E. Civil V CBSGS Geotech Engg-I

QP Code:577102

(3Hours)

Max Marks=80

05

10

N.B 1. Attempt any 4 out of six questions

2. Question 1 is compulsory

3. Assume any suitable data where ever required

Q.1	Attempt any four

- a. Classify the shear tests based on drainage conditions and how these are simulated to field conditions
- b. Write a short note on Atterberg limits and show their variation with respect volume of soil
- c. Briefly explain different design features for sampler to obtain undisturbed soil sample > 05
- d. A sample of inorganic soil has following grain size characteristics the liquid limit is 55% and plastic limit is 31% classify the soil as per IS classification system.

Size(mm)	%passing
2.0	95
0.075	78

- e. Mention the scope of Geotechnical engineering in construction of various civil engineering works
- Q.2 a. Derive the expression for dry density and percentage air voids of soil by using the three phase diagram
 - b. 50 grams of oven dried soil sample is taken for sedimentation analysis. The hydrometer reading in a 100ml soil suspension, 30minutes after the commencement of test is 24.5. The effective depth for hydrometer reading 25 found from calibration curve is 10.7cm. The composite correction is -2.5 take G=2.75 viscosity of water is 0.008poise. calculate the particle size that would have settled during this 30minutes and also % finer
 - c. For the construction of embankment, the soil is transported from the borrow area using a truck which can carry 6m³ of soil at a time. With the following details determine the number of truck loads required to obtain 100m³ compacted earth fill and volume of soil to be excavated from borrow pit

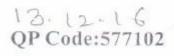
Borrow area (insitu)	Truck(loose)	Field(compacted)
16.6kN/r	11.5kN/m ³	18.2kN/m ³
8%	6%	14%
	16.6kN/r3	21,030,011

Q.3 a. Define Relative Density and Activity of soil along with the applications in the field

- A saturated soil sample has a volume of 23cm³ at liquid limit. The shrinkage limit and liquid limit are 18% and 45% respectively. The specific gravity of solids is 2.73 find the minimum volume which can be attained by the soil
- c. A layer of sand 3m thick lies over the layer of clay. The water table is at a depth of 1m below ground surface, above the water table, the sand is saturated with capillary moisture, the saturated unit weight of sand is 20kN/m³ and its dry unit weight is 17kN/m³ plot the total stress neutral stress and effective stress at a depth of 8m below ground level

Turn Over

T.E. Civil V CBSGS Geotech Engg-I2



05

08

06

05

210

- Q.4 a. Describe in detail the design criteria for geotextile filter
 - b. An aquifer of 20m thickness is overlain by an impermeable layer of 30m thickness. The test well of 0.5m diameter and two observation wells at a distance of 10m and 60m from the test well are drilled through the aquifer .after pumping at a rate of 0.1m³/s for a long time, the following draw downs are stabilized in these wells, first observation well 4m, second observation well 3m. show the arrangement in diagram and find the coefficient of permeability and drawdown in the test well
 - c. Write a short notes on utilization of flow nets in seepage analysis
- Q.5 a. Define(i) relative compaction(ii) placement water content also enlist the factors effecting compaction
 - b. Define preconsolidation of soil and explain graphical method for finding 04 preconsolidation pressure
 - c. A CU triaxial tests were performed on two identical samples of saturated remolded clay the observations are find the total and effective shear parameters if in another CU test on identical sample is consolidates to the cell pressure of 400kN/m², what would be the deviator stress at failure

Test No.	Cell pressure(kN/m²)	Deviator stress(kN/m ²)	Pore pressure(kN/m²)
1	250	179	101
2	350	242	145

- Q.6 a. A layer of clay 2m thick is subjected to a loading of 0.5Kg/cm² one year after loading, the average consolidation is 50% the layer has couble drainage
 - (i) What is the coefficient of consolidation
 - If the coefficient of permeability is 3mm/year, what is the settlement after one year and
 - (iii) How much time will the layer take to reach 90% consolidation
 - b. Write a short notes on bore hole log
 - c. Explain Mohr-Coulomb's criteria for shear strength of soils 05