B.E. Fourth Semester (Civil Engineering) (C.B.S.)

Geotechnical Engineering - I Paper – II

P. Pages : 3 **KNT/KW/16/7264**

Time : Three Hours * 0 1 3 4 * Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.
10. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) Discuss about formation of soil. **6**

b) Derive: **7**

$$\gamma_d = \frac{(1-n_a)\, G\, \gamma_\omega}{1+\omega G}$$

OR

2. a) Differentiate between Residual soil & transported soil. **6**

b) During a test for water content determination on a soil sample by pycnometer, the following observations were recorded. **7**

i) Mass of wet soil sample with = 1000 gm pycnometer.

ii) Mass of pycnometer with soil = 2000 gm and filled with water.

iii) Mass of pycnometer filled with = 1480 gm water only.

iv) Specific gravity of solids = 2.67

Determine the water content.
If the bulk density of the soil is 2.05 gm/ml, Determine the degree of saturation.

3. a) Explain the term density Index. What is it's utility? For what type of soil is useful. **6**

b) The oven-dry mass of pat of clay is 10.8 g and the mass of mercury displaced on immersion is 84.2 g. Taking the specific gravity of solids as 2.72, determine the shrinkage limit and Shrinkage ratio. **7**

OR

4. a) Explain various methods to find water content of a soil. **6**

b) A test was carried out for determination of liquid limit of soil sample. The following sets of observations were taken. Determine liquid limit and flow Index. **7**

No. of Blows (N)	38	27	20	13
Water content (%)	47.5	49.5	52	54

5. a) Write a brief note on "Quick Sand" condition. **6**

b) A falling head permeability test was carried on 15 cm long clay sample. The diameter of sample and stand pipe was 9.8 cm and 0.75 cm respectively. The level of water in stand pipe dropped from 60 cm to 45 cm in 12 minutes. Determine: **8**

i) Permeability in m/day
ii) Time required for level to drop to 10 cm.

OR

6. a) Explain four important factors affecting the permeability of soil. **6**

b) Find the ratio of average permeability in the horizontal to that in vertical direction for a soil deposite of three layers with thickness in the ratio 1:2:3. The permeability of the second layer is twice that of first and third is twice that of the second. **8**

7. a) Explain Equivalent point load method in brief. **6**

b) Two columns 3m apart transfer loads of 300 kN and 400 kN on a semi-infinite soil surfaces. Plot the combined effect of both the loads of normal stress on a horizontal plane 3m below the plane of loading. **7**

OR

8. a) Explain the construction and use of Newmark's influence chart. **6**

b) Discuss assumptions made in Boussinesq's equation, **3**

c) Explain the terms. **4**

i) Isobars.
ii) Vertical pressure on vertical plane.

9. a) Explain: **6**

i) Coefficient of compressibility.
ii) Coefficient of volume change.
iii) Compression Index.

b) Explain different factors affecting compaction of soil. **7**

OR

10. a) Explain Terzaghi's one dimentional consolidation from along with assumptions. **6**

b) Following data is for a standard compaction test on soil using a mould of volume 1000 cm^3. **7**

Water content (%)	8.5	12.5	13.75	15.5	18.2	20.2
Wt. of compacted sample (N)	18	19.4	20	20.5	20.3	19.3

11. a) Explain Mohr - Coulomb theory for shear strength of soil. **7**

b) A specimen of clean dry sand failed at a shear stress of 0.35 kg/cm^2 and normal stress of 0.5 kg/cm^2 . If an identical specimen is tested in triaxial cell with a lateral pressure of 0.5 kg/cm^2 , find the axial stress at failure. **7**

OR

12. a) Show that the angle of inclination of failure plane is $(45 + \phi/2)$ **6**

b) The stresses on a failure plane in a drained test on a cohesionless soil are as under. Normal stress (σ) is 95 kN/m^2 and shear stress (τ) is 45 kN/m^2. **8**

i) Determine the angle of shearing resistance and angle which the failure plane make with the major principal plane.

ii) Find the major and minor principal stress.

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