Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_

G:\logo and QP Template\logo 3 Feb 2018 final.tif

**End Semester Examination – Nov/Dec – 2018**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Code :** | **14CE2007** | **Duration :** | **3hrs** |
| **Sub. Name :** | **SOIL MECHANICS** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | A sample of clay was coated with paraffin wax and its mass, including the mass of wax was found to be 697.5gms. The sample was immersed in water and volume of water displaced was found to be 355ml. The mass of the sample without wax was 690gm the water content of the respective specimen was 18%. Determine the bulk and dry density. Take specific gravity of the solids as 2.70 and that of wax as 0.89. | CO1 | 10 |
| b. | Write down a neat procedure for determining water content and specific gravity of a given soil by laboratory method. | CO1 | 10 |
| (OR) | | | | |
| 2. | a. | An air dry soil sample weighing 25kg was sieved in a laboratory. The results are given below.   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **IS sieve (mm)** | 2.0 | 1.0 | 0.6 | 0.425 | 0.212 | 0.125 | 0.075 | Pan | | **Mass retained** | 0 | 2.02 | 3.51 | 7.53 | 8.15 | 2.81 | 0.90 | 0.08 |   Draw the grain size distribution curve and determine the coefficient of curvature and the uniformity coefficient. | CO1 | 10 |
| b. | Discuss in detail about the origin and formation of peat soil? Explain the failure of foundation due to peat soil with a case study | CO1 | 10 |
|  |  |  |  |  |
| 3. | a. | In a shrinkage limit test, a dish with volume of 10.5ml was filled with saturated clay. The mass of the saturated clay was 18.75gm. The clay was dried gradually first in atmosphere and then in an oven. The mass of the dry clay was 12.15gm and its volume 5.95ml. Determine the shrinkage limit. | CO1 | 6 |
| b. | Relate the effect of seepage pressure with hydraulic gradient. | CO1 | 7 |
| c. | Discuss about the failure of foundation due to expansive soil. | CO1 | 7 |
| (OR) | | | | |
| 4. | a. | The maximum dry density of a sample by the light compaction test is 1.78g/ml at an optimum water content of 20%. Find the air voids and the degree of saturation. G = 2.68 What would be the corresponding value of dry density on the zero air void line at O.W.C? | CO2 | 10 |
| b. | Describe the standard proctor test and the modified proctor test. How would you decide the type of test to be conducted in the laboratory? | CO2 | 10 |
|  |  |  |  |  |
| 5. | a. | Differentiate between primary consolidation and secondary consolidation. | CO2 | 5 |
| b. | Illustrate the different methods of compaction adopted in the field. | CO2 | 15 |
| (OR) | | | | |
| 6. |  | A consolidation test was conducted on a sample of a normally consolidated clay, with an initial void ratio of 1.55, and the following results were obtained.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | σ (kN/m2) | 80 | 160 | 320 | 640 | 1280 | | e | 1.35 | 1.28 | 1.14 | 0.96 | 0.78 |  1. Plot e-log σ curve, If the initial overburden pressure is 150kN/m2, draw the field consolidation line and hence determine the coefficient of compression 2. If the thickness of the clay layer in the field is 4m and the increase in the pressure due to loading is 50kN/m2, compute the settlement. | CO2 | 20 |
|  |  |  |  |  |
| 7. | a. | A rectangular footing of size 4 m x 3 m is subjected to a uniformly distributed load of 300 kN/m2. Determine the vertical stress at a point P at a depth of 3 m below the ground surface where the location of the point is as shown below, using equivalent point load method.  1 m  1 m  P  3 m  4 m | CO2 | 8 |
| b. | Discuss the basis of the construction of Newmark’s influence chart. How it is used? | CO2 | 12 |
| (OR) | | | | |
| 8. | a. | A sand stratum is 10m thick. The water table is 2m below ground level. The unit weights of sand layer above and below water table are 17kN/m3 and 21kN/m3 respectively. Draw the effective stress, pore pressure and total stress diagrams for the sand stratum. | CO3 | 10 |
| b. | List the different different types of slope failures? Give the different types safety used in the stability of slopes? | CO3 | 10 |
|  | |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. | a. | Discuss the friction circle method for the stability analysis of slopes. Can this method be used for purely cohesive soil? | CO3 | 10 |
| b. | The following results were obtained from a series of consolidated undrained test on soil, in which the pore water pressure was not determined. Determine the cohesion intercept and the angle of shearing resistance.   |  |  |  | | --- | --- | --- | | Sample No. | Confining Pressure (kN/m2) | Deviator Stress at failure ( kN/m2) | | 1 | 100 | 600 | | 2 | 200 | 750 | | 3 | 300 | 870 | | CO3 | 10 |