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



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**Supplementary Examination – June – 2017**

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

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

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| Q. No. | Sub Div. | Questions | Course  Outcome | Marks |
| 1. | a. | A soil sample has a porosity of 40% .the specific gravity of solids 2.70, Calculate  (i) void ratio  (ii) Dry density  (iii) Unit weight if the soil is 50% saturated  (iv) Unit weight if the soil is completely saturated | CO1 | 8 |
|  | b. | Prove that | CO1 | 6 |
|  | c. | Discuss various methods for determination of water content in a laboratory. | CO1 | 6 |
| (OR) | | | | |
| 2. | a. | Briefly explain about the two phase and three phase block diagram. What is it use? | CO2 | 8 |
|  | b. | The in-situ percentage voids a sand deposit is 34% for determining the density index, dried sand from the stratum was first filled loosely in a 1000cm3 mould and was then vibrated to give a maximum density. The loose dry mass in the mould was 1610g and dense dry mass at maximum compaction was found to be 1980g. Determine the density index if the specific gravity of the sand particles 2.67. | CO1 | 6 |
|  | c. | An undisturbed sample of soil has a volume of 100 cm3 and mass of 190g. On oven drying for 24hrs, the mass is reduced to 160g. If the specific gravity grain is 2.68, determine the water content, voids ratio and degree of saturation of the soil. | CO1 | 6 |
| 3. | a. | Define particle size distribution curve. How will you determine the uniformity coefficient and the coefficient of curvature? | CO2 | 10 |
|  | b. | 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. | CO2 | 10 |
| (OR) | | | | |
| 4. | a. | Discussthe different methods for determination of the coefficient of permeability in a laboratory? Discuss their limitations. | CO1 | 8 |
|  | b. | What is Darcy’s law? What is its limitations? | CO1 | 4 |
|  | c. | A horizontal stratified deposit consists of three layers, each uniform in itself. The permeabilities of the layers are 8 x 10-6 m/sec, 50 x 10-6m/sec and 5 x 10-6 m/sec and their thickness 6m, 3m and 9m repectively. Find the effective average permeability of the deposit in the horizontal and vertical direction. | CO1 | 8 |
| 5. | a. | Describe Standard Proctor test and the modified Proctor test. How would you decide the type of the test to be conducted in the laboratory? | CO3 | 12 |
|  | b. | List out the factors affecting compaction? Explain in brief. | CO3 | 8 |
| (OR) | | | | |
| 6. | a. | A soil deposit is subjected to a surcharge load of 30 kN/m2 at the ground level. The soil deposit consists of four layers from the top:  (i) a partially saturated layer of density 16.5 kN/m3 to a depth of 3m (ii) partially saturated layer of density 17 kN/m3 to a depth of 2.5 m (iii) saturated layer of density 18.7 kN/m3 to a depth of 3.2 m  (iv) saturated layer of density 19.2 kN/m3 to a depth of 4 m. Plot the diagram showing the total stress, pore water pressure and effective stress. | CO2 | 14 |
|  | b. | Define total stress, neutral stress and effective stress. What is the importance of the effective stress? | CO2 | 6 |
| 7. | a. | Discuss the spring analogy for primary consolidation. What are it uses? | CO3 | 7 |
|  | b. | Discuss the Terzhagi’s theory of consolidation, stating the various assumptions and their validity | CO3 | 7 |
|  | c. | A stratum of clay is 4m thick and has an initial overburden pressure of 45 kN/m2 at its middle. Determine the final settlement due to an increase in pressure of 35 kN/m2 at the middle of the clay layer. The clay is over-consolidated, with a preconsolidation pressure of 60 kN/m2. The values of the coefficients of recompression and compression index are 0.05 and 0.25 respectively. Take initial void ratio as1.40. | CO3 | 6 |
| (OR) | | | | |
| 8 | a. | Write Notes on Iso-Bars. | CO2 | 4 |
|  | b. | A concentrated load of 1500kN is applied at the ground surface. Determine the vertical stress at a point P which is 6m directly below the load. Also calculate the vertical stress at a point R which is at a depth of 6m but at a horizontal distance of 5m from the axis of the load. | CO2 | 8 |
|  | c. | An L-shaped building in plan exerts a pressure of 75kN/m2 on the soil. Determine the vertical stress increment at a depth 5m below the interior corner P. | CO2 | 8 |
|  | | **Compulsory:** |  |  |
| 9. | a. | What is unconfined compressive test? Sketch the apparatus used. What is its advantages over a triaxial test? | CO3 | 10 |
|  | b. | The following results were obtained froma 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 resisitance.   |  |  |  | | --- | --- | --- | | Sample No. | Confining Pressure (kN/m2) | Deviator Stress at failure ( kN/m2) | | 1 | 100 | 600 | | 2 | 200 | 750 | | 3 | 300 | 870 | | CO3 | 10 |