**Q.1/following are the results of a sieve analysis: (50 marks)**

|  |  |  |
| --- | --- | --- |
|  | sieve opening (mm) | Mass of soil retained on each sieve (g) |
| 4 | 4.7 | 103.7 |
| 10 | 2 | 89.08 |
| 20 | 0.850 | 78.05 |
| 30 | 0.6 | 35.32 |
| 40 | 0.425 | 35.5 |
| 100 | 0.150 | 108.23 |
| 200 | 0.075 | 30.59 |
| pan |  | 20.28 |

1.determine the percent finer than each sieve and plot a grain size distribution curve.

2.calculate the uniformity coefficient Cu.

3.calculate the coefficient of gradation.

**Q2/ Explain the following questions: (50 marks)**

1. **Define the specific gravity of soil? What are the purposes of this test?**

The specific gravity (Gs) of a soil is the ratio of the mass of a unit volume of a material at a stated temperature to the mass of the same volume of distilled water at stated temperature (4oC). Or the specific gravity of soil grains is unit weight of the solid particles to the unit weight of distilled water at 4 oC.

PURPOSES

 • Gs is useful for determining weight volume relationships.

• It's used in the computation of most of the laboratory tests; such as: hydrometer, consolidation.

• Specific gravity may be useful in soil mineral classification.

1. **On what range of particle size does the sieve and hydrometer analysis apply?**

For Sieve analysis its bigger than 0.075 mm to 40 mm

For hydrometer smaller than 0.075 mm to around 0.001 mm

1. **In hydrometer test; assume that the specific gravity of tested soil is 2.75, is this value of Gs needs to be corrected or not? If yes, determine the correction factor (a).**

*Yes, it needs to be corrected*

*a = =(2.75-1.65)/((2.75-1)\*2.65)=0.97*

1. **What is the purposes of unconfined compression test?**

PURPOSES:

 The unconfined compression test is widely used for a quick economical means of obtaining the approximate shear strength of a cohesive soil.

**5. Does the permeability coefficient increases or decreases with water temperature? Why?**

The permeability coefficient increase with increase in water temperature due to decrease in viscosity of water and reverse is true.

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1.determine the percent finer than each sieve and plot a grain size distribution curve.

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|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sieve No. | **W Soil(g)** | % passing | **Cumulative** | % Finer |
| 4.75 | 103.7 | 20.71 | **20.71** | 79.29 |
| 2 | 89.08 | 17.79 | **38.50** | 61.50 |
| 0.85 | 78.05 | 15.59 | **54.08** | 45.92 |
| 0.6 | 35.32 | 7.05 | **61.14** | 38.86 |
| 0.425 | 35.5 | 7.09 | **68.23** | 31.77 |
| 0.15 | 108.23 | 21.61 | **89.84** | 10.16 |
| 0.075 | 30.59 | 6.11 | **95.95** | 4.05 |
| Pan | 20.28 | 4.05 | **100.00** | 0.00 |
| Wsoil (g) | **500.75** |   |  |   |

2-

D60 = 1.9 D30=0.41 D10=0.149

Cu=D60/D10 = 1.9/0.149 = 12.75

3- Cc = D30^2 / (D60 \* D10) = 0.59