EXPERIMENT NO. DATE:

DETERMINATION OF GRAIN SIZE DISTRIBUTION BY SIEVE ANALYSIS

(IS: 2720 (Part 4) – 1985 – grain size analysis)

Objective: The objective of the experiment is to determine the grain size distribution of coarse grained soil by sieve analysis.

Sieve analysis is a 'dry method' which is applicable for the soil material if less than 10 percent of the material passes through 75 micron IS sieve.

Apparatus: **Sieves:** IS sieves of designation 4.75 mm, 2.00 mm, 1.00 mm, 600 micron, 425 micron, 150 micron and 75 micron.

Balance: A balance sensitive up to 0.1 percent of the mass of sample to be weighed.

Oven: thermostatically controlled oven with interior of non-corroding material to maintain the temperature between 105 and 110^{o} C temperature.

Sieve brush: A brush of metal wire or normal brush to clear the sieve mesh openings.

Mortar-Pestle: Porcelain mortar with rubber covered pestle.

Sieve shaker: Mechanized sieve shaker.

Riffler: Riffler for sampling of soil mass.

Material: The soil sample received from the field should be prepared as specified in IS: 2720 (Part 1)-1983. The soil fractions retained on and passing through 4.75 mm IS sieve should be taken separately for the analysis.

Procedure:

1. Depending on the soil fraction available for the test procedure the set of sieves is selected.
2. Then separate the soil into gravel and sand portion by sieving the sample on 4.75 mm IS sieve.
3. The material retained on 4.75 mm IS sieve (gravel fraction) will be subjected to dry sieve analysis through following set of sieves – 80 mm, 20 mm, 10 mm and 4.75 mm. Wash the material passing through 4.75 mm IS sieve and through 75 micron IS sieve so that the clay and silt particles will be separated from the sand fraction. Add 2 g. of sodium hexametaphosphate per litre of water and use it for washing. Washing shall be continued till the water passing through 75 micron sieve would be substantially clear.
4. Collect the material passing through and retained on 75µ IS sieve in different containers and subject it to oven drying.

5. The material retained on 75µ sieve will be subjected to dry sieving through following set of sieves - 4.75 mm, 2.00 mm, 1.00 mm, 600 micron, 425 micron, 150 micron and 75 micron size.
6. Arrange the sieves one over the other with the largest aperture sieve at the top and the smallest aperture sieve at the bottom and fit it to the mechanical sieve shaker
7. The sample will be subjected to mechanical sieving for minimum of 10 minutes.
8. Collect the soil sample retained on each sieve carefully in containers and weigh the amount retained in each sieve and record it.
9. Calculate the percentage of soil retained on each sieve on the basis of the total mass of soil sample taken and from these results. Then calculate the percentage passing through or percentage finer of each sieve.

Observations:

SAMPLE-I

Mass of soil sample taken: _____ g.

Serial No.	IS Sieve (mm)	Mass retained (g)	% retained	Cumulative % retained	Cumulative % passing
1.	4.750				
2.	2.360				
3.	1.180				
4.	0.600				
5.	0.425				
6.	0.300				
7.	0.150				
8.	0.075				
9.	Pan				

SAMPLE-II

Mass of soil sample taken: _____ g.

Serial No.	IS Sieve (mm)	Mass retained (g)	% retained	Cumulative % retained	Cumulative % passing
1.	4.750				
2.	2.360				
3.	1.180				
4.	0.600				
5.	0.425				
6.	0.300				
7.	0.150				
8.	0.075				
9.	Pan				

Plot two separate curves of cumulative % finer (as ordinate) vs. sieve size (as abscissa) on a semi-logarithmic graph paper for two different samples. Based on this plot find out the values of D_{10}, D_{30} and D_{60}. Based on these values estimate the coefficient of uniformity and coefficient of curvature using following equations:

Co-efficient of uniformity, $C_u = \frac{D_{60}}{D_{10}}$ =

Co-efficient of curvature, $C_c = \frac{D_{30}^2}{D_{60} \times D_{10}}$ =

Co-efficient of uniformity, $C_u = \frac{D_{60}}{D_{10}}$ =

Co-efficient of curvature, $C_c = \frac{D_{30}^2}{D_{60} \times D_{10}}$ =

Fig 1: Experimental setup for sieve analysis

Discussions: