EXPERIMENT NO.- 01

EXPERIMENT NAME:

SIEVE ANALYSIS OF FINE & COARSE AGGREGATE

INTRODUCTION

- The term sieve analysis is given to simple operation of dividing a sample of aggregates into fraction each consisting of particles between specific limits.
- The analysis is conducted to determine the grading of materials proposed for use as aggregates or being used as aggregates.
- The term *Fineness Modulus* (FM) is a ready index of coarseness or fineness of the material.
- It is an empirical factor obtained by adding the cumulative percentages of aggregates retained on each of the standard sieves and dividing this sum arbitrarily by 100. No. 100, No. 50, No. 30, No. 16, No. 8, No. 4, 3/8 in, 3/4 in, 1.5 in are the ASTM standard sieves (or US Standard Sieves).

REFERENCED DOCUMENT
ASTM C 136.

APPARATUS

- *Balance:* Sensitive to within 0.1% of weight of the sample
- *Sieves:* ASTM Standard Sieves
- *Mechanical Sieve Shaker*

Fine Aggregate

- The test sample of *Fine Aggregate* (FA), after drying, approximately the following amount:

Aggregate with at least 85% passing a No.4 sieve and more than 5 % retained on a No. 8 sieve.	**500 g**
Aggregate with at least 95 % Passing No. 8 sieve	100 g

Coarse Aggregate

- The weight of the test sample of *Coarse Aggregate* (CA) shall conform to the following requirement:

Aggregate with normal maximum size of ¾ in	**10 lbs**

Coarse and Fine Aggregate Mixtures

The weight of the test sample of CA and FA mixtures shall conform to the following:

Table 1.1: Course and Fine Aggregate Mixtures

Nominal Maximum Size Square Openings mm (in)	Minimum Weight of Test Sample, Kg (Ib)
9.5 (3/8)	1 (2)
12.5 (1/2)	2 (4)
19.0 (3/4)	5 (11)
25.0 (1)	10 (22)
37.5 (1.5)	15 (33)
50 (2)	20 (44)
63 (2.5)	35 (77)
75 (3)	60 (130)
90 (3.5)	100 (220)
100 (4)	150 (330)
112 (4.5)	200 (440)
125 (5)	300 (660)
150 (6)	500 (1100)

PROCEDURE FOR FA & CA

- Dry the sample to constant weight at a temperature of $110 \pm 5^{o}C$
- Nest the sieve in order of decreasing size of opening from top to bottom and place the sample on the top sieve.
- Agitate the sieves by hand or by mechanical apparatus for a sufficient period, say 15 minutes.
- Limit the quantity of material on a given sieve so that all particles have the opportunity to reach sieve openings a number of times during the sieving operation. For sieves with opening smaller than 4.75 mm (No.4), the weight retained on any sieve at the completion of the sieving operation shall not exceed 6 kg/m^2 (4 g/in^2) of sieving surface shall not exceed the product of 2.5 * (sieve opening in mm).In no case shall the weight be so great as to cause permanent deformation of the sieve cloth.

PROCEDURE FOR FA & CA (Contd..)

- Continue sieving for a sufficient period and in such manner that, after completion, not more than 1 % weight of the residue on any individual sieve will pass than but sieve during 1 minute of continuous hand sieving.
- Determine the weight of each size increment by weighting on a scale or balance to the nearest 0.1 % of total original dry sample weight. The total weight of the material after sieving should check closely with original weight of sample placed on the sieves. If the amount differs by 0.3%, based on the original dry sample weight, the results should not be used for acceptance purposes.

Figure 1.1: US Standard Sieves

Figure 1.2 Sieve Shaker

CALCULATION

- Calculate *Percentages Passing*, *Total Percentage Retained*, or *Percentages in Various Size Fractions* to the nearest 0.1 % on the basis of the total weight of the initial dry sample.
- Calculate the *Fineness Modulus*, when required, by adding the total percentages of material in the sample that is coarser than each of the following sieves (*Cumulative Percentages Retained*), and dividing the sum by 100: 150-µm (No. 100), 300 µm (No. 50), 600 µm (No. 30), 1.18 mm (No. 16), 2.36 mm (No. 8), 4.75 mm (No. 4), 9.5 mm (3/8 in), 19.0 mm (3/4 in), 37.5 mm (1.5 in), and larger, increasing in the ratio of 2 to 1.

REPORT

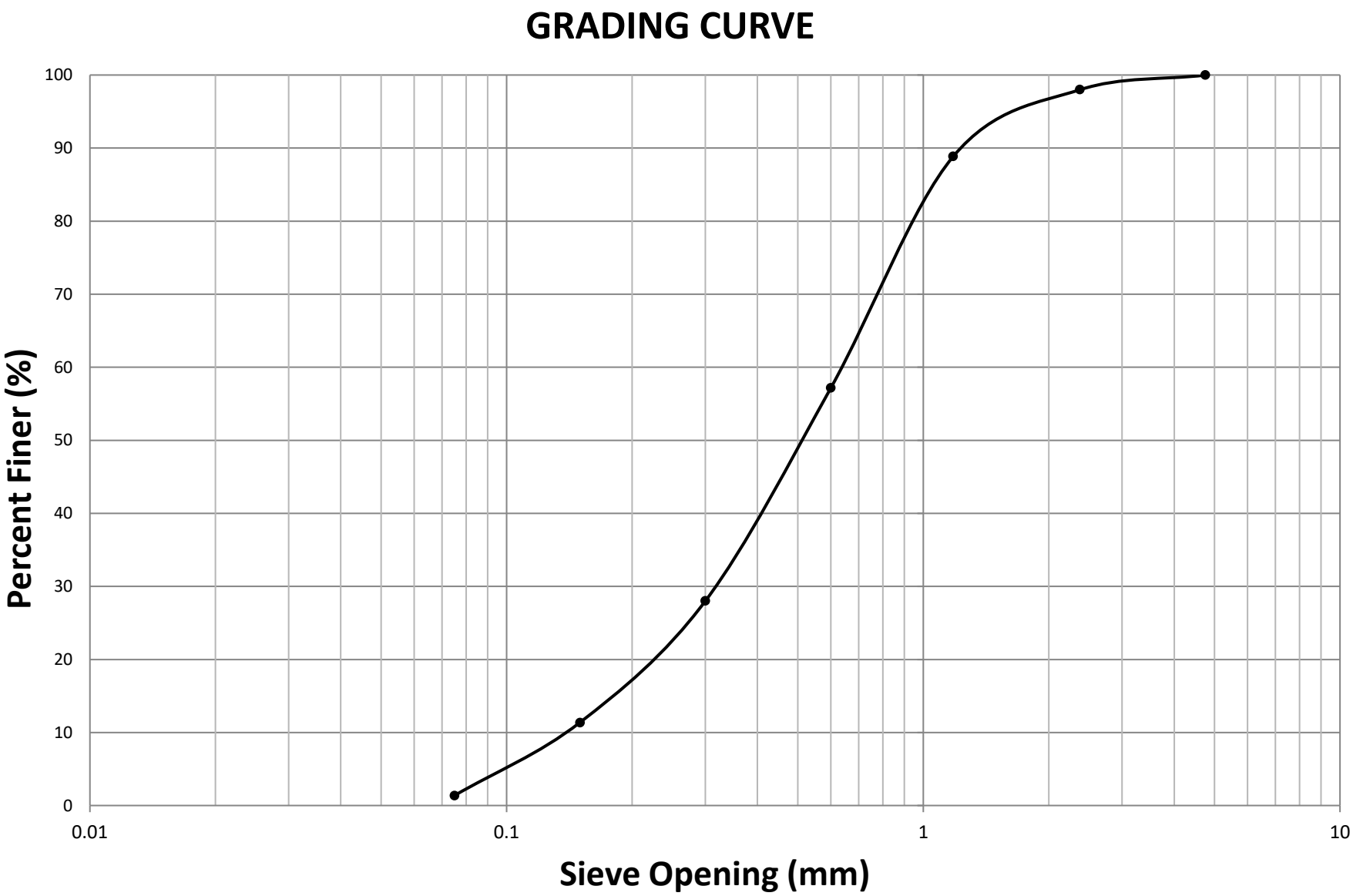
The report shall include the following:

- Total percentage of material passing each sieve, or
- Total percentage of material retained on each sieve, or
- Cumulative Percentage of material retained on each sieve and Percent Finer on each sieve.
- Calculate the ***Fineness Modulus (FM)*** to the nearest 0.01 of Fine Aggregate.
- Draw ***Gradation Curve*** (*Percent Finer* vs. *Sieve Opening*) for *Coarse Aggregate* and *Fine Aggregate* on semi-log paper.

QUESTIONS

- Define *Fineness Modulus (FM).* What is the significance of *FM*?
- What is meant by Good Grading? Draw qualitative curves for different types of grading.
- What is the practical use of controlling the grading of concrete aggregates?
- How does the fineness modulus of aggregates affect the strength of concrete?
- In what sizes of particles the aggregates are deficient or oversupplied? How might this be remedied in a practical way?

SAMPLE GRADING CURVE



EXPERIMENT 01
Data Sheet
Sieve Analysis of Fine Aggregate

Sieve Number	Sieve Opening (mm)	Materials Retained (gm)	% of Materials Retained	Cumulative % Retained	Percent Finer
No. 4					
No. 8					
No. 16					
No. 30					
No. 50					
No. 100					
No. 200					
Pan					
		TOTAL =			

Fineness Modulus (FM) =

Signature of Course Teacher

Student No.:
Group :
Date :

Data Sheet
Sieve Analysis of Coarse Aggregate

Sieve Number	Sieve Opening (mm)	Materials Retained (gm)	% of Materials Retained	Cumulative % Retained	Percent Finer
1.5 “					
1.25”					
1”					
0.75”					
0.50”					
0.375”					
No. 4					
Pan					

TOTAL =

Fineness Modulus (FM) =

Signature of Course Teacher

Student No.:
Group :
Date :