Aggregates and its types

INTRODUCTION:-

Aggregate are the important constituent in concrete. Aggregate are granular material, derived from the most part from the natural rocks, crushed stones, or natural gravels and sands.

Aggregate generally occupy about 70% to 80% of the volume of concrete and can therefore be expected to have an important influence on it properties.

CLASSIFICATION OF AGGREGATE:-

a)CLASSIFICATION BASED ON SIZE:

>Coarse aggregate:

Aggregate which retained on the No.4 (4.75mm) sieve. The function of the coarse aggregate is to act as the main load-bearing component of the concrete.

>Fine aggregate:

Aggregate passing No.4(4.75mm) sieve and predominately retained on the No.200 (75µ) sieve. The fine aggregate serve the purpose of filling all the open space in between the coarse particles.

b)CLASSIFICATION BASED ON SOURCE:

>Natural aggregates:

This kind of aggregate is taken from natural deposits without changing their nature during the process production such as crushing and grinding.

>Manufactured (synthetics) aggregates:

This is a kind of man-made materials produced as a main product or an industrial by-product. Some example are blast furnace slag, air cooled slag and broken bricks. Synthetics aggregates are produced by thermally processed materials such as expanded clay and shale used for making light weight concrete.

c)CLASSIFICATION BASED ON UNIT WEIGHT:

Aggregates are classified as Light-weight, Heavy-weight and Normal-weight aggregate depending on weight and specific gravity.

AGGREGATE	SPECIFIC GRAVITY	UNIT WEIGHT (kN/m3)	BULK DENSITY (kN/m3)	EXAMPLE
normal-weight	2.5-2.7	23-26	15.20-16.80	sand
heavy-weight	2.8-2.9	25-29	>20.80	Scrap iron
light-weight		12	<11.20	dolomite

d)CLASSIFICATION BASED ON SHAPE:

The shape of aggregates is an important characteristic, since it affect the workability of concrete.

CLASSIFICATION	EXAMPLE
Rounded	River or seashore gravels
Partly rounded	Pit sands & Gravels
Angular	Crushed Rocks
Flaky	Laminated rocks

FLAT

ELONGATED

ANGULAR

ROUND

e)CLASSIFICATION BASED ON SUFACE TEXTURE:

Surface texture is a measure of the smoothness and roughness of aggregate. The grouping of aggregate is broad and is based on visual examination of the specimen. As per IS:383-1970 the aggregates are classified into five groups, namely, Glassy, Smooth, Granular, Crystalline, Honeycombed and Porous.

CLASSIFICATION	EXAMPLES
Glassy	Black flint
Smooth	Gravel, Marble
Granular	Sandstone
Rough	Basalt
Crystalline	Granite
Honeycombed & Porous	Brick, slag

SMOOTH

ROUGH

GOOD QUALITYIES OF AN IDEAL AGGREGATE:

An ideal aggregate used for the manufacturing of concrete and mortar, should meet the following requirements.

- (1) It should consist of natural stones, gravels and sand or in various combinations of these materials.
- (2) It should be hard, strong and durable.
- (3) It should be dense, clear and free from any coating.
- (4) It should be free from injurious vegetable matters.
- (5) It should not contain flaky (angular) and elongated pieces.
- (6) It should not contain any material liable to attack steel reinforcement in case of reinforced concrete.

TESTS ON AGGREGATE:-

The test usually conducted on coarse aggregates are

>PARTICLE SIZE

>FLAKINESS &ELONGATION INDEX

>MOISTURE CONTENT

>SPECIFIC GRAVITY AND WATER ABSORPTION

>TEN PERCENT FINE VALUE

>AGGREGATE CRUSHING VALUE

>AGGREGATE IMPACT VALUE

> AGGREGATE ABRASION VALUE

Grading and Blending of Aggregate

- Grading refers to the particle size distribution of aggregates, which is determined through sieve analysis. The grading of aggregates is crucial because it affects the workability, density, and strength of concrete.
- Blending involves combining different aggregates to achieve a desired gradation and improve the overall performance of the concrete or asphalt mix.