Experimental Investigation on The Strength of Concrete by Replacement of Sand Using Granite Dust And Marble Dust

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Abstract- *When the Compressive strength, Flexural strength, Split tensile strength, Bond Strength and Stress Strain curve of concrete test are performed on the M30 Grade of concrete with and without Granit Dust and Marble Dust at 28 days of curing period. The strength was determined of Granit Dust and Marble Dust added concrete with addition of 15%, 25%, 40%, and 50% for M30 grade as a partial replacement of sand in conventional concrete. From the discussion it is clear that maximum strength is achieved when sand is replaced by 15% Granite dust but in case of Marble dust is comes out maximum at sand is replaced by 25% but sand is replaced by granite dust at 25% the compressive strength is little bit decrease hence maximum compressive strength in both the cases the sand is replaced by Granite dust & Marble dust.*

Keywords- Flexural Strength, Compressive strength, Tensile strength, Granit Dust and Marble Dust

I. INTRODUCTION

Concrete is very useful building material in all over the world. It is a versatile construction material due to its reasonable cost and easy availability of its constituents. Quality of construction is the most important aspect under consideration in the construction sector. Cement is factory made, water is naturally available, coarse aggregate is naturally available and factory crushed. Fine aggregate is often obtained from river beds. River sand has been the most popular choice for the fine aggregate Sand is the one of important constituents of concrete making which is about 35% of volume of concrete. The quality of the river sand normally depends on its source.

In the last 15 years it has been clear that availability of natural sand is decreasing. Environmental concern, In this situations where natural sand is not available. Some manufactured sands are obtained by crushing source rocks such as granite, gneiss, dolerite, basalt .Marble Dust & Granite Dust has to create as an similar to river sand that to consume extra profit to concrete and MD/GD is to be increase the strength of concrete over concrete produce's with equal ratio of river sand but they are reduce in the concrete workability.MD & GD is useful for various activities in the civil construction project like a road construction as well as manufactured of building component and materials like as light aggregates as well as bricks/tiles. Our project presents the result of experimental investigations carried out on "Quarry sand" and the details of concrete designed using Quarry sand.

About 6 million tons of wastes from marble industries are being released from marble cutting, polishing processing and grinding .the Granite Dust and Marble Dust is usually possesses a major environmental concern. In dry season, the granite and marble powder or dust dangles in the air and deposits on vegetation and crop. All these significantly affect the environment and local ecosystems. The granite and marble powder or dust deposed in the river-bed and causes reduction in porosity and permeability of top soil and result in water logging. Use industrial wastes and by products as an aggregate or raw material is of great practical significance developing building material components as substitutes for material and providing an Alternative.

II. OBJECTIVE

To study on the strength of concrete with partial replacement of sand by granite dust &marble dust. The main objectives of thesis are summarized as below-

- To design the concrete mixes M30 by using Granite Dust and Marble Dust as a replacement for natural sand.
- To Study the various characteristics of concrete made by using Granite Dust and Marble Dust.
- To compare the result with Normal concrete.

III. FORMULATION OF RESEARCH

Stage-I of work:

In stage-I, The sand is partially replaced by Granite Dustin different percentages 15%, 25%,40% &50% as shown in the table no- 1.1 below. 5 batches are prepared in different proportions including conventional concrete mix. Cubes and beams& cylinders are casted for determining compressive strengths, flexural strengths, Split Tensile Strength, Bond Strength & Stress Strain Curve Test of Concrete respectively at 28 days.

Table No. 1 Formulation of work (Stage-1)

Batch Mix	Cement (%)	Sand (%)	GD (%)	Coarse Aggregates (%)
1.	100	100	---	100
2.	100	85	15	100
3.	100	75	25	100
4.	100	60	40	100
5.	100	50	50	100

Stage-II of work:

In stage-II, The sand is partially replaced by Marble Dust in different percentages 15%, 25%, 40% &50% as shown in the table no-1.2 below. 5 batches are prepared in different proportions including conventional concrete mix. Cubes and beams & cylinders are casted for determining compressive strengths, flexural strengths, Split Tensile Strength, Bond Strength & Stress Strain Curve Test of Concrete respectively at 28 days.

Table No. 2 Formulation of work (Stage-2)

Batch Mix	Cement (%)	Sand (%)	MD (%)	Coarse Aggregates (%)
1.	100	100	---	100
2.	100	85	15	100
3.	100	75	25	100
4.	100	60	40	100
5.	100	50	50	100

IV. CONSISTENCY TEST

Residue of cement is 10 percent. The standard cement should comply with the subsequent situation of fineness's given by IS: 460-1978 & IS: 269-1976.

1. For normal Portland cement, the powder by mass on IS test should not exceed 10%
2. For fast hardening Portland cement, the deposit by mass on IS test sieve must not Exceed 5%.

Sr. No.	Weight of cement (gms)	Percentage by water of dry Cement (%)	Amount of water added (ml)	Penetration (mm)
1	400	-	105	5

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Initial and Final Setting Time

S. No.	Tests	Result
1.	Initial setting time	35minutes
2.	Final setting time	9 hours 53 min

Plate No. 2 Silt Contain Test of Sand

S.NO.	Description	Sample
1	Vol. of Sample V_1 (ml)	500 ml
2	Vol. of Silt after 3hr V_2(ml)	38 ml
3	% Silt by Vol. (V_2/ V_1)X100	7.2%

V. RESULT

When the Compressive strength, Flexural strength, Split tensile strength, Bond Strength and Stress Strain curve of concrete test are performed on the M30 Grade of concrete with and without Granit Dust and Marble Dust at 28 days of curing period.

The strength was determined of Granit Dust and Marble Dust added concrete with addition of 15%, 25%, 40%, and 50% for M30 grade as a partial replacement of sand in conventional concrete.

From the discussion it is clear that maximum strength is achieved when sand is replaced by 15% Granite dust but in case of Marble dust is comes out maximum at sand is replaced by 25% but sand is replaced by granite dust at 25% the compressive strength is little bit decrease hence maximum compressive strength in both the cases the sand is replaced by Granite dust & Marble dust.

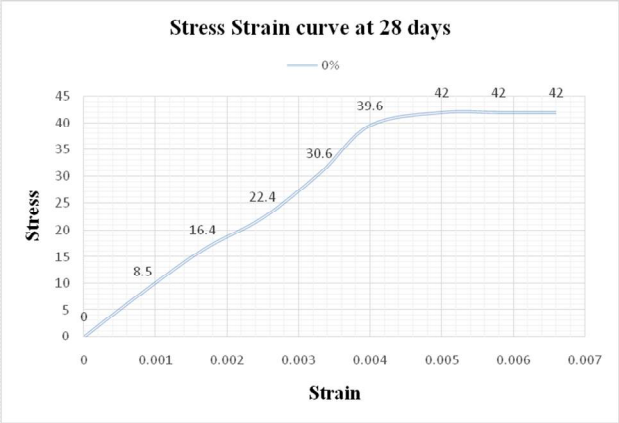

Fig.:1 Stress Strain curve of concrete of Conventional Concrete

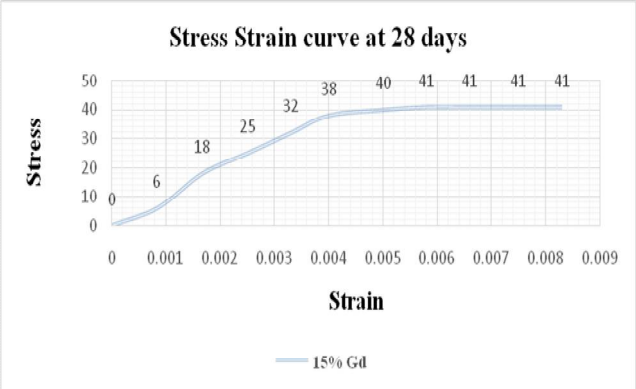

Fig.:2 Stress Strain curve of concrete with 15% Granite dust

VI. CONCLUSION

Maximum Flexural Strength is achieved when the sand is partially replaced with granite Dust at 50% but sand is partially replaced with Marble Dust at 15% maximum Flexural Strength is achieved. But maximum strength is quite good at 25%.

The Bond Strength is get maximum at 25% as sand is partially replaced with Granite dust as well as Marble dust. The Split Tensile Strength is also get maximum at 25% as sand is partially replaced with Granite dust as well as Marble dust.

Stress-strain curve of concrete, when sand is partially replaced with Granite dust as well as Marble dust at different percentage is similar to the Stress-strain curve of conventional concrete.

Hence it is clear that when the sand is replaced by Granite dust and Marble dust at 25% good quality of concrete

is obtained. All the of concrete formed by replacement of natural sand by both granite Dust & Marble Dust when compared to reference mix 0% replacement, reveal higher strength.

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