A Laboratory Investigation of Partial Replacement of Cement in Concrete with Marble Dust

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Abstract— The replacement of cement with Marble Dust Powder (MDP) provides a durable modification in compressive strength, making them compatible for the manufacturing of concrete. The replacement of materials offers cost reduction, energy savings and protection of environment. This would save not only the natural resources and energy but also protect the environment with the reduction of waste material. The strength development of the concrete is increases of marble powder as its age increases. For partial replacement of cement with marble powder (8%) in concrete got maximum compressive strength as compared to conventional concrete, the strength development of the concrete is more increases in lower grade of concrete as compared high strength concrete.

Key words: Cement, Concrete, Marble Powder

I. INTRODUCTION
Concrete is widely used for creating architectural structures, foundations, brick/block walls, pavements, bridges/overpasses, highways, runways, parking structures, dams, pools/reservoirs, pipes, footings for gates, fences and poles and even boats. Concrete is used in large quantities virtually all over the world for infrastructure. The number of concrete used worldwide. The marble cutting plants are emitting the powder in any near pit or vacant areas, close to their unit though notified spaces are marked for disposing resulting in serious environmental and dirt pollution and covering immense area of land, particularly once dehydration of powder, therefore it’s necessary to treat the marble waste quickly and use it within the industry. In INDIA, the marble and granite stone process is one in all the foremost thriving trade the consequences if variable marble mud contents on the physical and mechanical properties of recent and hardened concrete are investigated This project describes the practicability of victimization the marble sludge mud in concrete production as partial replacement of cement The compressive Strength of concrete was measured for seven and 28 days.

II. OBJECTIVES OF THE PROPOSED WORK
The main objective of the proposed work is to study the effect of partial replacement of cement by marble dust apart from this following point are also considered:-
1) To use marble powder dust of different percentage.
2) To conduct following tests :-
   – Slump cone test
   – Compressive strength test
   – To evaluate the coast of material of concrete
3) To compare the properties of concrete conventional concrete and marble powder dust concrete.

III. LITERATURE REVIEW
A. Khodabakhshian et. al. (2018) were over that it absolutely was found that the strength and sturdiness of concrete containing marble waste powder tend to say no for replacement ratios over 100% however satisfactory results were obtained below that level of replacement. Concerning the utilization of silicon oxide fume, it absolutely was discovered that it improves the strength and sturdiness of concrete with marble waste powder by antagonistic the decline of its properties relative to standard concrete. Additionally to getting some constant results because the original concrete combine, mistreatment two hundredth marble waste powder and 100% silicon oxide fume as partial replacement of cement resulted in a very half-hour cement reduction that decreases the harmful effects of cement trade on the surroundings.

Hamza, et. al. (2017) was over that Construction and demolition wastes area unit increasing considerably because of increased boom of recent construction. Though the partial cement replacement materials do promote the thought of property construction, the utilization of construction and demolition waste also can be thought-about to be viable choice to advance the property in trendy construction practices. This paper investigates the utilization of commercial waste materials particularly marble mud and crushed bricks as replacement of natural fine aggregates alongside the utilization of silicon oxide fume as a partial cement replacement on the mechanical properties and sturdiness characteristics of concrete. Authors powerfully counsel that the pozzolanic reaction and therefore the development of the microstructure of the concrete through the utilization of waste materials area unit for the most part accountable from the advances within the sturdiness of concrete.

A.K. Goutam, and M.S. Rawat, (2016) were over that the aim of this investigation is to the study the behavior of self-compacting concrete, having partial replacement of cement with waste marble powder. The perform of self-compacting concrete is to extend the flexibility to unfold and self-consolidate at intervals the formwork. During this study, compressive strength of self-compacting concrete is investigated and compared with self-compacting concrete on partial replacement of cement with waste marble powder. It’s found through this experimental study that concrete solid with waste marble powder is stronger than that obtained by self-compacting concrete.

A.D. Sakalkale et., al. 2014 studied on “Experimental study on use of marble mud in concrete” and over that for M twenty five grade concrete the compressive strength of cubes is multiplied once five hundredth of marble powder is value-added and additional any addition of waste marble powder
the strength step by step decreases. The split strength of cylinders are unit multiplied with addition of waste marble powder up to twenty fifth and reduces on additional addition. The flexural strength is obtained at five hundredth of marble powder combine.

IV. COMPRESSIVE STRENGTH OF MARBLE POWDERS (0-12 %) M-20

V. SLUMP TEST

VI. COST ANALYSIS

From the above table we note that the use of marble dust in concrete save money up to 1.72% over the conventional cement concrete in M-20. This is a significant saving of money. There are good properties of obtaining a good concrete strength and workability relatable cheaper cost even while replacement part of cement.

VII. CONCLUSIONS

- The compressive strength increases with the increase in marble powder compared with normal concrete. The values that are obtained increased at 7 days and 28 days of curing for 8% and then decreased of marble powder replaced by cement.
- When the cement is replaced with 8% marble powder gives the optimum compressive strength.
- At 8% marble powder replacement to cement increases compressive strength than conventional concrete in 28 days about 20.74% in M-20 grade concrete.
REFERENCE


