

## EXPERIMENTAL INVESTIGATION ON COMPRESSION AND TENSILE BEHAVIOUR OF CEMENT CONCRETE REPLACING FINE AGGREGATE BY BRICK AND QUARRY DUST

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### Abstract

Dumping of brick dust and quarry dust not only occupy land, but also create serious environmental problems. The problem could be reduced to a large extent by using these waste materials in cement concrete. This study gives an overview of the behaviour of replacing fine aggregate with both brick dust and quarry dust in cement concrete. Various basic properties of Brick dust and Quarry dust has been study and concrete specimens were made with combination of Brick dust (BD) and Quarry dust (QD) with different ratios. The combination were BD60%+QD40%, BD80%+QD20%, BD50%+QD50%, QD80%+BD20%, QD60%+BD40%. The compressive strength test and splitting tensile strength of concrete specimens were tested and the results were compared with the normal concrete. From the results obtained, it was found that QD80%+BD20% showed higher compressive strength and splitting tensile strength than normal concrete and other percentage of replacements. This replacement leads to control the demand of natural resources and eliminates the environmental pollution and land occupancy.

**Keywords:** Quarry dust; Brick dust;

### INTRODUCTION

Concrete is the dominant material which is used for the development of infrastructure of the country. The main reason for the concrete to be more popular is due to its high durability and strength. In India, most of the structures are made of concrete and concrete uses natural aggregates for the mixture. In recent years, there is a great development in the replacement of natural aggregates used in concrete. There are many material used as a replacement for aggregates such as demolition waste, E-waste, recycled aggregates etc. Since there is a need for reducing the demand of natural aggregates, replacement for aggregates is required. So in this project, 100% replacement was carried out in place of fine aggregate by brick dust and quarry dust. By the replacement of natural aggregates, it reduces the demand in the field of construction.

Selvakoodalingam et al concluded that quarry dust can be utilized as replacement material in place of sand for 50% replacement which gave higher strength at 28 days of curing. Kamal Uddin investigated the use of brick dust as mineral admixture replacing cement. He concluded that, the compressive strength values till 20 to 30% replacement gave slightly higher than control concrete at curing ages of 45 days. Nagabhushana et al concluded that from the test results the compressive, flexural and split tensile strength was increased and maximum at 40% sand replacement by crushed rock powder.

So in this project a combination of brick and quarry dust was used as a 100% replacement of fine aggregate with various percentages. The various combinations of brick and quarry dust used for the replacement of fine aggregate was BD60%+QD40%, BD80%+QD20%, BD50%+QD50%, QD80%+BD20%, QD60%+BD40%. The compressive strength and split tensile strength of replaced concrete was tested at 7, 14 and 28 days of curing the concrete specimens and the results were compared with the normal concrete.

### Materials And Testing

Various basic tests were carried out on the ingredients of concrete and the replacement materials according to Indian standard (IS) codal provision. The materials which are used for testing were cement, fine aggregate, coarse aggregate and replacement material such as BD and QD. The preliminary test was carried out on cement and the following results were obtained. The specific gravity and standard consistency of cement was found to be 3.15 and 31% respectively. The initial setting time and final setting time of cement was found to be 45 mins and 553 mins respectively. The various results obtained from testing of natural fine aggregate, natural coarse aggregate, BD and QD are given in table 1.