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Strength Properties Of Cement Mortar When Cement Anf Fine Aggregates Are Partially Replaced By Waste.

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Abstract*: Cement mortar cubes of selected particular dimensions are prepared without any modification in the first and these cubes are used as reference to find any increase in quality of modified cement mortar cubes. To improve strength a bit more fly ash is added to cement while mixing cement mortar. In the project work the fine aggregates are partially replaced with quarry dust and plastic waste in the proportions of 10%, 20% & 30% and the PW of 2%, 4%, 6%, 8%, and 10%. Cement mortars are casted and tested for 7days and 28 days.*

Key Words: *Plastic waste 1, Qurry dust 2, Compressive Strength*

1.INTRODUCTION 1

For Past many years construction industry has been making some progress in the utilization of waste materials in concrete. Some of waste products are fly ash, rice husk, saw dust, discarded tires, e-waste, glass, bagasse ash, stone dust and ceramic. Proper use of waste products provides viable economy and healthy environment. Each waste product has its specific effect on the properties of fresh and hard concrete. There has been a long-term growing demand for aggregates to produce concrete and this has presented increased problems of supplying of sand and gravel .Previous researches have shown crushed stone dust can be used to replace the natural sand in concrete .Recycle aggregates are also being studied though some loss in workability and mechanical property is reported. Every year millions of tons of plastic waste is being generated from many industries as well as from domestic plants. The problem gets compounded with million tons of waste being generated worldwide inform of demolished waste from natural and technological disasters. There is a growing concern to limit the amount of waste by recycling which will provide opportunities for saving energy, time and resources.

2. MATERIALS USED 2

2.1 Cement 1

In this experiment 43 grade ordinary Portland cement is used. The testing of cement is done as per IS …. Code the specific gravity of cement found is 3.10.

Content, %	Common Name	Oxide
60-67	Lime	CaO
17-25	Silica	SiO2
3-8	Alumina	Al2O3
0.5-6	Iron	Fe2O3
0.1-4	Magnesia	MgO
0.2-1.3	Alkalies	Na2O and K2O
1-3	Sulfuric anhydride	SO3

Chemical Properties of cement

2.2 Fly ash 2

Fly ash is a fine powder which is a byproduct from burning pulverized coal in electric generation power plants. Fly ash is a pozzolan, a substance containing aluminous and siliceous material that forms

Percentage	Chemical
3%	Sulphur AsSO3
35%	SiO2
1.50%	Alkalis As Sodium Oxide
5% 70%	MgO Silicon-Dioxide+Aluminium Oxide+Iron Oxide

2.3 Plastic waste 3

The plastic waste used is in the form of small pieces of size proportional to the fine aggregates that are being used. These pieces are sieved alongside with the sand i.e. from 4.75 mm sieve as they replace fine aggregate in the mix.

2.4 Water

The least expensive but the most important ingredient of concrete is water. The water which is used for mixing concrete should be clean and free from harmful impurities such as oil, alkali, acid etc. portable water was used for mixing and curing work.

2.6 Properties of Fine Aggregates

Those fractions from4.75mm to 150microns are termed as fine aggregate. The river sand is used in combination as fine aggregate conforming to the requirements of IS: 383. The river sand is washed and screens, to eliminate deleterious materials and oversize particles.

2.7 Properties of quarry waste

Quarry dust, a by-product from the crushing process during quarrying activities is one of such materials. Granite fines or rock dust is a by-product obtained during crushing of granite rocks and is also called quarry dust. This present work is an attempt to use Quarry Dust as partial replacement for Sand in concrete.

2.8 Properties Of Quarry Dust

Properties of Quarry dust Silicon dioxide (SiO2) - 62.48 Aluminium oxide (Al2O3) -18.72 Iron oxide (Fe2O3) -6.54 Calcium oxide (CaO) -4.83 Magnesium oxide (MgO)-2.86 Sodium oxide (Na2O)- NILL , Potassium oxide (K2O)-3.18, TiO2 - 1.21, Loss of ignition - 0.48

3. TEST OF MATERIALS

3.1 Compressive strength 1

The test is done for 28days and the size of the cube 70.6mmx70.6mmx70.6mm. The concrete mix design is carried out for (1:3) mix grade. The cubes are tested on 2000KN capacity universal testing machine. Compression test has been conducted confirming to IS 516-1959(5), on the concrete specimens in the universal testing 200MT. in this text cube is placed with the cast faces not in contact with the platens of testing machine. Load has been applied at a constant rate of stress equal to 15mpa/min according to the relevant IS code and the load at which the specimens failed has been recorded. Thus from the results, the compressive strength is obtained.

4. RESULTS 4

4.1 Compression Test 1

In this study the cubes are prepared with plastic waste and fly ash.. Totally 60 cubes are casted and tested for 7days and 28days. Mortars are casted for two different proportions and for 2 different age periods for every age period 3 cubes are casted. The size of cube is 70.6mmX70.6mmX70.6mm. The most and useful parameters is compressive strength because it is a desirable characteristic of cement mortar properties and also quantitatively related to compressive strength.

The replacement of cement with fly ash 10%, and the fine aggregates are replaced plastic waste 2% 4%, 6%, 8%, 10% strength is increased when compared to normal mortar

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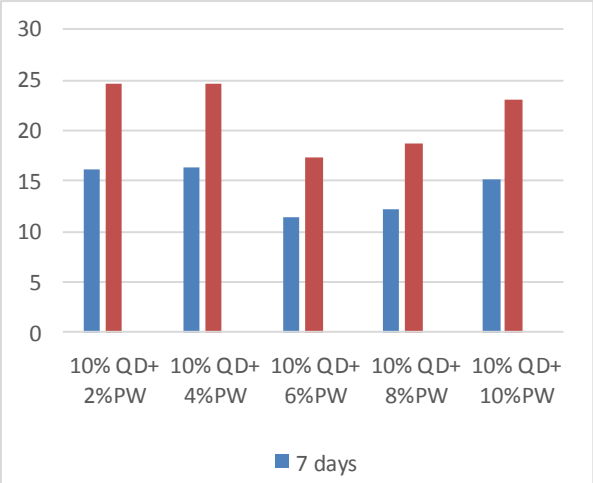
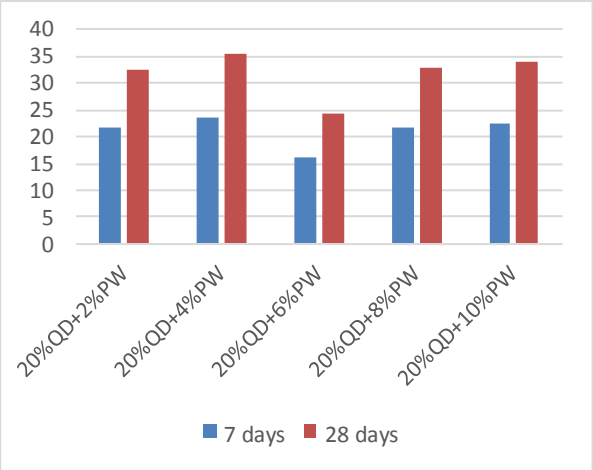
The compressive strengths are shown in bar charts

5. Results

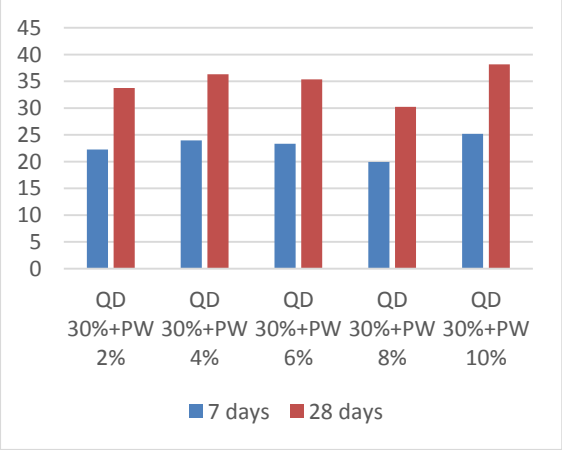
The results are shown in the bar charts below



Bar Chart 1 : Compressive strength of Quarry dust (10%) + PW (2%,4%,6%,8%,10%)



Bar Chart 2 : Compressive strength of Quarry dust (20%) + PW (2%,4%,6%,8%,10%)



Bar Chart 3: Compressive strength of Quarry dust (30%) + PW (2%,4%,6%,8%,10%)

Conclusions

In this project work fine aggregates will replaced by Quarry sand and Plastic waste (PW) which is taken from broken chairs.

1. From the experiments conducted, replacement of fine aggregates by quarry sand and PW in different ratios

2. When fine aggregates is replaced by quarry dust 10% and Plastic waste at 2%,4%,6%,8%,10%.

3. We got a high comprssive strength at ratio of QD 10%+ PW 4% at this replacement of fine aggregates.

4. And when fine aggregates is replaced by quarry dust 20% and PW waste at 2%,4%,6%,8%,10%.

5. We got a high comprssive strength at ratio of QD 20%+ PP 4% at this replacement of fine aggregates.

6. At remaining ratios we didn't get more compressive strengths than this in the above replacement

7. And when fine aggregates is replaced by quarry dust 30% and PW at 2%,4%,6%,8%,10%.

8. We got a high compressive strength at ratio of QD 30%+ PW 10% at this replacement of fine aggregates.

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