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INCREASE IN STRENGTH OF CONCRETE BY USING BAGASSE ASH AS PARTIAL REPLACEMENT OF CEMENT

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Abstract— Bagasse ash, one of the waste, is used in this study. The reason to choose the Bagasse ash to develop a novel method to transfer it to a valuable product and to solve the problem of dumping the tons of bagasse waste. The importance of this alternative stone replacement to reduce bagasse waste that is hard to lapse and in addition to reducing the pollution of nature, it also saves cost and applies the concept of Reduce, Reuse and Recycle. Concrete is most widely used construction material in the world. To solve environmental issues like deposition of waste product, recycling or reuse of waste product, I am using Bagasse ash to make eco-friendly concrete. Due to growing environmental awareness, the world is increasingly turning to researching properties of waste and finding solutions on using its valuable components parts so that those might be used as secondary raw material in other branches. Green building is an increasingly important global concern and a critical way to conserve natural resources and reduce the amount of materials going to our landfills.

Keywords—Bagasse Ash, Flexural Strength, Workability.

I. INTRODUCTION

Bagasse ash is a very versatile material. Due to the industrial revolution, and its large scale production bagasse ash seems to be a cheaper and effective raw material. To solve environmental issues like deposition of waste product, recycling or reuse of waste product, I am using Bagasse ash to make eco-friendly concrete. Due to growing environmental awareness, the world is increasingly turning to researching properties of waste and finding solutions on using its valuable components parts so that those might be used as secondary raw material in other branches. Therefore utilizing bagasse ash in concrete production not only solves the problem of disposing this ultra-light solid waste but also helps preserve natural resources.

A. Objectives of the Project

1. Investigate the strength of concrete by using bagasse ash as partial replacement of cement by using crushed sand.
2. Study the influence of partial replacement to cement with bagasse ash by using crushed sand.
3. Find the alternative of basic materials which are used in construction from past many years.
4. Manage industrial waste.
5. Compare the mechanical properties of bagasse ash in concrete with control concrete.

B. Scope of Investigation

1. The use of bagasse ash in concrete is relatively a new development in the world of concrete technology and a lot of research must go in before this material is actively used in concrete construction.
2. Utilization of bagasse ash in concrete in various proportions as partial replacement for cement to improve the strength to cement with bagasse ash by using crushed sand.
3. The test can be carried out for M-30 grade of concrete.
4. Experimental study has to be conducted for bagasse ash.
5. Compare the mechanical properties of bagasse ash in concrete with control concrete.

C. Need for Study

- Day to day development in construction field raises the demand for alternatives to the concrete materials.
- Need of eco-friendly environment leads to usage of waste in concrete to avoid improper disposal of wastes.
- Strength of concrete incorporating alternative materials should satisfy the overall requirements.
- Use of bagasse ash is an alternative material for the cement in concrete as it fulfills the demands on concrete materials and eco-friendly disposal of waste.

D. Physical Properties of Materials Used

1. Cement

| Sr. No | Property | Test results |
|--------|----------------------|--------------|
| 1 | Standard Consistency | 31.5% |
| 2 | Specific gravity | 3.15 |
| 3 | Initial setting time | 200 minutes |
| 4 | Final setting time | 260 minutes |

2. Coarse Aggregate

| Sr. No | Property | Test results |
|--------|----------------------|--------------|
| 1 | Standard Consistency | 31.5% |
| 2 | Specific gravity | 3.15 |
| 3 | Initial setting time | 200 minutes |
| 4 | Final setting time | 260 minutes |

3. Fine Aggregate

| Sr. No | Property | Test results |
|--------|----------------------|--------------|
| 1 | Standard Consistency | 31.5% |
| 2 | Specific gravity | 3.15 |
| 3 | Initial setting time | 200 minutes |
| 4 | Final setting time | 260 minutes |

4. Bagasse Ash

| Sr. No | Property | Test results |
|--------|-----------------------|--------------------------|
| 1 | Density | 10.20 g/cm ³ |
| 3 | Specific surface area | 4935 cm ³ /gm |

E. Casting of Specimen

Test specimens of beam with 700mm x 150mm x 150mm will prepared using the standard moulds. The samples are cast. The samples are remoulded after 24hrs of casting and kept in a water tank for 7 and 28 days curing. A total of 24 specimens cast for testing the properties such flexural strength.

All specimen beams size 700mm × 150mm × 150mm will casted with optimum compressive strength for the specific mix in single lift and consolidated using tamping rods. After final setting of cubes, the cube moulds will be removed and cubes will kept in water tank for curing up to 7 and 28days.



Fig. 1. Flexural Testing Machine

Table -1: Number of Beams casted for 7 days and 28 days

| % of Bagasse Ash | No. of Beam Cast | |
|------------------|------------------|---------|
| | 7- Days | 28-Days |
| 0 | 3 | 3 |
| 4 | 3 | 3 |
| 8 | 3 | 3 |
| 12 | 3 | 3 |

F. Testing of Specimen

After 24 hrs.,the specimens werw removed from mould and subjected to water curing for 7 days and 28 days.After curing, the specimens were tested for compression test. Strength of specimen were tested at 7 days and 28 days.

G. Workability

The workability of M30 grade of concrete is measured by compaction factor test with w/c ratio 0.40 for addition of different percentage of bagasse ash.



Table -2: Compaction Factor Test Results

| Sr. No. | Description | 0 % | 4 % | 8 % | 12 % |
|---------|---|-------|-------|-------|------|
| 1 | Weight of Empty Cylinder (W1) | 5.95 | 5.95 | 5.95 | 5.95 |
| 2 | Wt. of Empty Cylinder + Free Fall Concrete(W2) | 9.92 | 9.66 | 8.97 | 8.74 |
| 3 | Wt. of Empty Cylinder + Hand Compacted Concrete (W3) | 10.81 | 10.79 | 10.04 | 9.88 |
| 4 | Wt. of partially Compacted Concrete(Wp = W2 – W1) | 3.97 | 3.04 | 3.02 | 2.79 |
| 5 | Weight of Fully or Proper Compacted Concrete (Wf = W3 – W1) | 4.86 | 4.17 | 4.09 | 3.93 |
| 6 | Compaction Factor = Wp/Wf | 0.81 | 0.73 | 0.738 | 0.70 |

H. Experimental Methodology

Flexural Strength Test

The result of compressive strength After 7 days and 28 days are recorded. Result indicate that as we increase percentage of bagasse ash from 0% to 4% it's compressive strength increases after further increment in percentage of bagasse ash there is loss in compressive strength. That means we can replace up to 4% cement by bagasse ash.

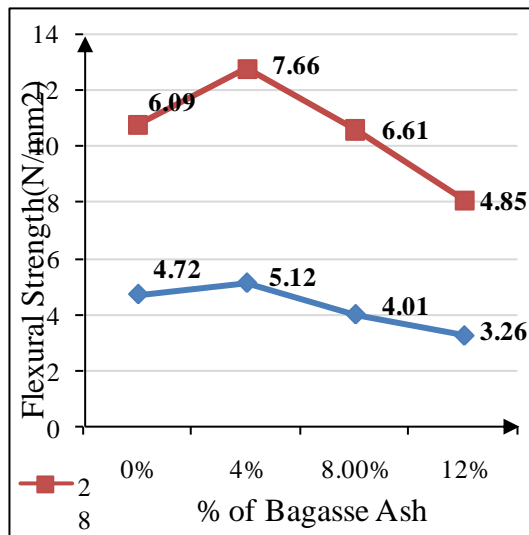
I. Experimental Result

Table -3: Results of Flexural Strength

| % of Bagasse Ash | Flexural Strength | |
|------------------|-------------------|----------|
| | 7- Days | 28- Days |
| 0 | 4.72 | 6.09 |
| 4 | 5.12 | 7.66 |
| 8 | 4.01 | 6.61 |
| 12 | 3.26 | 4.85 |



Graph 1: Flexural Strength at 7 and 28 days



II. CONCLUSION

1. It is observe that with increase in percentage of bagasse ash workability decreases.
2. Bagasse ash concrete is cheaper than conventional concrete.
3. Current study concluded that bagasse ash can replace cement up to 4%
4. The use of bagasse ash in concrete is possible to improve its flexural strength.

III. REFRENCES

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