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PERFORMANCE ON CONCRETE BY USING BAGASSE ASH AS AN ADMIXTURE

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ABSTRACT

In the current study, fine aggregate is partially replaced with sugar cane bagasse ash (SCBA) at different percentages of 0%, 5%, 10%, 15%, and 20%, respectively, while cement is partially replaced with metakaolin at percentages of 0%, 7.5%, 15%, and 20%, respectively. In order to strengthen the strength of the concrete in this project, 0.75 percent hemp fibre is used. Hemp is an environmentally benign and sustainable crop that may supply important raw materials for several industrial uses. At ages 7 and 28, several tests are carried out to ascertain the compressive strength and split tensile strength of concrete. We have seen that the strength grew up to a 15% replacement and reduced up to a 20% addition.

Keywords*: Hemp fiber, Metakaolin, Bagasse ash, compressive strength, split tensile strength*

1. INTRODUCTION

Concrete has been a key building material in the modern age because of its dependability in terms of strength, longevity, and cost. Portland cement and water are combined to create a paste for concrete. This paste is then combined with aggregates like crushed stone or sand and gravel. The cement and water combine to harden and bind the aggregates into a solid mass that resembles rock.The level of concrete's durability is quite high. In all areas of civil engineering, the concrete is crucial. Concrete is strong, simple to make, and can be shaped into a variety of forms and sizes. In addition, it is affordable, affordable, and immediately combined. It is intended to enable dependable, quick construction of the highest calibre. Concrete is used in a variety of tasks, from little DIY projects to large-scale academic buildings and structures. Along with many other purposes, it is utilised for flooring, walls, pillars, basements, and walkways. Concrete of many varieties is used in construction projects.

2. OBJECTIVES

The main objective was to study suitability and effect of Sugar cane bagasse ash and Hemp fibers in new generation concretes.

1. To optimize the usage of Metakaolin
2. To optimize the usage of Baggase ash
3. The strengths are studied at 7 and 28 days of curing.

3. MATERIALS

Raw materials required for the concreting operations of the present work are cement, fine aggregate, coarse aggregate, metakaolin, hemp fiber, bagasse ash and water.

The properties of cement are presented in Table 1.

Table 1: -Physical properties of cement

S.NO	DESCRITION OF ITEM	VALUES
1	Specific gravity	3.146
2	Fineness of cement	9.59%

4. EXPERIMENTAL INVESTIGATIONS

COMPRESSIVE STRENGTH TEST

The cube specimens of 150mm x 150mm x150mmwere cast and tested in compression testing machine for 7 and 28days of curing peri od for different proportions of concrete mix and presented.

Table 3: - Compressive strength of concrete with recycled aggregates and cement with metakaolin.

Sl.no	Metakaolin	7 days (N/mm^2)	28 days (N/mm^2)
1	0%	34.69	49.63
2	7.5%	36.60	54.15
4	15%	40.86	57.74
5	20%	37.57	54.86

Table 4: - Compressive strength of concrete with Partial replacement of fine aggregate with Bagasse ash

Sl.no	Bagasse Ash	7 days (N/mm^2)	28 days (N/mm^2)
1	0%	34.69	49.63
2	5%	35.04	51.16
3	10%	35.61	51.67
4	15%	37.71	53.80
5	20%	36.37	52.19

Table 5: Compressive strength of concrete with Hemp fiber

Sl.no	Hemp fibers	7 days (N/mm^2)	28 days (N/mm^2)
1	0%	34.69	49.63
2	0.75%	47.85	68.99

Table 6: Compressive strength of concrete for Combined replacement of BSH+MK+HF

Sl.no	BSH+MK+HF	7 days (N/mm²)	28 days (N/mm²)
1	0%	34.69	49.63
2	15%BSH+15%MK+0.75%HF	52.55	75.95

SPLIT TENSILE STRENGTH TEST:

At the age of 7 and 28days, the cylindrical specimens (150mm diameter x 300mm height) were tested for evaluating the split tensile strength.

Table 7: - Split tensile strength of concrete with metakaolin as partial replacement of cement in concrete

Sl.no	Metakaolin	7days (N/mm²)	28 days (N/mm²)
1	0%	3.43	4.91
2	7.5%	3.61	5.35
4	15%	4.04	5.78
5	20%	3.74	5.46

Table 8: Split tensile strength of concrete with Partial replacement fine aggregate with Bagasse ash

Sl.no	Bagasse Ash	7 days (N/mm²)	28days (N/mm²)
1	0%	3.43	4.91
2	5%	3.52	5.03
3	10%	3.59	5.14
4	15%	3.85	5.48
5	20%	3.54	5.08

Table 9: split tensile strength of concrete with Hemp fiber

Sl.no	Hemp fibers	7 days (N/mm²)	28days (N/mm²)
1	0%	3.43	4.91
2	0.75%	4.86	6.96

Table 10: split tensile strength of concrete for Combined replacement of BSH+MK+HF

Sl.no	BSH+MK+HF	7days (N/mm²)	28 days (N/mm²)
1	0%	3.43	4.91
2	15%BSH+15%MK+0.75%HF	5.36	7.68

5. CONCLUSION

In this study, the concrete ingredients like cement are partially replaced by metakaolin and fine aggregate by bagasse ash. Hemp fiber is added to the concrete for strength. Metakaolin varied different percentages of 7.5%,15%,20%and bagasse ash is varied with different percentages like 5%,10%,15%,20% and hemp fiber 0.75% respectively.

1. The Compressive strength of normal concrete at the age of 7 days and 28 days are 34.69 &49.63N/mm^2 .
2. The split tensile strength of normal concrete at age of 7 days and 28 days are 2.67 N/mm^2&3.82 N/mm^2.
3. At 15% partial replacement of cement with metakaolin the compressive strength of concrete at 7 and 28 days are 40.86 and 57.74 N/mm^2.
4. At 15% partial replacement of cement with metakaolin the split tensile strength of concrete at 7 and 28 days are 4.04 and 5.78 N/mm^2.
5. At 15% partial replacement of fine aggregate with Bagasse ash the compressive strength of concrete at 7 and 28 days are 37.71 and 53.80 N/mm^2.
6. At 15% partial replacement of fine aggregate with Bagasse ash the split tensile strength of concrete at 7 and 28 days are 3.85 and 5.48 N/mm^2.
7. At 0.75% the compressive strength of concrete with hemp fiber at 7 and 28 days are 52.55 and 75.95 N/mm^2.
8. At 0.75% the split tensile strength of concrete with hemp fiber at 7 and 28 days are 4.86 and 6.96 N/mm^2.
9. The combination of 15%BSH+15%MK+0.75%HF the compressive strength of concrete at 7 and 28 days are 52.55 and 75.95 N/mm^2.
10. The combination of 15%BSH+15%MK+0.75%HF the split tensile strength of concrete at 7 and 28 days are 5.36 and 7.68 N/mm^2.

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