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EXPERIMENTAL STUDY OF RICE HUSK ASH AS CEMENT REPLACEMENT IN CONCRETE

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ABSTRACT

With increment in industrialization the utilization of concrete has expanded the generation of cement which isn't environment well-disposed as it has expanded harms to the nature looking for limestone and energy included in its manufacturing. Rice Husk Ash is a waste product which is rich in silica and improper disposal of rice hush ash (RHA) leads to air pollution and land fill problem. The Rice Husk Ash has amorphous form of silica present in it which act as a binding material in presence of moisture so it can be used effectively in formation of geopolymer mortar and concrete. In this paper research is to be carried out to find suitability of RHA as a replacement of cement in concrete and to find the optimum percentage of cement replacement by RHA in concrete and variation in its compressive strength in various proportion of cement and RHA.

I. INTRODUCTION

Rice husk might be a rustic store that makes to 20% of the 649.7 million a ton of rice made every year round the world. The conveyed to some degree burnt husk from the procedure plants once utilized as a fuel in like manner adds to defilement and tries are being made to crush this regular issue by utilizing this material as a valuable setting up material. The fake course of action of rice husk is found to shift starting with one example then onto progressive inferable from the qualifications inside the sensibly paddy, reap year, climate and geologic conditions. Seething the husk underneath controlled temperature underneath 800 °C will convey red hot stays with silica basically in vague structure. Starting late, Nair et al. reported an examination on the pozzolanic development of RHA by using totally extraordinary frameworks as a region of demand to inspect the effect of burning temperature and seething length. He communicated that the examples burnt at 500 or 700 °C what's more, seethed for more than 12 hours conveyed searing garbage with high reactivity with no imperative proportion of crystalline material. The short bursting ranges (15 - 360 minutes) caused high carbon content for the made RHA even with high consuming temperatures of 500 to 700 °C. A stand out give an account of rice husk red hot flotsam and jetsam (RHA) was circulated by Mehta in 1992, and contains an overview of physical and compound properties of RHA, the effect of ignition conditions on it.

II. WHAT IS RHA?

Rice husk might be seethed into red hot remains that fulfills the physical characteristics and compound bit of mineral admixtures. Pozzolanic activity of rice husk soot (RHA) relies upon (I) silica content, (ii) silica crystallization stage, and (iii) size and surface locale of red hot remains particles. Moreover, ash ought to contain essentially a little proportion of carbon. The redesigned RHA, by controlled blast or potentially beating, has been utilized as a pozzolanic material as a piece of bond and cement. Using it gives various central focuses, for instance, expanded quality and durability properties, and normal benefits known with the exchange of waste materials also, to decreased carbon dioxide transmissions. RHA made inside the wake of seething of Rice husks (RH) has high reactivity and pozzolanic property. Blend structures of RHA are impacted in light of bursting technique and temperature. silica substance inside the powder increases with higher the blasting temperature. The effect of midway overriding of bond with different rates of ground RHA on the compressive quality and toughness of cement is broke down.

III. MATERIALS AND METHODS

Materials:
RHA: Rice Husk Ash was blazed for roughly 72hours in air in an uncontrolled burning method. The temperature was within the scope of 400-600 degree C .The powder collected was sieved through BIS standard sieve size 75µm and its shading was dim.

Compound	Rice Husk Ash	Broiler Bed Ash	RHA (Umamheswaranbatra)
SiO_2	91.80	37.70	93.52
Al_2O_3	0.06	1.30	0.01
Fe_2O_3	0.09	0.67	0.51
CaO	1.02	15.40	0.68
Na_2O	0.06	2.79	0.40
K_2O	1.73	6.64	2.40
MnO	0.31	0.16	0.47
TiO_2	-	0.06	0.04
MgO	0.42	4.23	-
P_2O_5	0.94	13.90	1.06
SrO	0.01	0.11	-

Cement: Ordinary Portland concrete (OPC) of 43 evaluation was utilized as a section of that the structure and properties is in consistence with the Indian standards

Aggregate: Total is a granular material, as an example, sand, rock, squashed stone, smashed hydraulic-bond cement, or iron impact heater slag, utilized with water powered establishing medium to make either concrete or mortar. Those particles that are dominatingly which held on the 4.75 mm (No. 4) strainer are known as coarse total. Those particles passing the 9.5 mm (3/8 in.) strainer, all passing the 4.75 mm (No. 4) strainer, and transcendently held on the 75 µm (No. 200) sieve are known as fine total.

IV. RESULT AND ANALYSIS OF RESULT

The test was being carried out of different mix i.e. M1, M2, M3, M4, M5 and M6 for 0%, 5%, ,10%, 15%, 20% and 25% replacement of cement by Rice Husk Ash

Table: Compressive strength of concrete

	Mix 1	Mix 2	Mix 3	Mix 4	Mix 5	Mix 6
7 days	19.78	21.97	24.89	17.82	15.80	12.26
28 days	31.75	35.67	38.76	25.86	23.21	16.48

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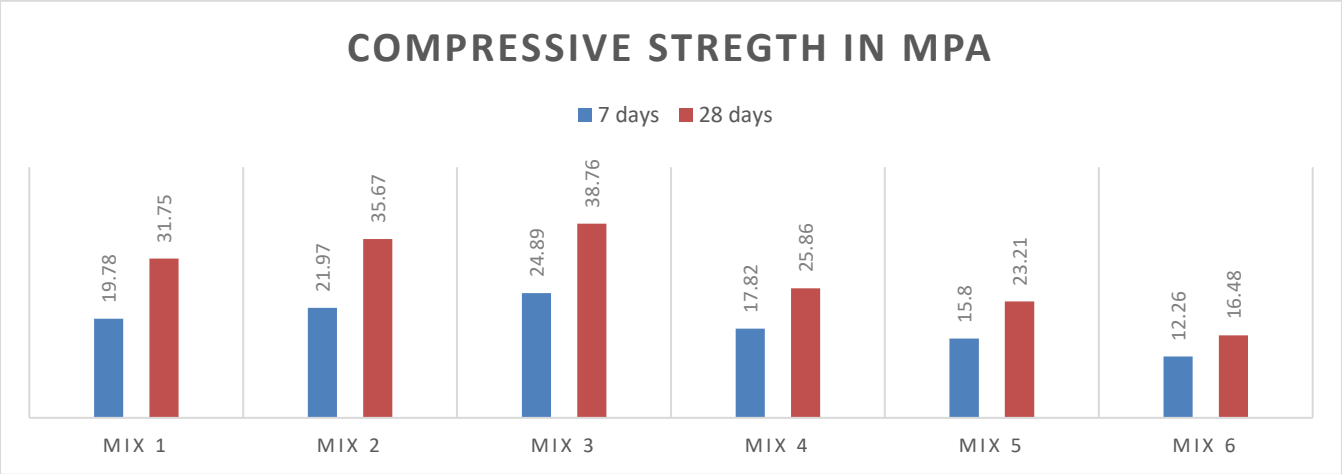

Fig: Compressive strength of concrete

The testing was also being carried out for split tensile strength for which the samples were casted as cylinder and tested for their tensile strength in which samples were being loaded with compressive force but it fails in tension

Table: split tensile strength of concrete

	Mix 1	Mix 2	Mix 3	Mix 4	Mix	Mix 6
7 days	1.35	1.89	2.36	1.83	1.15	0.76
28 days	2.29	2.84	3.35	2.65	1.67	1.23

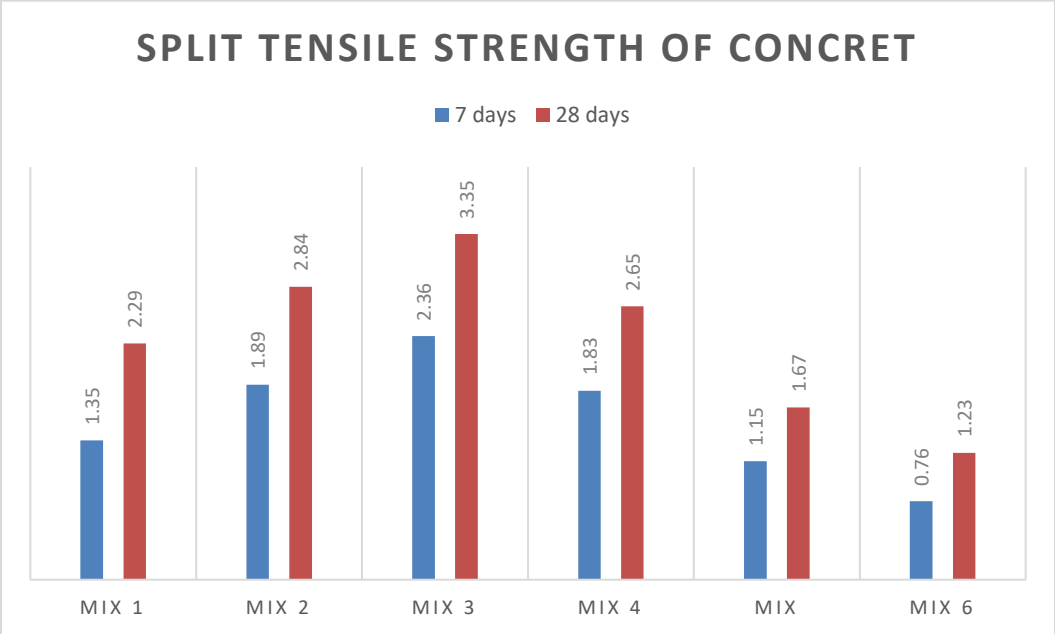

Fig: split tensile strength of concrete

V. CONCLUSION

For the above research the following conclusion can be drawn

- The physical properties of concrete is improved with replacement of ordinary portlant cement with rice husk ash.
- The increment in strength of concrete was being observed upto 15% replacement of Rice Husk Ash with cement.
- The optimum amount of cement to be replaced was found to be 15% which had maximum strength of 38.76 MPa in compression and 3.35 MPa for split tensile strength after a period of 28 days.
- RHA based sand concrete piece can essentially decrease room temperature. Henceforth ventilation system operation is diminishing bringing about electric vitality sparing.
- Also with the utilization of rice husk powder, the heaviness of cement lessens, along these lines making the solid lighter which can be utilized as light weight development material.
- To The pozzolonic action of rice husk fiery remains is viable in upgrade the solid quality, as well as in enhancing the impermeability attributes of cement
- As the Rice Husk Ash is waste material, it lessens the expense of development.

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