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EFFECT OF PARTIAL SUBSTITUTE OF CEMENT FLY ASH, RICE HUSK AND WITH THE USE OF STEEL FIBRE IN CONCRET

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Abstract: In the ancient period, production work became on the whole accomplished with help of mudstone from industry. Fly ash is a by-product of burned coal from energy station and rice husk ash is the by way of – fabricated from burned rice husk at better temperature from paper plant artificial fibers are generally used these days in order to enhance the mechanical houses of concrete. Especially Synthetic (Polypropylene, polyester and many others.,) glass, nylon, asbestos, carbon and steel fibers used in concrete brought on precise effects to improve severa concrete houses. Considerable efforts are being taken global to utilise herbal waste and bye – product as supplementary cementing materials to improve the properties of cement concrete. Rice husk ash (RHA) and Fly ash (FA) with using Steel fiber is such materials. RHA is bye- made from paddy enterprise. Rice husk ash is a pretty reactive pozzolonic material produced through managed burning of rice husk. FA is finely divided produced through coal-fired energy station. Fly ash possesses pozzolonic residences much like evidently occurring pozzolonic material. The designated experimental investigation is doing to observe the impact of partial substitute of cement by using FA, RHA with the use of Steel fiber in concrete. In this paper started percentage form 30% FA and 0% RHA mix together in concrete with the aid of replacement of cement ,remaining percentage taken 15% FA and 15% RHA, with sluggish increase of RHA through 2.5% and concurrently slow lower of FA by means of 2.5% and to improve the strength of concrete metallic fibers had been delivered and fiber quantity fraction became 0%, 0.25%, 0.5%, 0.75% and 1.0% in extent basis in the share of 10% RHA and 20% FA..

I. INTRODUCTION

Concrete is nicely known is a heterogeneous blend of cement, water and aggregates. The admixturesmay be brought in concrete a good way to decorate some of the residences desired especially. In its handiest shape, concrete is a combination of paste and aggregates. Various materials are delivered including fly ash, rice husk, admixture and with the use of steel fiber to obtain concrete of favored belongings. The man or woman of the concrete is decided by using satisfactory of the paste. The key to attaining a sturdy, long lasting concrete rests in the cautious proportioning, mixing and compacting of the elements. The detailed experimental investigation is doing to observe the impact of partial replacement of cement with the aid of FA and RHA with using Steel fiber in concrete. In this venture I commenced percentage form 30% FA and 0% RHA blend collectively in concrete by way of substitute of cement with the sluggish increase of RHA through 2.5% and concurrently slow decrease of FA BY 2.5% ,ultimate proportion taken 15%FA and 15% RHA. Numerous checks are accomplished on moist concrete including workability tests consisting of compaction thing take a look at and stoop check.

II. MATERIALS AND METHODS

The work offered in this paper reviews an investigation on the behaviour of concrete produced from mixing cement with RHA and FA. The physical and chemical residences of RHA, FA and OPC had been first investigated. Mixture proportioning become executed to produce high workability concrete (200-240 mm slump) with goal power of 32.1 Mpa (M25) for the control combination. The effect of RHA on concrete residences became studied by means of the fresh houses of concrete and the mechanical residences. I.E. Compressive strength, tensile splitting power, flexural check turned into studied as the time dependent assets.

2.1Cement

The cement used turned into Ordinary Portland cement (43 Grade) with a selected gravity of 3.15. Initial and final placing time of the cement became 50 min and 365 min, respectively

2.2 Rice Husk Ash

Rice husk ash used changed into received from Ellora Paper Plant placed in TumsarBhandara .The Specific gravity of rice husk ash is 2.10 and bulk density is 0.781 g/cc RHA, produced after burning of Rice husk (RH) has high reactivity and pozzolanic belongings. Indian Standard code of exercise for plain and bolstered concrete, IS 456- 2000, recommends use of RHA in concrete however does now not specify portions. Chemical compositions of RHA are affected due to burning procedure and temperature. Silica content material in the ash will increase with better the burning temperature. As in line with study by using Houston, D. F. (1972) RHA produced by using burning rice husk between 600 and 700°C temperatures for 2 hours, carries 90-95% SiO_2, 1-3% K_2O and < 5% unburnt carbon. Under controlled burning condition in commercial furnace, Studies have shown that RHA as a consequence of the burning of rice husks at manage temperatures have bodily andchemical properties that meet ASTM (American Society for Testing and Materials).Standard C 618-94a. Studies have proven that to obtain the required particle length, the RHA wishes to be grown to size forty 5 μm – 10 μm.

2.3 Fly Ash

Fly ash used was obtained Koradi Power Plant Nagpur. Fly

ash is one of the residues generated in the combustion of coal. Fly ash is generally captured from the chimneys of power generation facilities, whereas bottom ash is, as the name suggests, removed from the bottom of the furnace. In the past, fly ash was generally released into the atmosphere via the smoke stack, but pollution control equipment mandated in recent decades now require that it be captured prior to release. It is generally stored on site at most US electric power generation facilities. Depending upon the source and makeup of the coal being burned, the components of the fly ash produced vary considerably, but all fly ash includes substantial amounts of silica (silicon dioxide, SiO2) (both amorphous and crystalline) and lime (calcium oxide, (CaO). Fly ash is commonly used to supplement Portland cement in concrete production, where it can bring both technological and economic benefits, and is increasingly finding use in synthesis of geopolymers and zeolites.

2.4 Fibers

Steel fiber having low carbon and its both cease were hooked were used. The metal fibers have a period of 30 mm, diameter of 0.60 mm, issue ratio of fifty, and density of 7.85 g/cm3. Collect from Stewols Pvt. Ltd. Nagpur.

2.5Aggregate

Good excellent river sand was used as a first-rate aggregate. The fineness modulus, specific gravity and dry density are 2.32,2.68 and 1690 kg/m3. Coarse aggregate passing through 20mm and retained 10mm sieve was used.Its particular gravity and dry density become 2.7 and 1550 kg/m3.

2.6 Chemical Admixture

A business AC- Green Slump-GS-02B black cat Chemical Limited plasticizer From Nagpur was used to maintain the workability of clean concrete. The dosage of hyper plasticizer was 1% to 1.5 % via weight of cement of the binder content material of concrete. The purpose of maintaining the amount of plasticizer constant is to neglect, if any, the impact of plasticizer at the houses of hardened concrete.

Table 1 : Following are the chemical properties of cement (OPC), fly ash , and rice husk ash

Material	Sio2	Al2O3	Fe2O3	CaO	MgO	LOI	SO3	K2O	Na2O3
Cement	19.71	5.20	3.73	62.91	2.54	0.96	2.72	0.90	0.25
Fly ash	40	25	6	20	3.71	3.0	1.74	0.80	0.96
Rice husk	78.21	41.32		0.96	4.86	.....	....	.....	.....

III. EXPERIMENTAL PROGRAMME

Experimental programme comprises of test on cement, RHA, FA, cement concrete with partial replacement of cement with RHA and FA.

3.1 Rice Husk Ash

- Normal Consistency=17%
- Initial and Final Setting time=195min. and265min.
- Compressive Strength=11N/mm2
- Specific Gravity=2.09

3.2 Ordinary Portland Cement

OPC43 grade cement is used for this whole experimental study. The physical test results on OPC are as follows.

1) Normal consistency=22%
2) Initial Setting time=30min.
3) Final Setting Time=10hrs.
4) Specific Gravity=3.15

3.3Test on Concrete

An M25 mix is designed as per guidelines in IS10262, 1982 based on the preliminary studies conducted in the constituent materials. Tests on fresh concreteare obtained as follows.

1) Slump Test=65mm
2) Vee-Bee=15sec.
3) Compaction factor=0.95
4) Flow Test=79%.

Testing is completed as per following IS code. The checking out performed for compressive electricity of cubes were measured 7,14,28,56 and 90 days as per IS : 516 – 1959 ,the trying out accomplished for flexural electricity of beam have been measured 28 days as according to IS :5816 - 1999 and the checking out performed for break up tensile energy of cylinder had been measured 28 days as consistent with IS : 516 – 1959

3.6 Durability study

The durability of concrete with the most excellent percentage replacement of cement with the aid of Fly ash and RHA90µ is observe by using the subsequent test.

3.7 Acid Resistant Test

In this study concrete cubes of manage mix and most compressive power with alternative of cement by means of FA and RHA and maximum compressive strength with using0.75% of steel fiber are weighted after 28 days of curing and immersed in diluted 1% of sulphuric acid solution for 30 days. Then the cubes are taken out and before checking out each specimen is removed from the tub& brushed with the tender Nylon brush and rinsed in a faucet water and weighed. The percentage loss in weight and percent discount in compressive energy are calculated and compared with that of blend.

3.8 Chloride Attack Test

Chloride attack is one of the most important aspect to be considered while dealing with the durability of concrete because it primarily causes corrosion of reinforcement. Concrete cubes of control mix and maximum compressive strength with replacement of cement by FA and RHA and maximum compressive strength with using 0.75% of steel fiber are weighted after 28 days of curing and immersed in a solution of 3% sodium chloride by weight of water for 30 days. Then the cubes are taken out and weighed and the percentage loss in weight and percentage reduction in compressive strength are calculate.

Table 2 Compressive strength, Flexural strength, Split tensile strength

MIX			Strength after curing in days in N/mm2				
S.NO	MIX PROPORTION						
	FAby%of cement	RHAby%ofcement	7 Days	14Days	28Days	Flexural Strength	Spilt Tensile Strength
1	Control Mix		35.56	39.11	45.78	7.22	4.38
2	30	0	32.89	33.33	39.11	6.89	4.10
3	27.5	2.5	31.11	31.33	35.11	6.11	3.82
4	25	5	31.56	32.44	40.44	6.44	3.67
5	22.5	7.5	22.67	34.67	41.78	7.55	3.96
6	20	10	22.22	26.22	33.78	6.22	2.97
7	17.5	12.5	18.22	24.89	30.22	5.55	2.26
8	15	15	17.78	24	28.89	5.55	1.98

Table 3 Compressive strength, Flexural strength, Split tensile strength with using steel fiber by replacement of cement of 20%fly ash and 10% rice husk ash

S.no	Aspect fibres	% of steel	Strength after curing in N/mm2				
			7DAYS	14DAYS	28DAYS	FLEXURAL STRENGTH	TENSILE STRENGTH
1.	50	0%	22.26	26.22	33.78	6.22	2.97
2.	50	0.25%	23.56	28	34.22	3.33	3.53
3.	50	0.50%	24	29.89	37.33	6.67	3.68
4.	50	0.75%	25.33	30.22	38.22	7.78	3.96
5.	50	1.00%	24.44	28.44	36.89	8.33	4.38

IV. CONCLUSIONS

Based on the results presented above, the following conclusions can be drawn:

1.Compressive energy will increase with the boom in the proportion of Fly ash and Rice Husk Ash as much as substitute (22.5p.CFA and 7.5 % RHA) of Cement in Concrete for distinct blend proportions.

2.The maximum 28 days cut up tensile strength became received with 22.5 % fly ash 7.5% rice husk ash blend.

3.The maximum 28 days flexural energy turned into received again with 22.5 % fly ash and 7.5% rice husk ash blend.

4.The percentage of water cement ratio is reliant on quantity of RHA used in concrete. Because RHA is a notably porous fabric

5.The workability of concrete have been found to be decrease with growth RHA in concrete .

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