ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com

International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 5, Special Issue 5, March 2018

Behaviour of Light Weight Foam Concrete Block By Using Ggbs and Foaming Agent

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Abstract: Behaviour of light weight foam concrete in which cement is replaced by GGBS has been determined in this paper. Cement has been replaced by GGBS in three different proportions such as 10%, 20%, 30%. Foaming agent is used in concrete mixture to produce light weight concrete. The tests such as compressive strength, Split tensile test has been determined at the curing age of 7th day, 14th day, 28th day. From the result, the highest compressive strength is 16Mpa with the density of 2000Kg/m³.

Keywords— Foam Concrete, GGBS, Foaming Agent, Compressive Strength.

I. INTRODUCTION

Light weight foam concrete is a concrete which is aerated using foaming agent. Light weight foam concrete has an expanding agent that increases the volume of mixture and reduces the dead weight of structure. It differs from conventional concrete such that the use of coarse aggregate is neglected. There are two types of foaming agent such as protein based and synthetic based .In this project we used synthetic based foaming agent because use of protein based foaming agent leads to decomposition.

Foam concrete is the mixture of cement, GGBS, sand, foaming agent and water. Here, the GGBS is used as the replacement for cement. Because it consists of cementitious property. Initially a slurry of cement, GGBS, sand and water is produced which is then added to pre-formed stable foam. Foam concrete poses fire resistant, high sound and thermal insulation properties.

II. METHODOLOGY

The methodology carried out for this project is shown below.After collecting the materials preliniminary tests were done.The mix design was formulated.According to mix design experimental work was carried out.Then it is casted and allowed for curing.After testing, results were taken for curing age of 7,14 and 28th day.

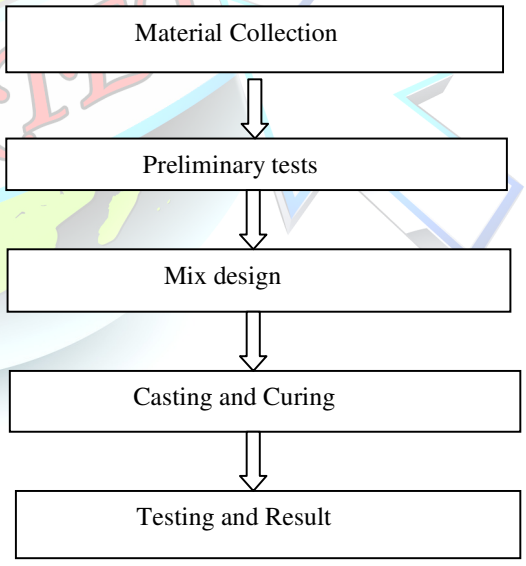

Fig. 1. Methodology

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III. MATERIALS USED

1. CEMENT

In OPC, 53 grade has better strength than 43 grade. Early strength can be achieved through it. Specific gravity of cement is 3.15.

2.WATER

Potable water is used as per IS 456:2000.

3.SAND

Sand passing through 2.36 mm IS sieve.

4.GGBS

It is obtained from iron slag which is quenched to get granular glassy fine powder.

5.FOAMING AGENT

Synthetic based foaming agent was used. It is diluted in 20 parts of potable water.

IV.MIX PROPORTION

DENSITY/ MATERIAL	CEMENT (Kg)	FINE AGGREGATE (Kg)	WATER (L)
1000Kg/m³	320	480	192
1200Kg/m³	380	570	228
2000Kg/m³	585	877	351

Mix design to produce 0.003375m³ of CLC

Volume =0.003375m³

Foam dilute =1:20

Mortar ratio =1:1.5

DENSITY=2000Kg/m³

CEMENT	2.014 kg		
FINE AGGREGATE	3.021 kg		
GGBS REPLACEMENT	10%	20%	30%
	0.198kg	0.397kg	0.596kg

V.MIX PROCEDURE

Manufacturing procedure is different from conventional concrete.There is no standard mix design for light weight cellular concrete.Hence, trial and error method was followed.

Foam concrete as prepared in two stages.Cement slurry was prepared by adding GGBS.Pre-foam was prepared using foam generator.Initially, materials such as cement, sand, GGBS mixed properly. Then water is added to the mixture and mixed thoroughly till it attains good consistency. Separately, pre-foam was prepared by adding foaming agent with water which is stirred well by using foam generator. Then cement slurry is mixed with pre-foam. It has to be stirred about 15-20mins to attain homogenous consistency. Finally, cellular light weight concrete is prepared.

VI.CASTING

After mixing slurry and pre-foam,it is placed in moulds as soon as possible.Before casting, the moulds should be cleaned properly.Then oil has to be applied to the moulds to prevent the sticking of concrete with the mould.As foam concrete has self-compacting property,vibration is not necessary.

VII.CURING

Usually curing is done by two methods,one is moist curing method another is steam curing.In this project we did moist curing method in which specimens are cured in water for 28 days.

VII. RESULTS AND DICUSSIONS

FOAM BLOCK(G0%)		7th DAY	14th DAY	28th DAY
TRIAL 1	Wt(kg)	6.636	6.838	6.801
	Load(KN)	75	308	392
	Stress(N/mm^2)	3.33	13.68	17.422
TRIAL 2	Wt(kg)	6.714	6.724	6.754
	Load(KN)	136	275	370
	Stress(N/mm^2)	6.04	12.22	16.44
TRIAL 3	Wt(kg)	6.680	6.925	6.792
	Load(KN)	106	50	380
	Stress(N/mm^2)	4.71	15.56	16.889

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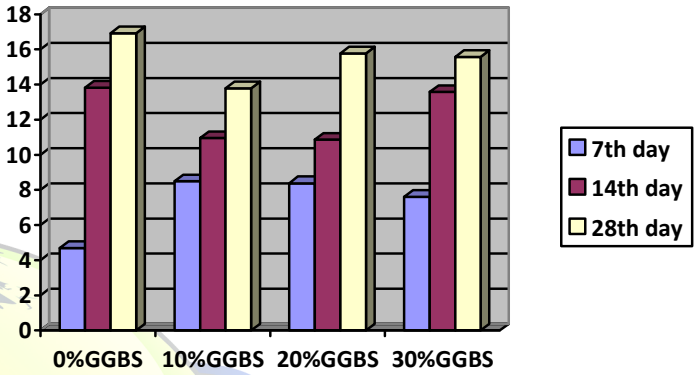
FOAM BLOCK(G10%)		7th DAY	14th DAY	28th DAY
TRIAL 1	Wt(kg)	6.754	6.260	6.154
	Load(KN)	192	242	319
	Stress(N/mm^2)	8.53	10.76	14.18
TRIAL 2	Wt(kg)	6.483	6.429	6.069
	Load(KN)	182	250	262
	Stress(N/mm^2)	8.09	11.11	11.64
TRIAL 3	Wt(kg)	6.832	6.401	6.310
	Load(KN)	200	248	350
	Stress(N/mm^2)	8.89	11.02	15.56

FOAM BLOCK(G20%)		7th DAY	14th DAY	28th DAY
TRIAL 1	Wt(kg)	6.612	6.815	7.125
	Load(KN)	182	250	425
	Stress(N/mm^2)	8.09	11.11	18.89
TRIAL 2	Wt(kg)	6.830	6.625	6.713
	Load(KN)	184	187	290
	Stress(N/mm^2)	8.18	8.31	12.88
TRIAL 3	Wt(kg)	6.900	6.910	6.912
	Load(KN)	200	297	350
	Stress(N/mm^2)	8.89	13.20	15.55

FOAM BLOCK(G30%)		7th DAY	14th DAY	28th DAY
TRIAL 1	Wt(kg)	6.915	6.487	6.675
	Load(KN)	160	210	315
	Stress(N/mm^2)	7.11	9.33	14
TRIAL 2	Wt(kg)	6.643	6.597	6.624
	Load(KN)	174	285	302
	Stress(N/mm^2)	7.73	12.67	13.422
TRIAL 3	Wt(kg)	6.945	7.004	7.02
	Load(KN)	180	300	434
	Stress(N/mm^2)	8.00	13.33	19.29



VIII. CONCLUSION

From the result obtained, light weight concrete that were produced with 20% replacement of GGBS for cement which showed the compressive strength 16MPa with density 2000Kg/m³. As there is increase in material cost, there is need to find cost saving alternatives. By using GGBS, we can construct economically it will be environment friendly and sustainable material.

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