Light Weight concrete By using EPS And GGBS

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Abstract **- EPS or expanded polystyrene is a low density, inert, hydrocarbon thermoplastic that is extensively used in packaging and thermal insulation. EPS is stable in the presence of more other chemical with the organic solutes and saturated aliphatic compounds which dissolve EPS. Complete combustion of EPS in an atmosphere with sufficient oxygen produce carbon dioxide (Co2) and the increasing amounts of municipal solid waste and industrial wastes. Due to use of EPS the concrete becomes lightweight.**

keywords **- EPS, GGBS, Compressive Strength**

I.INTRODUCTION

Lightweight concrete can be defined as type of concrete which includes an expanding agents in that it increase the volume of the mixture while giving additional qualities such as nailbility and lessened the dead load. Lightweight concrete is lighter than conventional concrete. EPS or expanded polystyrene is a low density, inert, hydrocarbon thermoplastic that is extensively used in packaging and thermal insulation. EPS is stable in the presence of more other chemical with the organic solutes and saturated aliphatic compounds which dissolve EPS. Complete combustion of EPS in an atmosphere with sufficient oxygen produce carbon dioxide (Co2) and the increasing amounts of municipal solid waste and industrial wastes. In addition Portland cement manufacture process, much more reason in the field of construction material in focused on using environmentally sustainable raw material. In which traditional components have been replaced by waste material. This material include by fly ash, paper sludge and GGBS. Waste material alters the municipal and physical properties and durability of cementations material.

II. OBJECTIVE

- To evaluate a lightweight concrete which can be used at various sections of a building.
- To know the essential properties of material used as a part of the concrete.
- To make the concrete lightweight
- To make a concrete eco-friendly and less costly
- To compare light weight concrete with conventional concrete.
- To decrease water absorption properties of concrete

III. LITERATURE REVIEW

1) Experimental study on replacement of coarse aggregate by EPS beads in concrete to achieve lightweight concrete by "Jayant M P"

In this paper therefore by important factor of this study the strength features of concrete containing different properties of EPS beads and replacement to natural coarse aggregate like compressive strength, tensile strength and flexure test of light weight concrete comprising expanded polystyrene beads and to study the durability properties of EPS concrete will reduce with compressive strength factor.

2) Light weight concrete by using EPS beads by "Roshan Gawale"

This study works on the qualities of lightweight concrete comprising of expanded polystyrene, coarse aggregate. This paper report the result such as compressive strength, modulus of elasticity, drying shrinkage and creep, of polystyrene aggregate concrete increase by increasing EPS concrete. Lightweight concrete using EPS beads a desirable strength to be an alternative construction material for the construction of partition wall, foot path, parapet wall, bed concrete

3) Experimental Study of Lightweight Expanded Polystyrene Aggregate Concrete Containing Silica Fume and Polypropylene Fibers by "CHEN Bing"

They examined the building properties of expanded polystyrene aggregate (EPS) concrete. With fine silica fume and polypropylene (PP) fibers were added to improve mechanical and shrinkage properties of EPS concrete finally observe that increase the compressive strength of EPS concrete and drying shrinkage properties are significantly improved.

4) Lightweight Concrete Using EPS Beads and Aluminum Powder by "Abhijitsinh Parmar"

Aluminum is a forming agent the reaction with water produce hydrogen gas which make air pocket in concrete which respect in to lowering of density and make it porous. The material used in the present investigation are according Portland cement of 53 grade having a specific gravity of 3.07 with initial and final setting time of 33minutes and 489 minutes respectively.

5) Lightweight mortars containing expanded polystyrene and paper sludge ash by "V. Ferrandiz Mas"

Lightweight cement mortar with good thermal-insulation properties by incorporating expanded polystyrene (EPS) and paper sludge ash (PSA), bath of which are problematic waste up to 20% PSA, and 60%of EPS workability, bulk density and thermal conductivity testing are used. The bulk density of mortar were also reduce by PSA and EPS.

6) Effect of matrix particle size on EPS light weight concrete properties by "Duc Hoang Minh and Ly Le phuong"
It is shows that decreasing aggregate size of the matrix is the effective waste to increase workability and compressive strength of lightweight concrete. When the density of concrete decrease by 200 kg/m 3 slump Value decrease by about 20 to 30 mm with lightweight concrete mixture using maximum particle size of 0.63 mm. the coarse aggregates with diameter size are smaller than 10 mm was recommended to use for matrix.

7) Light weight concrete made from waste polystyrene and fly ash by "B.A. Herki, J. M. Khatib and E.M. Negim"
Concrete containing Portland cement, fly ash as the supplementary cementations' materials, natural fine aggregates and noval lightweight material called stabilized polystyrene (SPS) aggregate were investigated. The properties of concrete investigated in this paper were compressive strength and ultrasonic pulse velocity (ups) at the age of 28-days.there is tendency for the compressive strength and UPV to decrease when natural sand and Portland cement are replaced with the increasing amounts of stabilized polystyrene (SPS) aggregate and fly ash. This was high carbon content in the fly ash which would have demanded more mixing water. Cementations material.

IV. MATERIAL AND METHODOLOGY

1) Cement

Cement is the binder material which sets and solidifies when it dries furthermore effortlessly ties with alternate materials. In the modern history concrete was made from the crushed rock with burnt lime as the binder the materials required for the cement production are silica, lime, iron oxide and alumina various properties of cement RAMCO Portland pozzolana fly ash based cement (PPC) has been used.

2) Aggregate

Aggregate are generally classified into two group sizes, coarse and fine. In so many cases two or more actual sizes of material has been used, because of la further subdivision by size of material either present in one or both of the groups.

3) Expended polystyrene (EPS) Beads

Expended polystyrene (EPS) is a plastic substantial which is contain around 98%air and 2% polystyrene. These are light in weight comprising of fine circular shaped particles. Its like closed cell arrangement cannot absorb water.
It as decent thermal and sound resistance qualities and additionally impact resistance. EPS material is non-biodegradable .The waste material which is coming after packing industry.

4) Fly Ash

Fly ash is a fine powder that is a by product of burning pulverized coal in electric generation power plants. Fly ash is a pozzolana, a substance containing aluminous and siliceous material that forms cement in the presence of water. When mixed with lime and water, fly ash forms a compound similar to Portland cement. This makes fly ash suitable as a prime material

6) GGBS

GGBS is used to increase the life of the structure in combination with ordinary Portland cement and other pozzolanic materials. Concrete made with GGBS is sets slowly as compare to concrete made with ordinary Portland cement depending on the but it also helps to gain the strength over a long period of tim**e.**

Table -1 proportion of material

SR NO	DESCRIPTION	DETAIL
1.	Type of cement	OPC
2.	Maximum nominal size of aggregate	20 mm
3.	Maximum nominal size of EPS beads	1.34
4.	Maximum water cement ratio	0.40

5.	Workability	
6.	Maximum cement content	400kg/ m

Table-2 TEST OF MATERIAL

SR. NO	MATERIAL	RESULT
1	Cement	
	Specific gravity	3.15
2	Coarse aggregate	2.11
3	Fine aggregate	2.6
	Silt contain	0.15
4	EPS beads	
	Flexural strength	0.219MPA
5	GGBS	10% by vol

TABLE-3 MIX DESIGN

Material (kg/m3)	Trial 1	Trial 2	Trial 3
Cement	250	250	250
Sand	375	450	600
Aggregate	750	825	975
Fly ash	250	250	250
EPS Beads	7.5	6	6
GGBS	7.5	6	6
Water	178	185	200

Compressive Strength Study

Light weight concrete cubes were made by using ordinary Portland cement. Cement EPS beads 1:3. Mould with dimension of 150mm× 150mm. After the casting, all mould were placed in normal temperature of room with a relative humidity of more than the 24 h period. After the de-moulding the specimens kept in water tank for curing up the date of compressive strength test carried out at 7th, 14th, 28th day.

Table-4 density of concrete 28th day.

Sr. No	28th day (kg/m3)
1	785.62
2	857.73
3	870.56
4	910.12
5	950

Table-5 compressive strength result

Sr. No	7th day	14th day	28th day
1	2.81	3.85	4.25
2	3.50	3.96	4.86
3	3.67	4.12	5.21
4	3.82	4.21	5.56
5	3.83	4.23	5.60s

V.CONCLUSION

It conclude from the result that decrease in density and decrease in compressive strength of concrete.
As the density of concrete decreasing, the dead weight of structure also decreasing by replacing the polystyrene we can achieve light weight concrete.

FUTURE SCOPE

Since this concrete have not been used on large scale for the large scale construction work. But it has good scope in future, because this concrete in manufacture from the waste material known as fly ash, paper sludge and GGBS. Since the natural resource are limiting so this is easy way to manufacture and increase its scope of construction work. This concrete also reduce the chances of pollution during its construction work which is not same in all the concrete manufacturing process.

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