Light Weight Concrete

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Abstract- *Lightweight concrete, often referred to as foam concrete or aerated concrete, is a versatile construction material with a wide range of applications. It is formulated by incorporating a foaming agent into the concrete mixture, resulting in the formation of numerous air bubbles that reduce its density while maintaining structural integrity. The production of foam concrete involves the generation of as table foam using a foaming agent, which is then mixed with cement, sand, and other additives. The resulting mixture is a light weight, porous material with enhanced insulation properties, reduced weight, and improved workability.*

Keywords- Water absorption test, Compressive strength test,Compare with Light Weight Concrete and Normal Concrete unit weight.

I. INTRODUCTION

Lightweight concrete with foam, often referred to as foam concrete or aerated concrete, is a type of concrete that incorporates air bubbles or foam into its composition, resulting in a lighter and more insulating material compared to traditional concrete. It is commonly used in construction for its unique properties. Here's a brief introduction.[1]. Composition: Foam concrete is made by mixing a cementitious material (usually Portland cement or fly ash), water, and a stable foam. The foam is typically generated by mixing a foaming agent with water and air. [2].Lightweight Aggregate: The inclusion of air bubbles or foam in the mixture significantly reduces the density of the concrete. This makes foam concrete much lighter than conventional concrete, which is advantageous for various applications.[3].Insulation: Due to its lower density, foam concrete has excellent thermal insulation properties. It is often used in construction projects where insulation is a priority, such as in walls and roofs.[4].Fire Resistance: Foam concrete can have good fireresistant qualities, depending on the specific formulation.This makes it suitable for fireproofing a 1:4 cement-toaggregate ratio are used to create LFC.Sand and FA made up the aggregates, which varied in weight by 0%, 10%, 20%, and 30%. Foam made up between 30 and 40 percent of the volume of the mortar.

Hameed et al (2021) [4]. “Experimental Study on Foam Concrete”. In this study the author had studied the effect of mech- anical properties of foamed concrete by the applications.[5].Ease of Handling: Its lightweight nature makes foam concrete easier to handle and transport on construction sites compared to heavy traditional concrete.

II. LITERATURE REVIEW

Namsonea et al (2017) [1]. "Durability Properties of High Performance Foamed Concrete". The author of this paper discussed low density, excellent thermal characteristics, and moderate strength. Another type of cellular concrete is FC. Depending on the application, a variety of densities can be achieved by aerating cement mortar with foaming agents and controlling the ratios of cement, sand, water, and foaming agent. FC is created with cement mortar, a foaming agent, and no additional heat processing. It is crucial to take FC durability into consideration, particularly in cold and damp environment conditions. Mechanical strength, water absorption, and frost resistance are key factors in durability. Additionally, shrinkage (including shrinkage from carbonation) needs to be taken into account. Carbonation processes are sped up by a material's low density and high open porosity.

Mohd et al (2017) [2] "Applications of Foamed Light weight Concrete". The author said about Foamed concrete with densities between 400 kg/m3 and 1600 kg/m3 and an improvement in the workability and bond adhesion will also increase the flexural and tensile strength. the strengths of foamed concrete foamed concrete is developed is between the 100kg/m³ to 15000 kg/m3

Habsya et al (2018) [3] “Physical, mechanical and thermal properties of lightweight foamed concrete with fly ash”. The purpose of this research is to determine how the fly ash content affects the density, thermal conductivity, compressive strength, and water absorption in lightweight foamed concrete (LFC) Cement, water, sand, fly ash (FA), and foam make up this LFC. A 1:1 water-to-cement ratio and replacement of cement with 0%,10% and 20% of fly ash and also by the addition of fibers at dosages of 1%, 1.5%. It was observed that the compressive strength of foamed concrete is about 5N/mm2 when cement is replaced with fly ash at 10% dosage and by the addition of fibers the split ten sile strength was increased when compared to conventional mix.

IV. METHODOLOGY

MATERIAL PROPERTY OF LIGHTWEIGHT CONCRETE

In order to study the behaviour of lightweight concrete, normal concrete testing was done to determine the material and structural properties of each type of lightweight concrete and how will these properties differ according to a different type of mixture and its composition.Once concrete has hardened it can be subjected to a wide range of tests to prove its ability to perform as planned or to discover its characteristics. For new concrete this usually involves casting specimens from fresh concrete and testing them for various properties as the concrete matures

MATERIAL USED

- **CEMENT**
- **AGGRIGATE**
- **FOAM**
- **WATER**

CEMENT

In this present work Portland Pozzolana cement confirming to IS 1489.1991 was used. This type of cement is obtained by grounding the Portland cement clinker with fine pozzolanic material and adding possible amount of gypsum. The properties of cement are shown below.

S. No.	Property	Volue
1	Specific gravity	2.74
2	Standard consistency	35%
3	Initial setting time	40 in

SAND

Sand is a granular material made out of finely separated shake and mineral particles. It is defined by size. Sand can likewise allude to a textural class of soil or soil type Hence the sand assume fundamental job in the waste plastic blocks The tests like Specific gravity, Fineness modulus, and Sand Replacement test were directed for getting the physical properties of sand and the acquired outcome the finished product is uniform and strong, concrete is made of many components, but is mostly made up of materials known as coarse aggregates. Coarse aggregates have a wide variety of construction applications because they resemble standard rock particles, as opposed to fine aggregate, which more closely resembles sand

AGGRIGATE.

Coarse aggregates are an integral part of many construction applications, sometimes used on their own, such as a granular base placed under a slab or pavement, or as a component in a mixture, such as asphalt or concrete mixtures. Coarse aggregates are generally categorized as rock larger than a standard No. 4 sieve (3/16 inches) and less than 2 inches.

FOAM

Foam is a form of stable bubbles- produced by mixing foaming agent and water infoam generatorThe purpose of the foam is to control the density of lightweightfoamed concrete by incorporatingdry preformed stable foam into fresh lightweightfoamed concrete for this study- the ratio of foaming agent to water is 1:30 byvolumeThe will have foam density of 45kg/m^3

WATER

The laboratory works utilized clean tap water, which was free from organic elements or detritus. The water-cement proportion was kept constant at 0.45 because it gave reasonable workability. The tap water was utilized to make the mortar slurry, LFC mixing, and curing p

COMPRESSIVE STRENGTH

TEST

The compressive strength test is carried out as per IS 516:1959 test on hardened concrete. The load is applied without shock and increased continuously at a rate of approximately 140 kg/sq cm/min until the resistance of the specimen to the increasing load breaks down and no greater load can be sustained. The maximum load applied to the specimen shall then be recorded and the appearance of the concrete and any unusual features in the type of failure shall be noted.

S.N	**% REPLACEMENT OF FOAM**	**COMPERASSIVE STERNTH**		
		7DAY	**14 DAY**	**28 DAY**
1	**0%**	**21.78**	**24.2**	**25.5**
2	**50%**	**9.33**	**10.36**	**13.32**

3	**60%**	**15.5**	**17.22**	**22.14**
4	**70%**	**6.2**	**6.9**	**8.85**

V. CONCLUSION

Light Weight Concrete is becoming very popular day by day. In this project the performance of Light Weight Concrete obtained from mixing fly ash and aerating agent(Kemilite-PR-Protein Based Foaming Agent) in conventional concrete will be analysed.Mechanical properties of foamed concrete depends on the foam volume, type and volume of fiber and the compressive strength is influenced by the shape, size and method of pore formation, age of the sample, direction of loading, characteristics of ingredients used and method of curing.

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