

## Preparation of Lightweight Concrete by using of LECA Aggregates

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### ABSTRACT

*This report expresses influence of LECA in the concrete. In this report LECA is used as a replacement of coarse aggregate construction of lightweight aggregate in the essential need of our society. It reduces total weight of structure which is very helpful in the construction of high rise building by using lightweight concrete 20 to 30% dead load of building is reduced. LECA is use in concrete to reduce the required amount of coarse aggregate and furthermore in the design of concrete based structures, hence self weight occupies extremely great portion of load coming on to the structures, critically in cases such are weak soil or tall structure. Coarse aggregate is replaced 21% by using LECA. In this experimentation, concrete cubes are casted at water cement 0.34, 0.40 and 0.42 correspondingly. These cubes are tested for compressive strength, result of these cubes for compressive strength are very pleasing at water cement ratio 0.42. This experimentation shows behaviour of lightweight concrete at different water cement ratio for a fixed substitution of coarse aggregate such as compressive strength. After this experimentation, all the aim of such research is done.*

**Keywords:-***LECA, water cement ratio, compressive strength, water absorption.*

### INTRODUCTION

Lightweight concrete is used to construction lightweight structure, in high rise building and where bearing capacity of soil is not sufficient to carry heavy load by using lightweight aggregate. Lightweight concrete is formed in different forms LECA, used as replacement of coarse aggregates up to 21% for lightweight concrete. It is not as strong as concrete made with distinctive aggregates. Lightweight concrete, used where high quality concrete is needed and vital necessity is lightness of structure. There are numerous complimentary circumstances of lightness over typical concrete. These are also utilized owing to its low warm conductivity, which comes about becomes of its high void substance for air entrainment is frequently utilized as

a fraction of lightweight concrete to reduce the density, boost workability and imperviousness to frost and to lessen warm conductivity.

It is very essential to proper control on quality of work. In this experiment LECA is used 21% as coarse aggregate. Cubes are constructed W/C ratio 35%, 40% and 42% respectively, for each W/C ratio 3 cubes are formed.

### MATERIAL AND ITS PROPERTIES

#### LECA

LECA is abbreviation of LECA is light expanded clay aggregate. LECA is product of clay and poor line which is dried fired in rotary kilns.



*Fig.1:-LECA*

### **Cement**

Cement is a binder material, which is used to bind coarse aggregate and fine aggregate. Though all cement conforming to various IS codes are suitable, selection of cement should be based on their compressive strength, fineness, soundness.

### **Fine aggregate**



*Fig.2:-Fine aggregate*

Sand is taken as fine aggregate for the production of lightweight concrete. Sand which is used in the construction purpose must be clean free from waste stones and impurities. This experiment should be made on the fineness of the variable sand and depending on its fineness.

### **Coarse Aggregate**



*Fig.3:-Coarse aggregate*

Coarse aggregate, used for making lightweight concrete they might be

angular, round, flatty or elongated and for better design angular aggregates are used, aggregate which are retained on 4.75mm IS sieve, is termed coarse aggregate.

### **Water**

Water used in the production of concrete free from any chemical compound, dirt and should be portable water. Water used in mortar should not need to be distilled but must be free all acid and all other dissolved salt.

The main objective of research is not study the compressive strength of concrete at different water cement ratio for a mixed proportion of LECA.

### **METHODOLOGY**

LECA is the experimental material in this study that is used with different water cement ratio. Firstly the raw materials are demand such that it should be free from impurities and then the materials are tested. On the basis of different water cement ratio the mix design are obtained for M20 grade concrete. To obtain mix design the lightweight aggregate LECA is replaced in place of conventional aggregates with various water cement ratio, and slump test is performed on each plummeted proportioned fresh concrete and the cubes. The specimens are wrapped in water for curing for 28 days after 28 days results of curing water is obtained. The about obtained. The about process are carried out at different water cement ratio 0.3, 0.35, 0.4 and 0.45 after testing of cubes lightweight concrete the optimum proportion is determined at which strength is obtained. Further the lightweight concrete is compound with conventional concrete.

### **EXPERIMENTAL ANALYSIS**

Various test are performed some test on fresh concrete and some on hardened concrete, to get their properties some tests are as follows.

A. Test on fresh concrete - Slump test

B. Test on harmed concrete - Compression strength test.

### Slump Test



*Fig.4:-Preparation of Slump test*

1. Clean the internal surface of the mild and apply oil and place it on a smooth horizontal non-porous base plate.
2. Fill the mould with the prepared concrete mix in 4 approximately equal layers and tamp each layer with 25 strokes with temping rod uniformly.
3. Removed the enclose and level the surface with a trowel.
4. Raise the mould from the concrete immediately slowly in vertical direction.
5. Measure the slump as the difference between the height of the mould and point of the specimen being tested.

**Note** - The about operation should be carried out at a place free from vibrations on shock and with a period of 2 minutes after sampling.

### Compressive Strength of Concrete

Procedure for test –

1. Firstly remove the specimen form water after 28 days and wipe out the excess water from the surface of cubes.
2. Take the dimension of the merest 0.2m and clean the bearing surface of the testing machine.
3. Place the specimen in the machine in such a way that load shall be applied to the opposite side of the cube cast with centrally.
4. Aligned the lead gradually shock and continuously on the base plate.

5. Apply the load gradually shock and continuously at the rate of 190 kg/cm<sup>2</sup>/minute till the specimen fails.
6. Record the maximum load at which the specimen fails.

### CONCLUSION

The main objective of this project is to reduce the weight of structure using lightweight concrete expanded clay aggregate (LECA). LECA is a line and clay mixed material that observes more water in compare to conventional aggregate. And the properties also changes with different water cement ratio. So the study is carried out for water cement ratio 0.35, 0.4 and 0.42 as the water cement ratio increases. The workability of mixture increases, with good density and as density increases, compressive strength increases when the cubes are tested after 28 days curing hence the compressive strength increases the W/C ratio in a limit but less effective as conventional aggregate concrete in strength. Before the mix of curing of LECA increases the strength of concrete. As the water absorption and heat of LECA is decreased. As the density of concrete of concrete is reduced, it is very beneficial of high rise building.

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