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Analysis and Comparison of R.C.C. Structure Using CLC Block With Burnt Clay Bricks

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Abstract :- A building can be defined as an enclosed structure intended for human occupancy. Constructions work can be seen in almost all the developing countries. With the increases in material cost in the construction work, there is a need to find more cost saving alternatives so as to maintain the cost of construction houses , multistory etc, which can be affordable to people. In the manufacturing of burnt clay bricks, smoke evolved at a great extent and also some toxic gases which can harm an enviornment. So as to overcome with all these problem, Cellular lightweight concrete blocks are used which is more economical and eco-friendly. This project present analysis and comparison of building for G+12 residential building by using Cellular lightweight concrete blocks at the replacement of burnt clay bricks. Analysis is made by using burnt clay bricks and Cellular lightweight concrete blocks for different densities Overall modeling and analysis is done by using STAAD-Pro software. By using cellular lightweight blocks the overall cost of construction is reduce and it will be safe and economical in earthquake forces also.

Keywords:- Cellular lightweight blocks(CLC blocks), Burnt Clay Bricks, Steel , Concrete, Coarse Sand

1. Introduction :-

Bricks can be of different types such as burnt clay bricks, cellular light weight concrete blocks, autoclave aerated concrete blocks etc. The bricks which is used in this project is of cellular light weight concrete blocks (CLC blocks). Cellular lightweight concrete blocks further classified in 3 grades such as Grade A, Grade B, Grade C. The density of cellular light weight concrete blocks are less as compared to conventional burnt clay bricks and it is porous, non toxic, reusable, renewable and recycled. Therefore cellular lightweight concrete blocks are used in the high rise residential building at the replacement of the conventional burnt clay bricks. And the comparison has been made between cellular light weight concrete blocks and the conventional red bricks by analysis a G+12 residential building. Due to lightweight of these blocks there will be less dead load will act on the structure , therefore the structure became lighter. If the structure will be lighter than there will be reduction in the reinforcement, reduction in the size of the member , reduction in the concrete and also by using these blocks there will be no use of coarse sand for the plastering purpose. And the building should be constructed in a most economical way.

2. Review

In order to contextualize the current work, related works from literature is discussed and gives a comprehensive review of the work carried out by various researches in the field of cellular light weight concrete blocks at the replacement of conventional burnt clay bricks.

K.Krishna Bhavani Siram (2012) made an attempt to compare CLC blocks and Clay bricks and recommend a replacement material to red bricks in construction industry. Burnt clay Brick is the prdominant construction material in the country . The CO2 emissions in the brick manufacture process have been acknowledged as a significant factor to global warning and also focus on the environment solution for greener environment because red bricks requires high energy to burn in kiln to produce it. This study has also shown that the use of fly ash in foamed concrete, can improve the properties of CLC blocks.

Dr. B G Naresh kumar and at all (2013) in this experimental study the feasibility of using aerated concrete block as an alternative to the conventional masonry units has been investigated. The preliminary studies focused on the estimating physical, strength and elastic properties of light weight concrete blocks i.e. Autoclaved aerated concrete blocks(AAC). These include initial rate of absorption, density test, water absorption test etc. The compressive strength, modulus of elasticity and the flexural strength of the units were obtained.

Prakash T M and at all (2013) investigated the feasibility of using lightweight concrete block as an alternative to the conventional masonry units. The preliminary studies focused on estimating physical and elastic properties of cellular lightweight block units. These included initial rate of absorption, density test, water absorption test etc. The compressive strength, stress-strain characteristics and the flexural strength of the units were obtained. And the results are comparing with that of conventional masonry units

Nagesh. Mustapure and At all (2014) made an attempt to study on cellular lightweight concrete blocks, and following experiment has done to check the properties of CLC blocks of Grade B, such as compressive strength, water absorption, thermal conductivity of CLC blocks for 800 kg/m3, 900 kg/m3, 1000 kg/m3, 1100 kg/m3. The excellent insulatig property of foam concrete is due to the great number of closed cavities forming the multi-cellular structure.And the study shows that ClC blocks may be used for construction purpose, which is advantageous in terms of general construction properties as well as eco-freindliness.

A.K. Marunmale and At all (2014) focus on the reduction of the construction cost, time and labor by using Cellular lightweight brick wall in a Rat-trap bond for building masonary over the conventional brick work system. Construction industry boom can be seen in almost all the developing countries. With the increase in material costs in the construction industry, there is need to find more cost saving alternatives so as to maintain the cost of constructing houses at prices affordable to people. There is need to develop an alternative system of building component which would impart more benefits and are multifunctional with optimum use of labor and

material. Therefore cellular lightweight bricks wall in rattrap bond ia an innovative technique for building masonary unit which reduces the construction cost , time and labor considerably.

Ali J. Hamad (2014) this paper is attention to classified of aerated lightweight concrete into foamed concrete and autoclaved concrete. The literature review of aerated lightweight concrete on material, production, properties and its applications. The aerated lightweight properties is focusses on the porosity, permeability, compressive strength and splitting strength. It posses many beneficial such as low density with higher strength compred with conventional concrete, enhanced in thermal and sound insulation, reduced dead load in the could result several advantages in decrease structural elements and reduce the transferred load to the foundations and bearing capacity. Aerated concrete is consider economy in materials and consumptions of by-product and wastes materials such as fly ash.

P.S. Bhandari and and at all (2014) investigated the performance of cellular lightweight concrete in terms of density and compressive strength. The Compressive strength for cellular lightweight concrete is low for lower density mixture. The compressive strength also decreases with the increment of voids. Compressive strength of 53 grade cement is slightly higher than 43 grade cement , but as strength increases its density also increases. Cellular lightweight concrete is acceptable for framed structure. Cellular lightweight concrete can be suitable for earthquake areas.

A.S. Mahajer and at all (2014) investigate the production of lightweight refractory insulation panels on the basis of perlite. For saving energy in industrial furnaces, various forms of insulation are used as bricks, blocks, castable and fibers. Lightweight refactory insulation panels on the basis of perlite (~30 wt.%) with chemical bonding were successfully prpared by extruding technique after sintering at 900-1100 degree centigrade. Properties such as density, sintering shrinkage percent, permanent linear change and cold crushing strength are measured.

Sohani N. Jani and at all (2014) shows the comparison between the cellular lightweight concrete blocks, autoclved aerated concrete and burnt clay bricks with there physical properties, thermal conductivity, density etc. and main focuses on the analysis of microstructure and properties of autoclaved aerated concrete (AAC) block with its manufacturing process. There are two types of AAC production method which are chemical and mechanical process. In the chemical process, some metallic compounds would be added to react and generate tremendous amount of air bubbles in concrete texture while in mechanical process expansive foaming agent is normally employed. Additionally , AAC has excellent properties of acoustic insulation, fire resistance and allergy-free while it tends to suffer edge damage or breakage if it s subjected to abrasion or collision.

Soumini A K and at all (2015) in this study they shows that the burnt clay bricks are commonly used for the building construction works. By the central pollution control board is focused on pursuing enviornmental pollution, global warming, reduce time and reduce manpower for the building construction. Cellular lightweight concrete block result the low enviornmental pollution compared to the

burnt clay bricks and other materials. So as to minimize the enviornmental issues related and also to reduce time and manpower required in the conventional process which is the need of the construction industry. Therefore cellular lightweight concrete blocks are more eco freindliness as compared to conventional clay brick and require less man power, saving in time, reduction in the dead load in the building ultimately lead to reduce the cost of project.

Sagar W. Dhengare And At All (2015) concluded that the cellular lightweight concrete has a desirable strength to be an alternative construction material for the industrialized building system. It was made using natural aggregates of volcanic origin such as pumice, scoria etc. Lightweight concrete can be defined as a type of concrete which includes an expanding agent in that it increases the volume of the mixture while giving additional qualities such as inability and lessened the dead weight. This study has shown that the use of fly as in foamed concrete, either can greatly improve its properties and the usage of lightweight concrete blocks gives a prospective solution to building construction industry along with enviornmental preservation.

Mr. Ashish S. Moon and at all (2015) concluded that the foam concrete can be used for sustainable construction as a building material because foam concrete is a type aerated lightweight concrete. Foam concrete does not contain any coarse aggregate. It require no compaction , but it will flow readily from an outlet to fill restricted and irregullar cavities. Lightweight foamed concrete is use in low strength capacity for building and civil construction purposes as a result of its peculiar features such as low thermal conductivity, low selfweight and self-compacting features hence its high workability.

HjhKamsiah Mohd.Ismail and at all (2014)in this paper the low density and thermal conductivity of light weight concrete has focused and its advantages, disadvantages and application were studied thoroughly.

Satyendra Kumar Meena and at all (2014) studied that the cellular lightweight concrete possesses high flow ability, low self-weight, minimal consumption of aggregate, controlled low strength and excellent thermal insulation properties. It has excellent resistance to water and frost, and provides a high level of both sound and thermal insulation.

3. Conclusion

1) Reduces the reinforcement in the structure.
2) Reduces the size of the member.
3) Reduces the quantity of concrete.
4) No use of coarse sand for plaster.
5) Saving of cement due to no use of coarse sand plaster.
6) The building can be design in a economical way.

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