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LOW-COST CONCRETE BLOCK WORK

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Abstract: Low-cost concrete block work is an economical and sustainable construction technique widely used in residential, commercial, and institutional buildings. Concrete blocks are manufactured using cement, sand, aggregates, and water, and are molded into uniform shapes and sizes. Compared to traditional burnt clay bricks, concrete blocks offer several advantages such as lower construction cost, faster construction speed, better strength, durability, and reduced environmental impact. Due to their lightweight nature and ease of handling, they help in minimizing labor requirements and construction time, making them suitable for affordable housing projects and large-scale infrastructure developments.

The production of low-cost concrete blocks involves the careful selection of raw materials and a controlled manufacturing process to ensure quality and performance. The blocks may be solid, hollow, or cellular depending on the intended application. Hollow concrete blocks are particularly popular because they reduce the overall dead load of structures and provide better thermal and sound insulation. The use of locally available materials further decreases transportation costs and contributes to sustainable construction practices. In many developing regions, low-cost concrete blocks have become an effective solution for meeting the growing demand for affordable housing.

Index Terms – Concrete, Environment, Compression, Structure.

INTRODUCTION

The basic requirement of human being is shelter. In ancient time human starts living in caves below ground level, after that they started constructing walls from mud, they developed the techniques of burnt clay brick masonry for making the structure part of the shelter.

Now days, concrete blocks are being very popular in construction. These blocks are being mostly used in the construction of multi- storied buildings, factories and residential buildings. These concrete blocks are commonly used in compound walls because of cheapness. These concrete blocks are more useful due to its lightweight and the most important feature is ease of ventilation. The concrete blocks are made out of mixture of cement, sand and stone chips. It reduces cement in masonry work and reduced the cost of construction. The concrete blocks found out due to different advantages

1. Sound control
2. Small dead load
3. Resistance to fire
4. Adequate strength
5. Superior thermal insulation
6. Economy

7. Highly durable
8. Environmentally Eco friendly
9. Reduction in mortar consumption
10. Fast and Easier construction system
11. Better Architectural features

The first Concrete block as a replacement for stone and wood in the building was used in the United States. The first concrete block house built up in 1837 on Staten Island in New York.

Harmon S. Palmer, designed first concrete block in 1890. Palmer patented the design of block in 1900 after 10 years of experimental research. Palmer's blocks were 8-inch(20.3cm) × 10-inch(25.4cm) × 30-inch(76.2cm) and they were heavy in weight. These early blocks were cast by hand and average output was about 10 blocks per hour.

Now concrete blocks are manufacturing by automated process that can make up to 2000 blocks per hour. The Compressive strength of masonry is one of the most important properties in the design of masonry structure. This strength depends upon several factors such as unit strength, mortar strength, grouting, grout strength, geometry of the blocks, bedding mortar, and the type of bonding and bedding arrangements adopted. In extreme hot or cold climate countries these concrete blocks possessing low thermal conductivity and also serve as a thermal insulation material which minimize the energy consumption by minimizing the dependence on electricity for air conditioning or heating. In all countries, the different conventional materials are replacing to the concrete hollow blocks because most conventional materials cost is increasing. In the review study we found that blocks of double- H shape gives more strength with semi-grouted masonry and low strength with fully grouted masonry.

RESULTS AND DISCUSSION

TABLE 6.1 COMPRESSIVE STRENGTH OF THE BRICK

Sl.no	Load (kN)	Compressive strength in N/mm ²
1	452	20.08
2	455	20.22
3	452	20.08
4	462	20.53
5	449	19.95
6	471	20.93

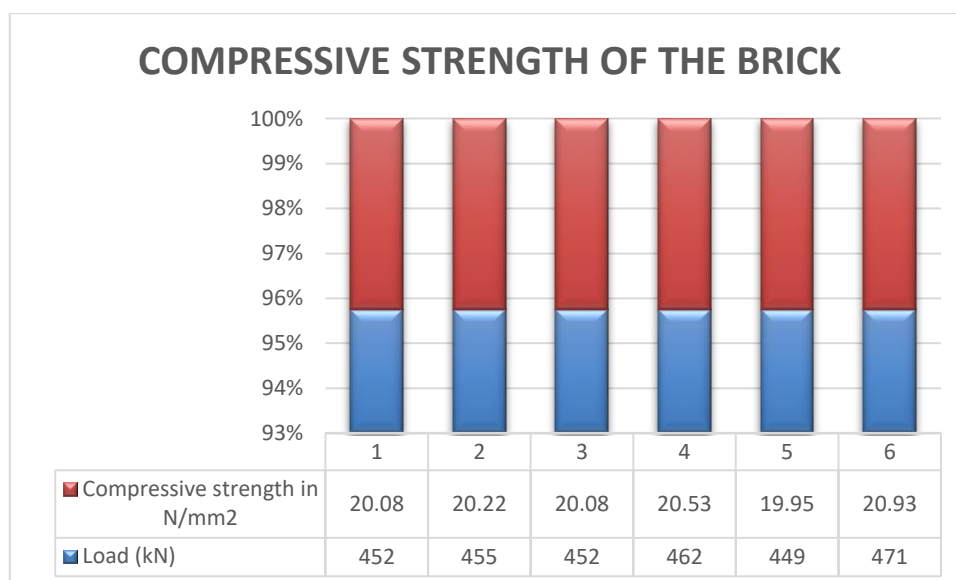
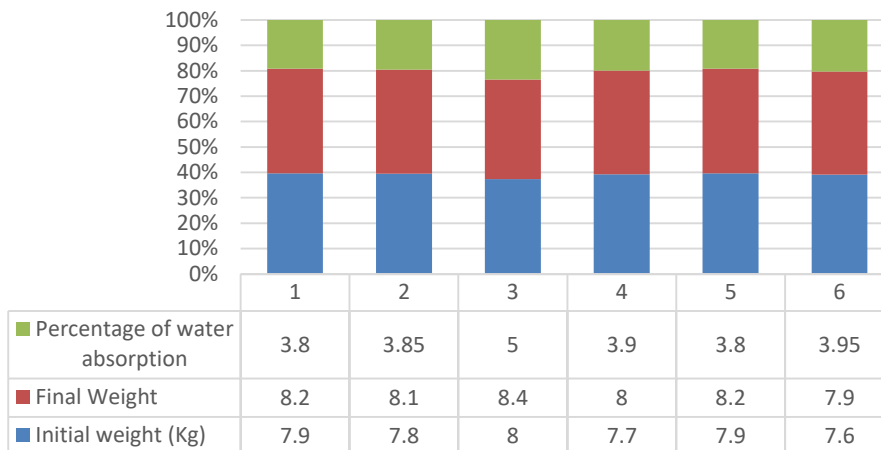
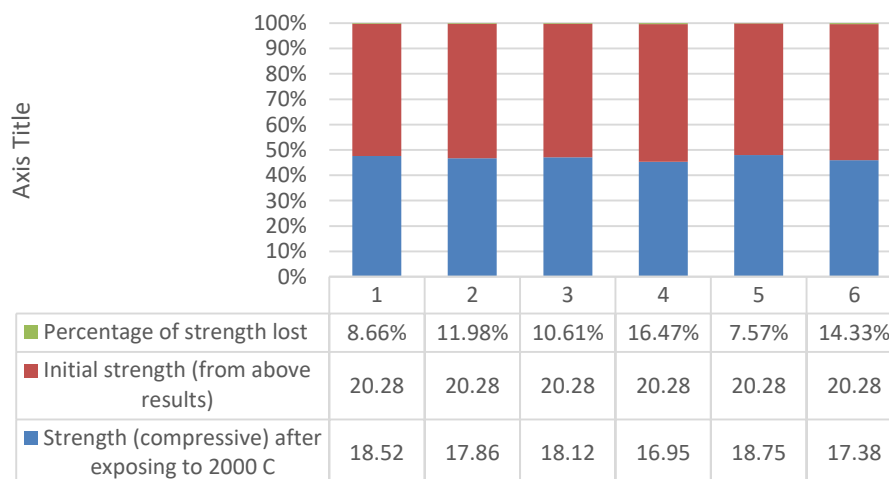


TABLE 6.2 WATER ABSORPTION OF BRICK

Sl.No	Initial weight (Kg)	Final Weight	Percentage of water absorption
1	7.9	8.2	3.80
2	7.8	8.1	3.85
3	8.0	8.4	5.00
4	7.7	8.0	3.90
5	7.9	8.2	3.80
6	7.6	7.9	3.95

WATER ABSORPTION OF THE BRICK**TABLE 6.3 FIRE RESISTANCE OF THE BRICK**

Sl.No	Strength (compressive) after exposing to 200 ⁰ C	Initial strength (from above results)	Percentage of strength lost
1	18.52	20.28	8.66%
2	17.86	20.28	11.98%
3	18.12	20.28	10.61%
4	16.95	20.28	16.47%
5	18.75	20.28	7.57%
6	17.38	20.28	14.33%

FIRE RESISTANCE OF THE BRICK

The benefits of using concrete block work in construction include their lightweight nature, thermal insulation properties, fire resistance, durability, design flexibility, sustainability, sound insulation, cost-effectiveness, construction speed, and code compliance. These advantages make hollow concrete bricks an attractive choice for various construction projects.

CONCLUSION:

Low-cost concrete block work is an economical and durable construction method that helps reduce overall building costs without compromising strength and quality. Concrete blocks are easy to manufacture, require less mortar, provide good thermal insulation, and enable faster construction. Their availability, low maintenance requirements, and long service life make them a suitable choice for affordable housing and other construction projects. Therefore, low-cost concrete block work is an effective solution for achieving cost-efficient, sustainable, and durable buildings.

From a sustainability perspective, concrete blocks can be manufactured using locally available materials, reducing transportation costs and environmental impact. Their durability and strength contribute to the longevity of structures, making them a reliable building material.

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