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To Study, Analysis and Modification of Brick with Use of Different Types Materials

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Abstract: ***The Demolish waste for the purpose of experimentation was collected from the demolition of residential building at Janata chokadi, Anand. The mixtures of clay available at the brick casting site and the fly Ash, demolish waste, waste wire of tyre and waste of granite partials with different percentages by weight are prepared. These mixtures are used to make the bricks of clay and fly ash with different proportions. The bricks are made with frog. These bricks are air dried in open atmosphere for 4 - 5 days as per usual practice. The curing of the bricks is done in a traditional way as is done at gayatri brick works, GIDC, Anand. These bricks are cured for fourteen days. At the end of the 14 days, the bricks are allowed for sundried as per usual practice. The bricks are taken out and stacked in the testing lab of the institute where the sample bricks are tested for water absorption, dimension and compressive strength as per BIS procedures at Mangalam Consultancy Services, Karamsad.***
Keywords: Demolish waste, Fly-Ash, Brick, Test, Compressive, Water absorption.

I. INTRODUCTION

Bricks are one of the oldest known building materials dating back to 7000BC where they were first found in southern Turkey and around Jericho. The first bricks were sun dried mud bricks. Fired bricks were found to be more resistant to harsher weather conditions, which made them a much more reliable brick for use in permanent buildings, where mud bricks would not have been sufficient.

Fired brick were also useful for absorbing any heat generated throughout the day, then releasing it at night

The Ancient Egyptians also used sun dried mud bricks as building materials, evidence of which can still be seen today at ruins such as Harappa Buhen and Mohenjo-daro. Paintings on the tomb walls of Thebes portray slaves mixing, tempering and carrying clay for the sun dried bricks.

These bricks also consisted of a 4:2:1 ratio which enabled them to be laid more easily.

Using mobile kilns, the Romans were successful in introducing kiln fired bricks to the whole of the Roman Empire. These bricks differed from other ancient bricks in size and shape. Roman bricks were more commonly round, square, oblong, triangular or rectangular.

The Romans preferred this type of brick making during the first century of their civilisation and used the bricks for public and private buildings all over the empire. During the 12th century bricks were reintroduced to northern Germany from northern Italy. The buildings around this time were mainly built from fired red clay bricks. Brick Gothic style buildings can be found in the Baltic countries Sweden, Denmark, Poland, Germany, Finland, and Russia. The brick gothic period can be categorized by the lack of figural architectural sculptures which had previously been carved in stone. During the renaissance and Baroque periods, exposed brick walls became unpopular and brickwork was generally covered by plaster. Only during the mid 18th century did visible brick walls again regain some popularity.

II. SCOPE OF THE STUDY

A. High strength:
B. Low On Cost
C. Low in weight:
D. Environmentally Free

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III. REVIEW OF THE RELATED LITERATURE

1) *Aeslina Abdul Kadir, Abbas Mohajerani, BRICKS:* AN EXCELLENT BUILDING MATERIAL FOR RECYCLING WASTES, Proceedings of the IASTED International Conference July 4 - 6, 2011 Calgary, AB, Canada Environmental Management and Engineering (EME 2011).
2) *Rohit Kumar Arya, Rajeev Kansal* Utilization of Waste Papers to Produce Ecofriendly Bricks, International Journal of Science and Research (IJSR),2015.
3) *A. Venkatesan, G. Anand, A. George Fernandez, V. V. Thillai Natarajan, A. Alex,* A Compressive Strength and Water Absorption Test on Brick Made of Wood Ash, Charcoal with Clay Bricks: A Comparative Study, The International Journal Of Science & Technoledge (ISSN 2321 – 919X), March, 2015
4) *Sarangapani e [2002]* compared the characterization and properties of local low modulus bricks, table molded bricks and wire cut bricks, mortars and masonry.

IV. MATERIALS AND METHODS

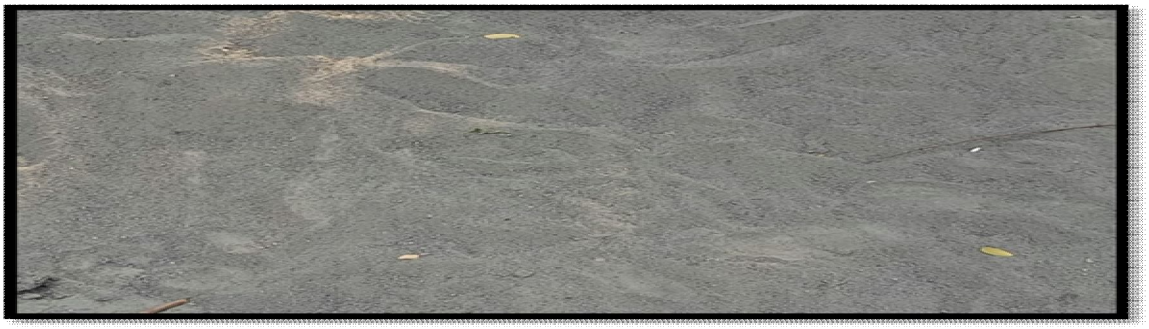


Clay



Scarap Tyre's Wire

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Fly-Ash



Demolish material



Marble's Partical



Lime

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Proportion

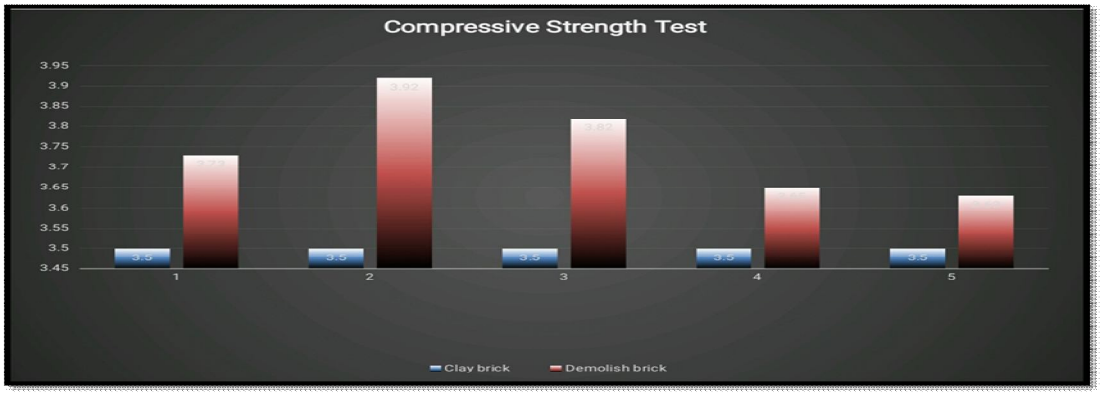
Brick	Fly-Ash	Dust	Lime	Gypsum	Demolish	Marble	Wire
1	40-50%	20-30%	8-10%	7-11%	15-19%	-	-
2	40-50%	20-30%	8-10%	7-11%	7-9%	5-7%	10-12%
3	40-50%	25-35%	8-10%	6-10%	-	-	20-25%
4	50-60%	20-30%	8-10%	5-6%	-	10-30%	-

V. BRICK TEST AND RESULT

A. *Compressive Test*

Sr. No.	Test Sample ID	Load (KN)	Area of Brick (cm^2)	Compressive Strength(N/mm^2)
1	CS 1	88	235.8	3.73
2	CS 2	93	237.0	3.92
3	CS 3	90	235.3	3.82
4	CS 4	88	240.8	3.65
5	CS 5	86	236.6	3.63
Average	-	89	237.1	3.75
Method Of Testing				I.S.3495-(P 1)1992,(RA 2016)

Requirement as per Indian Standard. I.S.1077-1992 RA -2016	Compressive Strength shall not be less than 3.5N/mm^2 (Table – 1 Clause 4.1)

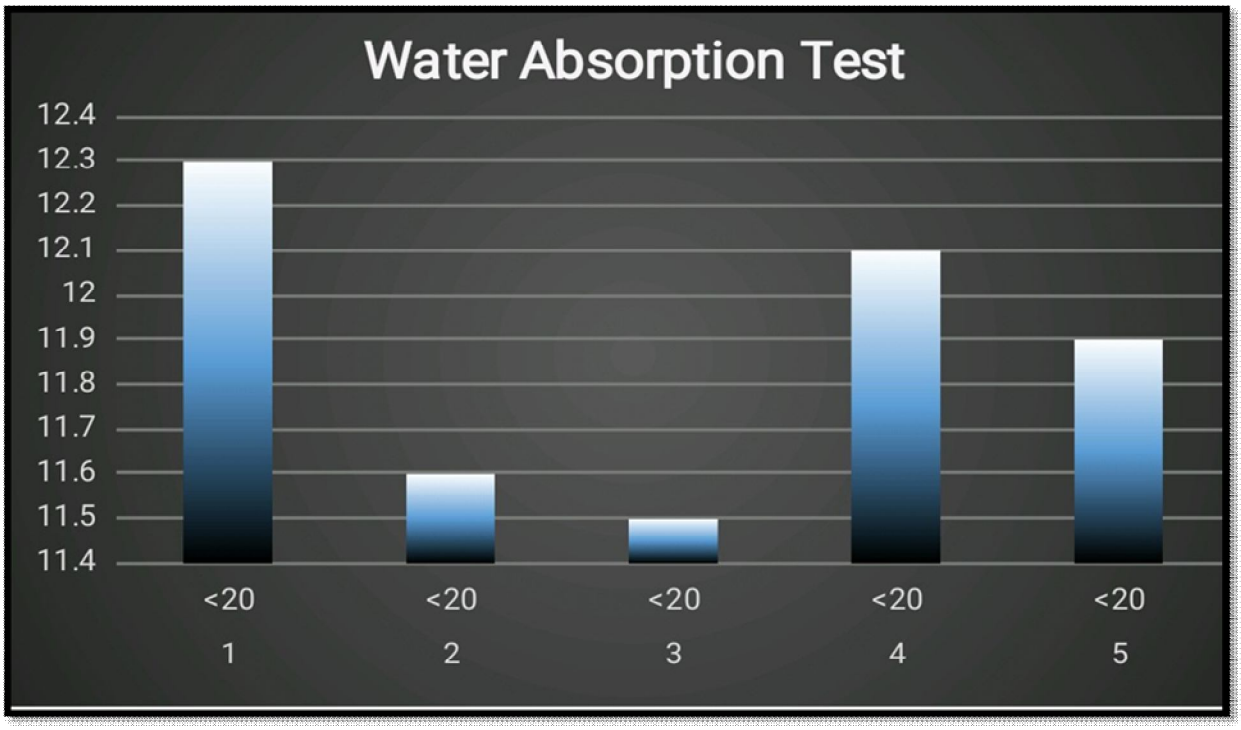


B. *Water Absorption Test Data*

Sr. No.	Test Sample ID	Water Absorption(%)
1	WA 1	12.3
2	WA 2	11.6
3	WA 3	11.5
4	WA 4	12.1
5	WA 5	11.9
Average	-	11.9
Method of Testing		IS:3495(P 2)-1992, RA 2016

Requirement as per Indian Standard. I.S.1077-1992 RA -2016	Shall not be more than 20%(Clause 7.2)

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C. Efflorescence Test Data

Sr No.	Test Sample ID	Efflorescence
1	EF 1	Nil
2	EF 2	Slight
3	EF 3	Nil
4	EF 4	Slight
5	EF 5	Nil
Average	-	-
Method of Testing		IS:3495(P 3)-1992, RA 2016

Requirement as per Indian Standard. I.S.1077-1992 RA -2016	Nil/Slight/Moderate/Heavy/Serious (Clause 7.3)

D. Hardness Test

1) In this test, a scratch is made on brick surface with the help of a finger nail.

2) If no impression is left on the surface, brick is treated as to be sufficiently hard.

E. Dimension Test Data

Dimension Test Results Of 20 Nos. Brick	Length, mm	Width, mm	Thickness, mm
Results	4650	2210	1420
Requirement as per Indian Standard. 1077(1992)RA-2016(Clause 6.2)	4600(+/-)80mm	2210(+/-)40mm	1400(+/-)40mm

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VI. CONCLUSION

Proportion Of Brick 2.

Brick	Fly-Ash	Dust	Lime	Gypsum	Demolish	Marble	Wire
2	40-50%	20-30%	8-10%	7-11%	7-9%	5-7%	10-12%

Compressive Strength Of Brick 2.

Sr. No.	Test Sample ID	Load (KN)	Area of Brick (cm^2)	Compressive Strength(N/mm^2)
2	CS 2	93	237.0	3.92

Water Absorption Test Of Brick 2.

Sr. No.	Test Sample ID	Water Absorption(%)
2	WA 2	11.6

VII. COSTING OF BRICK

A. Costing of Brick per unit

Brick type	Fly Ash	Dust	Lime	Gypsum	Demolish	Marble	Wire	Total
1(gm.)	681	511	136	119	225	0	0	1702gm
Cost(Rs.)	0.34	0.10	0.54	0.29	0.2	0	0	1.47Rs.
2(gm.)	741	370	148	129	129	192	185	1765gm
Cost(Rs.)	0.36	0.06	0.55	0.32	0.05	0.08	0.092	1.51Rs.
3(gm.)	625	395	140	98	0	0	350	1608gm
Cost(Rs.)	0.36	0.09	0.53	0.23	0	0	0.160	1.37Rs.
4(gm.)	800	355	142	88	0	293	0	1678gm
Cost(Rs.)	0.44	0.07	0.56	0.22	0	0.131	0	1.42Rs.

B. Costing of brick

1) Fly Ash: 0.5Rs/kg
2) Dust: 0.2Rs/kg
3) Lime: 4Rs/kg
4) Gypsum: 2.5Rs/kg
5) Demolish: 0.40Rs/kg
6) Marble: 0.40Rs/kg
7) Wire: 0.50Rs/kg

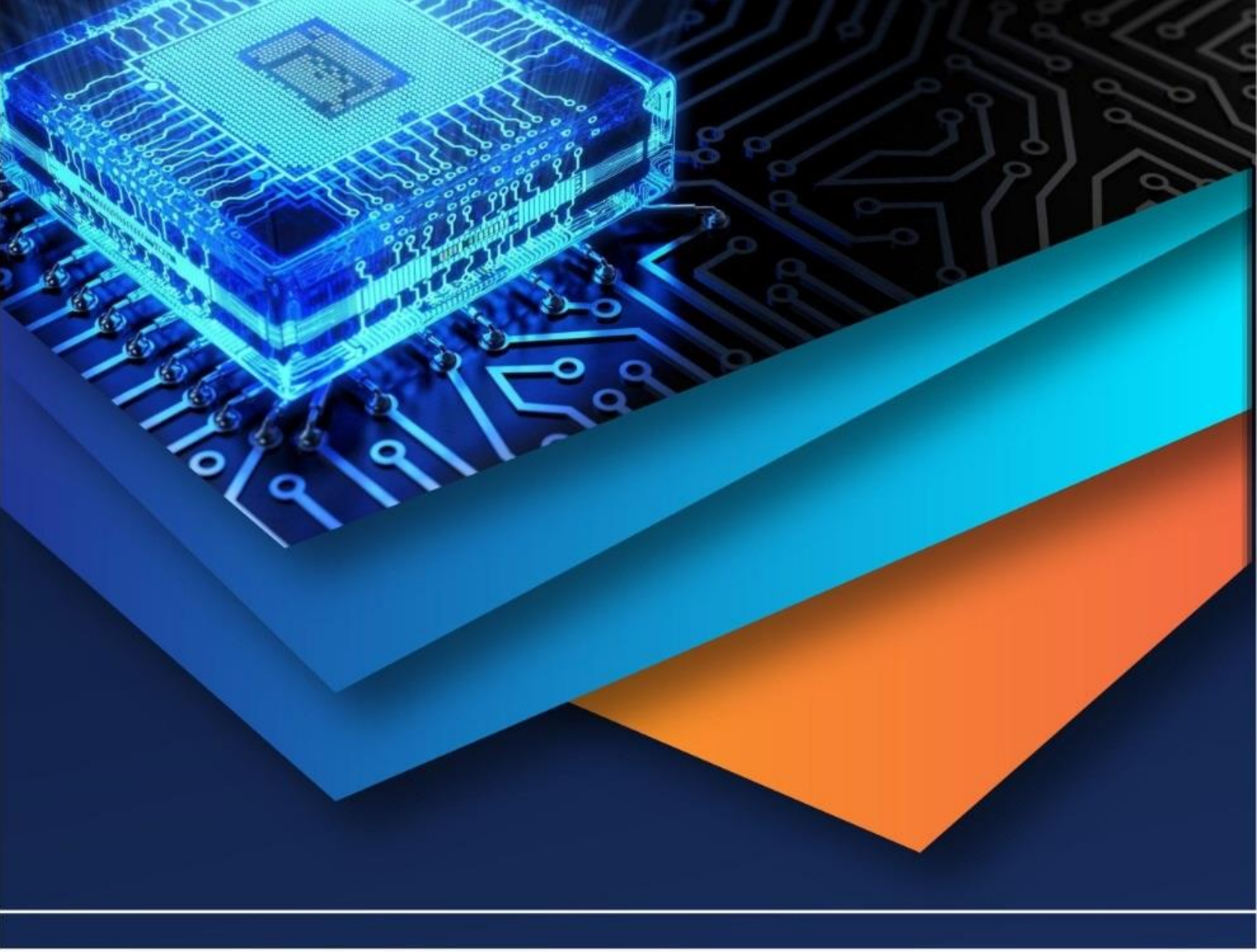
C. Benefits

The current brick is economical in costing than other established bricks. Hence, from economic point of view it will be extremely low in cost and also financially it will be quite economic at the site from market may cost save of lakhs.

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