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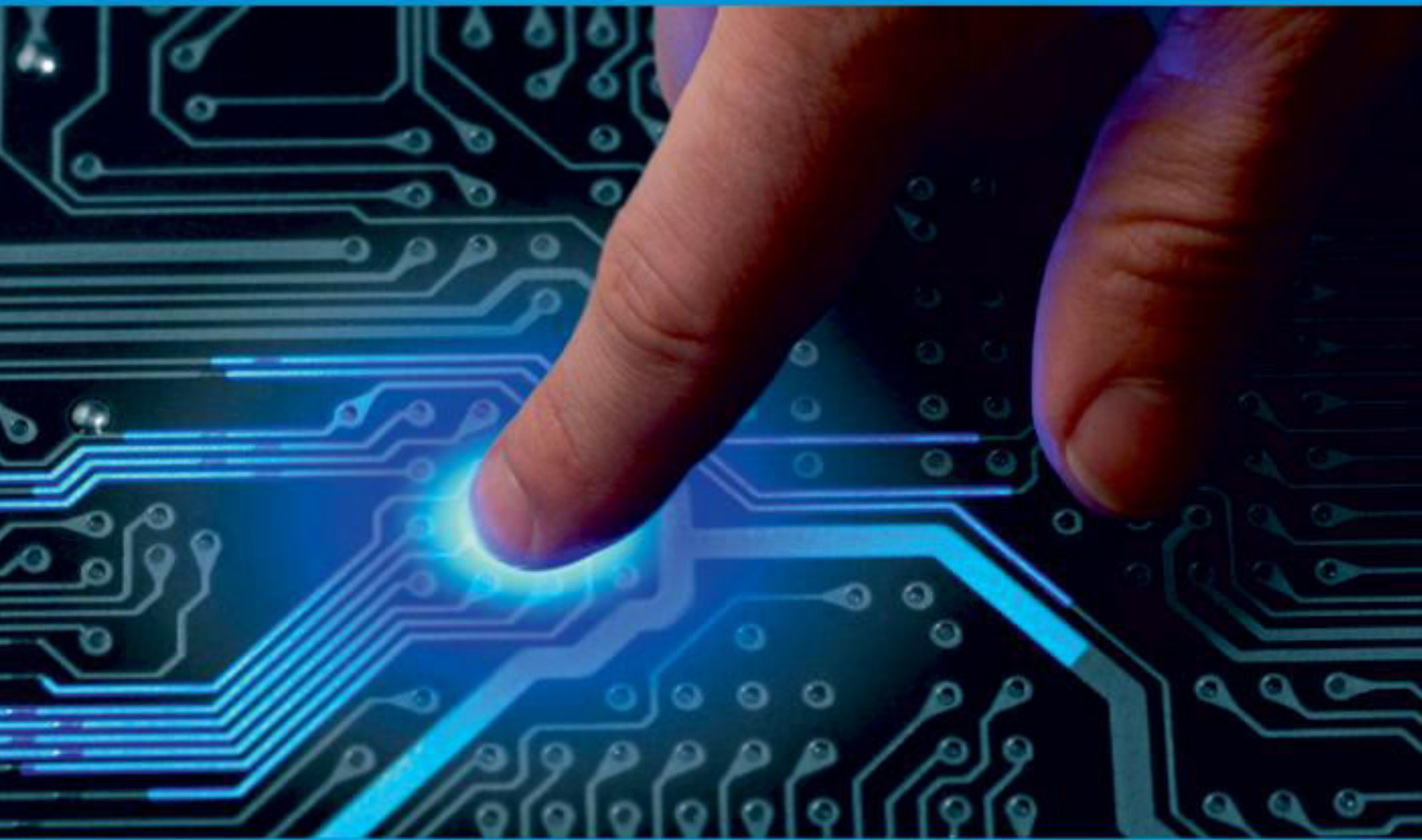

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Review on the Durability of Latex Modified Concrete Mixed With a Shrinkage Reducing Agent

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ABSTRACT- In order to enhance the overall performance of concrete, polymers are blended with concrete. It's been found that polymer modified concrete (PMC) tends to be more long-lasting compared to typical concrete because of high durability and superior strength. It's been better if blending with latex more or less 15 % of terminology of polymer cement ratio (P/C ratio) by weight displayed absolutely no occurrence of cracks with adequate tensile strength as well as bond strength of LMC. Nevertheless, numerous cracks happen within the real area largely as a result of drying out shrinkage of concrete, needing regular maintenance. Thus, this particular analysis examined the feasibility of using a shrinkage minimizing representative (SRA) which may lessen clear plastic shrinkage splits during earlier era in addition to drying out shrinkage splits of LMC. The quantity of shrinkage reducing representative ideal for obtaining general performance needs in deep measurements shift, break opposition, chloride ions penetration opposition plus turning opposition, was examined.

KEYWORDS: Shrinkage, Drying Shrinkage, Shrinkage Reducing Admixtures, Supplementary Cementations Materials, latex modified concrete

I. INTRODUCTION

1.1 GENERAL

Recently, the building of big bridges was encouraged around Korea with the target of revitalizing tourist within the West Sea and also the South Sea, incorporating the improvement of over 36 bridges (bridges linking the land and an island as well as bridges linking islands) slated till 2020.Various latex substances are already designed as well as marketed, they had been worn around mortars, however in the past few years the use of theirs has prolonged to concrete. Latexes used are vinylidene chloride, acrylics, polyvinyl acetate and styrene butadiene. Inclusion of latex what about concrete alters the mechanical as well as longevity qualities of concrete combination Latex is polymer structure created through the emulsion polymerization of monomers plus it has 50 % solid by weight. Since physical qualities, hydration procedure for durability and cement of concrete are very influenced by the state of microstructure. Last study scientific studies show that the polymer as modifier is guaranteeing within enhancing micro structure of concrete. For that reason the characteristics of LMC are much better within the traditional concrete. Since regular concretes generally neglect to keep the intrusion of moisture as well as intense ions sufficiently, specific concretes with lower permeability are necessary. Numerous scientific studies about the pavement of these bridges are now being completed definitely at home in addition to abroad, as a technique of saving the bridge deck coming from impacts, rain water, and chloride along with other environmental circumstances is needed.

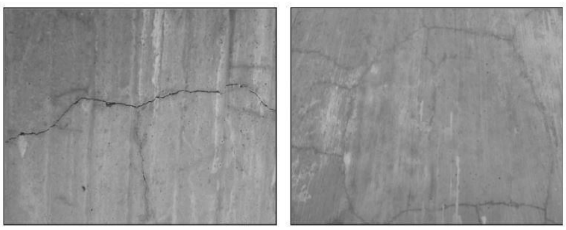

Fig.1.1 Case of break occurrence within the LMC bridge deck pavement

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1.2 PRINCIPLE OF SHRINKAGE REDUCING AGENT

Drying out shrinkage is regarded as an actual action accompanied through the evaporation of dampness, so probably the most valid concept along with different theories for the mechanism of its of activity stands out as the capillary tension theory, A meniscus is created to a micro pore inside concrete, as a result of the capillary tension current together with the surface area stress of water when water evaporates, Drying shrinkage is definitely the physical deformation on the matrix due to a generating force, the capillary tension, The capillary tension might be displayed when the coefficient of the surface and radius curvature tension, as well as when water evaporates because of drying out, the radius curvature decreases as well as the capillary stress grows.

1.3 WHY CONCRETE CRACKS

To begin with it's essential to see exactly why the concrete splits. There can easily be reasons that are many the reason the concrete cracks. These need being understood from the reaction of its as well as setting pattern perspective. The primary cause is incorrect concrete blend design as well as resting / jointing apply relevant to the natural dynamics of concrete to alter volumetrically as a result of moisture, thermal effects etc and reaction. The likelihood of cracks could be minimized by improving concrete blend layout, installing time weather as well as jointing methods with regular saw reducing & correctly handled curing some time.

1.4 TYPES AND CAUSES OF CRACKS IN CONCRETE

Table 1: Crack in Concrete

Types and Causes of cracks in concrete Structures			
I			
Before Hardening			
1 - Constructional Movement	2 - Settlement Shrinkage	3 - Setting Shrinkage	
1A - Subgrade Movement	2A - Reinforcement or similar Obstruction	3A - Plastic Shrinkage	3B - Drying Shrinkage
1B - Formwork Movement	2B - Aggregates		3B(a) - Rapid

1.5 SHRINKAGE REDUCING ADMIXTURES

Shrinkage cutting down admixtures are surfactants which bring down the shrinkage of cementations components to some extent like autogenously shrinkage, drying out shrinkage, clear plastic chemical and shrinkage. Mechanism of SRA on various kind of shrinkage is alkaline primarily decreased surface stress, diminished focus of pore remedy ions, modified relative moisture as well as development effect

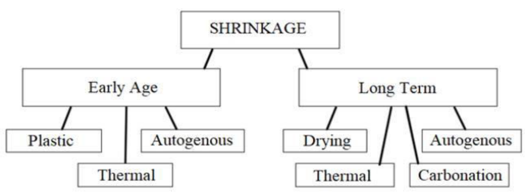

Fig 1.2: Stages of shrinkage

1.6 CHARACTERISTICS OF SRA

SRA is a surfactant which has a hydrophilic tail as well as hydrophobic head. SRA be adsorbed along the non-polar user interface of SRA within the pore remedy as well as outcomes within the drop on the surface area tension

1.7 PROBLEM STATEMENT

A lot of cracks happen within the real area largely as a result of drying out shrinkage of concrete, needing regular maintenance. Thus, this particular analysis examined the feasibility of using a shrinkage minimizing agent(SRA) which may lessen clear plastic shrinkage cracks during earlier era in addition to drying out shrinkage cracks of LMC.

1.8 AIM OF THE STUDY

The aim of this particular analysis was to investigate the usefulness of SRA within decreasing drying out shrinkage found bridge decks.

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1.9 OBJECTIVE OF THE STUDY

The principal objectives of this study are:

- The effect of the polymer-binder ratio on the properties of latex modified concrete was examined
- The latex modified concrete using SBR latex were prepared with various polymer-binder ratios and tested.
- To investigate and evaluate the main durability aspects of latex modified concrete (LMC) compared to those of conventional concrete.

II. LITERATURE REVIEW

T. Rehman et.al (2015) (1) author provides an evaluation of transported several experimental applications to take a look at the impact of use of polyolefin fibers on clear plastic shrinkage cracks, drying out shrinkage, as well as restrained shrinkage of mortar under lab. A mortar blend is evaluated from two distinct polyolefin fiber contents as well as with no fibers. The examination outcomes reveal that including polyolefin fibers on the mortar blend is able to arrest plastic shrinkage cracks as well as lead to a lessening inside drying shrinkage while they impact the flexural strength somewhat. The flexural strength of polyolefin fiber reinforced mortar with three kg/m3 elevated by 14 % in comparison to basic mortar, however absolutely no enhancement noticed by raising the quantity of fiber to 6kg/m3

O. Fenyvesi et.al (2014)(2) completed experimental work to assess premature age shrinkage cracking inclination of each and every blend. He summarized the measurements of each crack for every specimen. The typical on the summarized break measurements on the four band examples signifies the crack inclination of mixtures. In order to assess the usefulness of the various dosages of various fibers, prior to each and every sequence, they set up a guide Fibers have been put into the combination prior to the water for greater blending of fibers. Exterior diameter on the band is 60 cm, the inner is 30 cm. The height on the ring is 4 cm. On the internal aspect of external formwork metal plates are welded, to improve break inclination on the sample. And also the conclusion is, the connection in between early age and fiber dosage shrinkage crack inclination was discovered to become linear just in case of each and every examined kind of fibers.

R. Mishra et.al (2015) (3) author carried an investigation on earlier age shrinkage design of concrete, ready, on 50 % replacing of manufacturing by product (like pond ash and also granulated blast furnace slag) as good aggregate by using PSC, PPC, and OPC as a binder. And also the realization is 1) when PPC cement utilized to be a binder evaporation of water from blend needs to be stayed away from or maybe zero dampness campaign condition must be taken care of to get optimum hydration as well as strength gain. 2) From shrinkage perspective PSC cement functions as OPC cement

A. Mazzoli et.al (2016) (4) researcher centered on earlier age shrinkage cracking to lessen shrinkage phenomena with the inclusion of synthetic fibers within cement matrix. A simple methodology based upon image analysis was designed. And also the final result utilization of fibers established to get really successful within the width decrease in the cracks as well as, even though not considerably, within the length reduction. The most significant parameter is established to become the element ratio, presuming that the amount of fibers is all about of exactly the same purchase of magnitude.

N. Banthia et.al (2007) (5) author analysis carried out an exam technique during a rectangular box sample. A novel examination technique for characterization of restrained plastic shrinkage cracking within cementations substances is discussed. Outcomes additionally suggest that fiber reinforcement is substantially good at minimizing shrinkage induced cracking within cementations substances.

III. METHODOLOGY

3.1 Introduction

The experimental investigation of concrete under axial compression test is conduct for the behavior of concrete under axial compression to failure. A total of 48 specimens were tested and from these 48 specimens thirty six specimens are filling with concrete, six specimens are only concrete, and fourty two specimens are kept Latex. And these total specimens are experimentally tested under axial compression was tested to investigate load carrying capacity in particular and behaviour.

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3.2 Methodology:

The project study involved two stages. The primary data was gathered through a Literature survey targeted by web searches and review of eBooks, manuals, codes and journal papers. After review the problem statement is defined and sample preparation is taken up for detail study and analysis purposes.

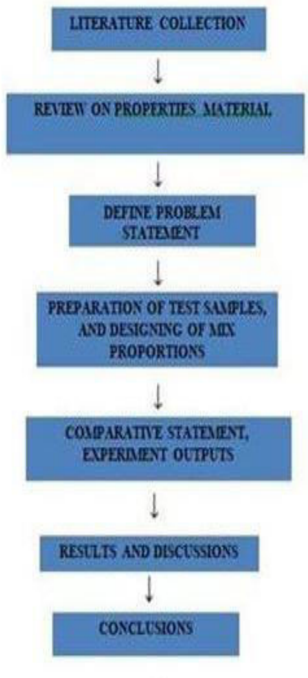

Fig 3.1 Flowchart of Methodology

3.3 Experimental Investigation:

3.3.1 Materials and mix proportions:

Materials used include ordinary Portland cement (53 grade, conforming to is 8112- 1989), coarse aggregate of crushed rock (max.size, 20mm), fine aggregate of clean river sand (zone II of is: 383-1970) and portable water. Size of marble dust was measured by microscope and uniform length of the was obtained by cutting machine. Length is 10mm and aspect ratio is 104.8. (5g each) was accurately weighted in an electronic balance and water absorbed after 24h of continuous impression was determined .a mix was designed as per is 10262-1982 to achieve a concrete grade of M20 and M30.A sieve analysis conforming to IS 383-1970 was carried out for both fine and coarse aggregates.. The concrete mix was designed so as to achieve cube strength of 20 MPa and 30 mpa (28 days).

3.3.2. Mixing and casting:

Hand mixing was used for convenient handling of the concrete. Sand and cement were mixed dry and kept separately. Then coarse aggregates, dry mix of cement and sand were kept in three layers and approximate amount of water was sprinkled on each layer and mixed thoroughly. Mixing procedure was felt to be extremely tedious due to formation of small lumps .In order to avoid the formation of lumps the particles were randomly oriented in the mix. The column of both conventional and reinforced concrete specimens was casted. Each layer was compacted with 25 blows with 16 mm diameter steel rod

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3.3.3 Mix proportion of M40 grade concrete:

M40 grade of concrete has been designed as per IS code and the mix proportions is given as follows:

3.3.4 Selection of water cement ratio:

Various parameters like type of cement, aggregate, maximum size of aggregate, surface texture of aggregate etc are influencing the strength of concrete, when water cement ratio remain constant, hence it is desirable to establish a relation between concrete strength and free water cement ratio with materials and condition to be used actually at site.

From Table 3.1 of IS 456, maximum water cement ratio for M40mix = 0.55

From the trial mixes, water cement ratio is fixed as 0.50

0.50 <0.55, hence OK

3.4 Workability properties:

3.4.1 Slump Cone Test-

This test is used to determine the workability of concrete. The apparatus is a cone of 10cm top diameter, 20cm bottom diameter and 30cm height. It has two handles for lifting purposes. Initially, the cone is cleaned and oil is layers. Each layer is compacted 20 times by a standard tamping rod. After filling the cone, it is lifted slowly and carefully in the vertical direction. Concrete is allowed to subside and this subsidence is called slump.

If the slump is even, then it is termed as true slump. If one half of cone slides, it is called shear. If entire concrete slides, it is called collapse. Shear slump indicates that concrete is non-cohesive and shows a tendency for segregation. Generally, the slump value is measured as the difference between the height of the mould and the average height after subsidence. Slump test is found to be the simple test and is widely used

3.4.2 Compaction Factor Test:

The compaction factor test was developed at the Road Research Laboratory, UK and it is one of the most efficient tests for measuring the workability of concrete. This test is more precise and sensitive than the slump test and is particularly useful for concrete mixes of low workability as are normally encountered when concrete is to be compact by vibration. The compaction factor test is designed primarily for use in the laboratory. The apparatus consists of upper hopper, lower hopper and a bottom cylinder. The concrete to be tested is filled in the upper hopper to the brim. The trap door is opened so that the concrete falls in to the lower hopper. Then the trap of the lower hopper is opened and the concrete is allowed to fall into the cylinder. In the case of a dry mix, it is likely that the concrete may not fall on opening the trap door. In such a case, a slight poking by a rod may be required to set the concrete in motion. The excess concrete remaining above the top level of the cylinder is then cut off with the help of plane blades supplied along with the apparatus.

The concrete is weighed to the nearest 10 grams. This is known as weight of partial compacted concrete. The cylinder is emptied and then refilled with the concrete for four (or) five layers compacting each layer fully. The top surface of the fully compacted concrete is then struck off in level with the top of cylinder and weighed to the nearest 10 grams. This is known as weight of fully compacted concrete. The test set up for the compaction factor is in photo

Compaction factor is the ratio obtained when the weight of partially compacted concrete is divided by the weight of fully compacted concrete. The weight of fully compacted concrete can also be calculated by knowing proportions of materials, their respective specific gravities and the volume of the cylinder.

3.5 Tests on cement:

3.5.1 Standard Consistency –

The standard consistency of a cement paste is defined as that consistency which will permit the Vicat plunger of 10 mm diameter and 50 mm length to penetrate to a point 5 to 7 mm from the bottom of the Vicat mould Figure 3.1.

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The experiment was done as per IS 4031-Part IV.

3.5.2 Initial Setting Time Initial setting time is regarded as the time elapsed between the moments that the water is added to the cement to the time that the paste starts losing its plasticity. Experiment was done as per IS -269:1989, clause 6.3

3.5.3 Final setting time Final setting time is the time elapsed between the moments that the water is added to the cement and when the paste has completely lost its plasticity. Experiment was done as per IS -269:1989, clause 6.3

3.5.4 Fineness of Cement Fineness is a measure of total surface area of cement. For finer cements surface area will be more. Fineness influences the rate of hydration, rate of strength development, shrinkage and rate of evolution of heat. Experiment was done as per IS 4031-Part I-1996.

3.5.5 Density of Cement Le Chatelier's flask is used to determine density of cement as shown in Figure 3.2. Kerosene which does not react with cement is used. Experiment is done in Le Chatelier's flask.

3.5.6 Soundness of Cement The testing of soundness of cement is to ensure that the cement does not show any applicable subsequent expansion. Unsoundness in cement is due to excess of lime, magnesia or excessive proportion of sulphates. Experiment is done by Le Chatelier method. And the value of soundness is 1mm.

3.6 Tests on hardened concrete:

3.6.1 Compressive strength test (IS 5816: 1999)

Compressive strength is the capacity of a material or structure to withstand axial loads tending to reduce the size. It is measured using the Universal Testing machine.

Concrete can be made to have high compressive strength, e.g. Many concrete Structures have compressive strengths in excess of 50 MPa. Here the compressive strength of concrete cubes for the plain concrete and fiber reinforced concrete are found out using Compression testing machine. Three cubes were cast for each percentage of fibres and the average of the two compressive strength values was taken. A Compression testing machine is shown in Figure 3.8

3.6.2 Experimental Work
For experimental investigation axial load is applied on specimen. While testing care taken that the end surfaces on which concrete filled steel tubes keeping for testing should be plane. All specimens were tested in Compression Testing Machine and are simply supported at both ends.

3.6.2.1 Experimental Test Setup
The concrete filled steel tube specimens of different cross sections are tested for their load carrying capacity under axial compression on the compression testing machine. The actual test setup is as shown in following figure. The specimen of concrete is placed centrally on plates of compression testing machine and load is applied gradually. The capacity of compression testing machine in our college is 200 ton. The readings were taken on dial gauge and tabulated.

Figure 3.2 Curing of cube

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Fig 3.3 Testing of Compressive strength

3.6.3 Flexural Strength Test

The flexural strength of the size of the prisms of concrete its size is about 150mm×150mm×150mm of prism casted in the particular manner & is kept it for about 24 hours. After casting the prisms are kept for about 24 hours the prisms are de-moulded past 24 hours & reserved in a curing container for the curing purpose of about 7days, and 28days for flexural strength force test. Maintain the center to center distances the roller will be kepted i.e. 150mm of 60mm.

Fig. 3.4 Flexural strength testing

3.6.4 Modulus of Elasticity

Specimens of size 150mm diameter and 300mm height were used for the determination of modulus of elasticity as per IS: 516-1959.Concrete mixes with 10% latex content provided the average strength development for both compression and flexural strength. Hence elastic modulus test conducted for selected mix only. Specimens were loaded uniaxial in a compression testing machine and deformations were recorded using dial gauge of 0.01mm least count at an interval of 10kN until the peak load.

3.6.5 Rapid Chloride ion Penetration Test

Disc shaped test specimens of size 100 mm dia x 50mm thickness cut from the 100mm x 200mm cylinder were used for chloride diffusion studies as per ASTM C1202.The diffusion cell considered of two transparent chambers and was specially fabricated for the test on one side chamber I of the test set up contained Nacl solution (concentration 3.0m).The chloride ions from chamber I was forced to enter chamber II through the centrally placed concrete specimens, under effects voltage as well as difference in concentration of chloride ion on either side of the specimen.

IV. RESULT

4.1 General

The compressive and flexural performance of concrete confined with latex modified concrete structures will be investigated in detail. The mass content of Latex considered will be 5% and 10% and 15%, 20% of total mix proportion. Test results for the both (conventional and Latex mixed concrete) for axial compressive strength, for its flexural behaviour In flexure, the Latex Concrete is expected to increases the lateral load bearing capacity and the deflection several times larger than the concrete cubes with the addition of Latex. This experimental investigation is carried out under mix proportion i.e. M40 and the results of the durability tests are compared with the same mix proportionate concrete cubes.

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This section discusses of the results from hardened concrete i.e. 7 & 28 days. For getting the final results all the sample results are compared to other i.e. to standards. In this work we have done mix design of M40 grade & the high strength are achieved in final results are obtained.

4.2 Methods Adopted For The Testing Of Sample:

In this the characteristics properties of substance testing includes compressive strength, Modulus of elasticity, Rapid chloride test flexural force of the material.

4.3 Results of Compressive force testing of the Cubes

The compressive force tell us the material quality gives a strength of will be unswervingly of correlated of the hydrated structure which is the cement glue. The test is conducted to determine the strengths of hardened state concrete which is for developing the specimens of the concrete is very much important concrete. This test is most common test which is the concrete is hardened state of concrete. To get the compressive strength cube specimen are casted which of concrete is in the size of about 150mmX150mmX150mm. All over specimens are kept into water & will be warmed immediately after the water tank which is be in the state of soaking condition. The cubes come from moulds when it will be held in reserved dry condition in water for the 24 hours and after as it shall be taken for the cube testing. The testing will be conducted of those cubes which will keep for 7, 28 days of curing in tank. The sample (Normal concrete mould) will be fixed in between the jaws of compressive testing machine it will have a load capacity of about 2000KN. After placing the load is which applied from the compression testing machine through jaws to the cubes. The load is applied continuously up to the specimen i.e. mould fail to attain the compression load i.e. up to the specimen will be failed or a crack formation on it. The load is applied continuously without any disbelief and the rate increases endless. The specimen attains the maximum load will be recorded. The concrete shows failure in load carrying which will be noted simultaneously.

Table 2: Result of Compressive Strength of 5% Latex Modified concrete

MIXING MATERIAL WITH % OF (LATEX)	COMPRESSIVE STRENGTH (N/MM^2)	
	7Days	28Days
CC	37.193	58.26
MIX_1 (2%)	60.04	66.54
MIX_2 (3%)	60.54	66.44
MIX_3 (4%)	62.52	69.45
MIX_4 (5%)	61.52	67.25

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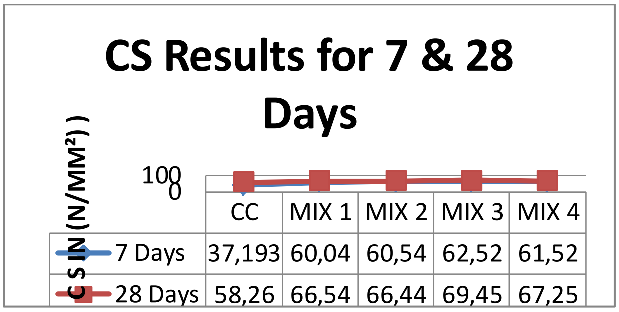
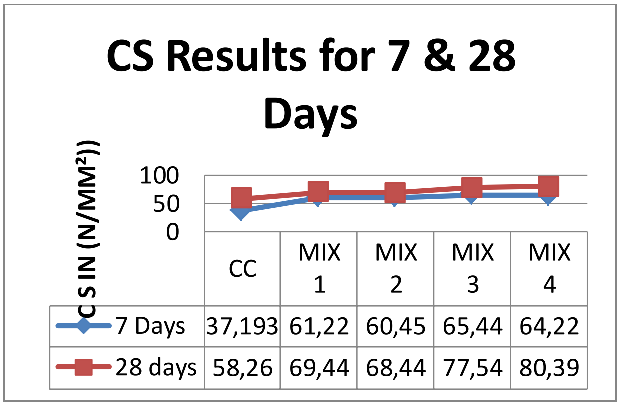


Graph:1 Shows 7 & 28 days C T results with various mixes of Latex

Table : 3 Result of Compressive Strength of 10% Latex Modified Concrete

MIXING MATERIAL WITH % OF (LATEX)	COMPRESSIVE STRENGTH (N/MM²)	
	7Days	28Days
CC	37.193	58.26
MIX_1 (7%)	61.22	69.44
MIX_2 (8%)	60.45	68.44
MIX_3 (9%)	65.44	77.54
MIX_4 (10%)	64.22	80.39



Graph: 2 Shows 7 & 28 days C T results with various mixes of Latex

Table: 4 Result of Compressive Strength of 15% Latex Modified Concrete

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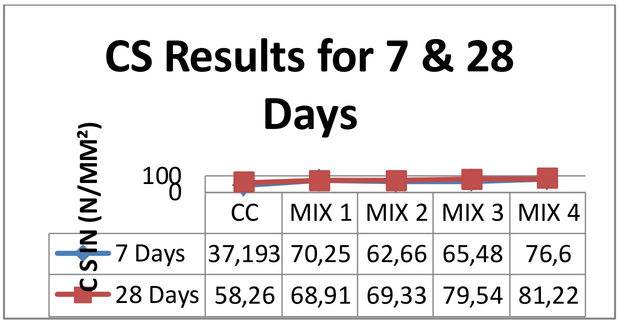
MIXING MATERIAL WITH % OF (LATEX)	COMPRESSIVE STRENGTH (N/MM²)	
	7Days	28Days
CC	37.193	58.26
MIX$_1$ (2%)	60.04	66.54
MIX$_2$ (3%)	60.54	66.44
MIX$_3$ (4%)	62.52	69.45
MIX$_4$ (5%)	61.52	67.25



Graph:3 Shows 7 & 28 days C T results with various mixes of Latex

Table : 5 Result of Compressive Strength of 20% Latex Modified Concrete

MIXING MATERIAL WITH % OF (LATEX)	COMPRESSIVE STRENGTH (N/MM²)	
	7Days	28Days
CC	37.193	58.26
MIX$_1$ (17%)	72.55	69.31
MIX$_2$ (18%,)	64.95	70.66
MIX$_3$ (19%,)	68.26	85.45
MIX$_4$ (20%,)	79.4	82.31

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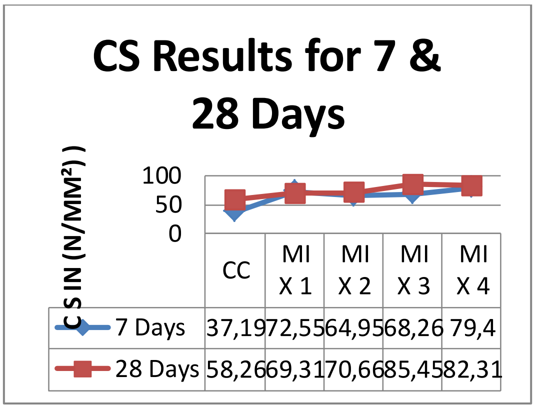
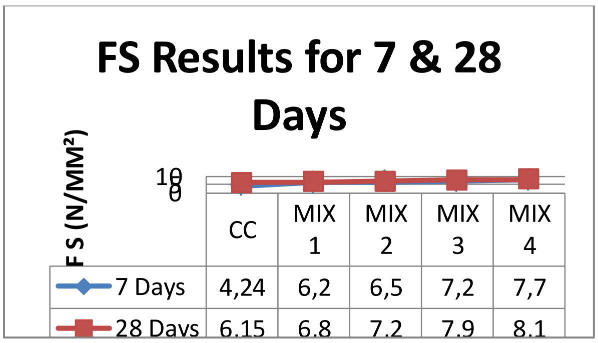


Graph:4 Shows 7 & 28 days C T results with various mixes of Latex

4.4 Results of Flexural Strength testing of the Concrete

Table :6 Result of Flexural Strength of 5% Latex Modified Concrete

MIXING MATERIAL WITH % OF (LATEX)	FLEXURAL STRENGTH (N/MM²)	
	7Days	28Days
CC	4.24	6.15
MIX_1 (2%,)	6.2	6.8
MIX_2 (3%)	6.5	7.2
MIX_3 (4%)	7.2	7.9
MIX_4 (5%)	7.7	8.1



Graph: 5 Shows 7 & 28 days C T results with various mixes of Latex

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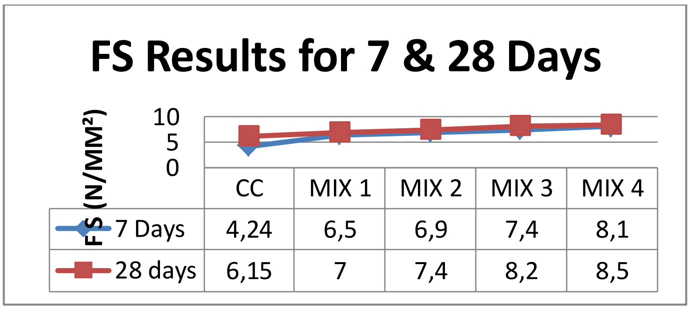
Table :7 Result of Flexural Strength of 10% Latex Modified Concrete

MIXING MATERIAL WITH % OF (LATEX)	FLEXURAL STRENGTH (N/MM²)	
	7Days	28Days
CC	4.24	6.15
MIX_1 (7%,)	6.5	7
MIX_2 (8%,)	6.9	7.4
MIX_3 (9%,)	7.4	8.2
MIX_4 (10%,)	8.1	8.5



Graph: 6 Shows 7 & 28 days C T results with various mixes of Latex

Table: 8 Result of Flexural Strength of 20% Latex Modified Concrete

MIXING MATERIAL WITH % OF (LATEX)	FLEXURAL STRENGTH (N/MM²)	
	7Days	28Days
CC	4.24	6.15
MIX_1 (17%,)	7	6.92
MIX_2 (18%,)	6.8	7.2
MIX_3 (19%)	7.5	7.02
MIX_4 (20%)	8.3	8.47

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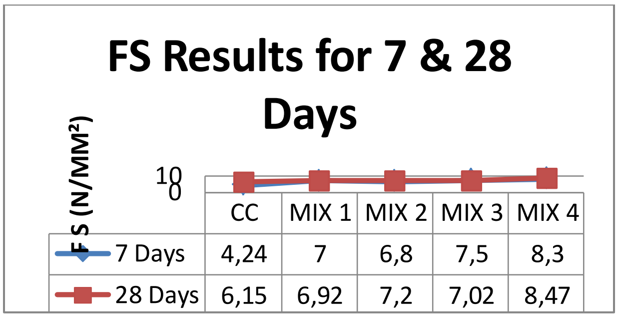


Graph:7 Shows 7 & 28 days C T results with various mixes of Latex

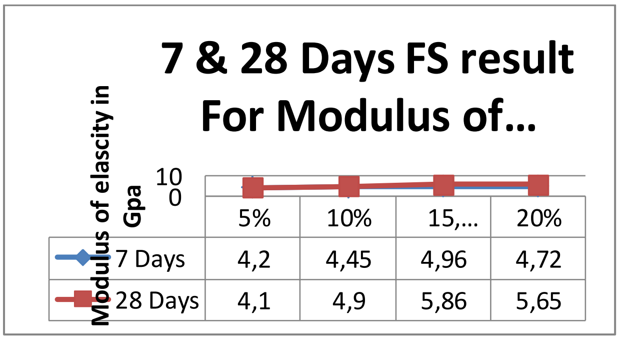
The flexural strength of the size of the prisms of concrete its size is about 150mm×150mm×150mm of prism casted in the particular manner & is kept it for about 24 hours. After casting the prisms are kept for about 24 hours the prisms are de-moulded past 24 hours & reserved in a curing container for the curing purpose of about 7days, and 28days for flexural strength force test. Maintain the center to center distances the roller will be kepted i.e. 150mm of 60mm. sample. Loading & supported with bearing of surface should be a clean, wipe, any loose sand material may will be removed from the specimen at the surface of prisms in which they may be contact to making with the rollers.

4.3. Modulus of Elasticity

Specimens of size 150mm diameter and 300mm height were used for the determination of modulus of elasticity as per IS: 516-1959.Concrete mixes with 10% latex content provided the average strength development for both compression and flexural strength. Hence elastic modulus test conducted for selected mix only. Specimens were loaded uniaxial in a compression testing machine and deformations were recorded using dial gauge of 0.01mm least count at an interval of 10kN until the peak load. Stress strain curves obtained from cylinder compressive strength test were shown in Figure 4. The elastic moduli of the selected concrete mixes are shown in Table 5.

Table: 9 Elastic Modulus of Concrete Mixes at 28 days

Latex Concrete	7 Days	28 Days
5%	4.2	4.1
10%	4.45	4.9
15%	4.96	5.86
20%	4.72	5.65



Graph: 8 Shows Result of Modulus of elasticity

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Fig 4.1 square section type of specimen for testing

4.4. Rapid Chloride Permeability Test

To verify the high degree of resistance to chloride penetration of the SBR latex modified concrete and comparison with conventional concrete.

This test covers the determination of the electrical conductance of concrete to provide indications of its resistance to chloride ions.

Disc shaped test specimens of size 100 mm dia x 50mm thickness cut from the 100mm x 200mm cylinder were used for chloride diffusion studies as per ASTM C1202.The diffusion cell considered of two transparent chambers and was specially fabricated for the test on one side chamber I of the test set up contained Nacl solution (concentration 3.0m).The chloride ions from chamber I was forced to enter chamber II through the centrally placed concrete specimens, under effects voltage as well as difference in concentration of chloride ion on either side of the specimen. Observations were made over a period of 6 hours under an electric voltage of 60V and total charge passed was calculated. Rate of chloride penetrations at the age of 28 days were shown in Figure 4 and in Table 5.The total charge passed is presented in Table.6.

Table: 10 Rate of Chloride ion Penetration

S.No	Time in mnts	Current Passed in mA			
		5%	10%	15%	20%
1	30	19	21	22	20
2	60	39	44	45	42
3	90	35	48	52	49
4	120	42	58	61	55
5	150	62	64	66	61
6	180	58	65	71	66
7	210	69	72	75	71
8	240	62	69	80	75
9	270	77	81	92	89
10	300	98	101	111	105
11	330	85	111	116	101
12	360	84	103	121	111

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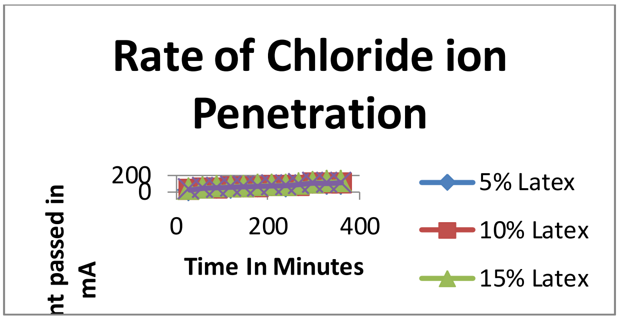

Graph: 9 Shows Result of Chloride test

Table: 11 Total Charge passed

S.No	Mix	Charge Passed (Coulombs)	Reference value as per ASTMC1202	Chloride ion Penetrability
1	5%	1752.35	1000-2000	Low
2	10%	1839.93	1000-2000	Low
3	15%	1148.52	1000-2000	Low
4	20%	958.32	1000-2000	Low

V. CONCLUSION

Latex modified concrete was developed focusing on the workability, strength development and durability. This study showed the effect of latex modification in mechanical property of latex modified concrete. The main variables were latex content 5% to 20% .The conclusions are as follows.

- Latex addition allows w/c ratio to fall by 0.05 to 0.15 without affecting the workability in all cases studied. It is expected that such fall in w/c ratio should increase strength more appreciably in the lower w/c ratio than higher w/c ratio. But it is observed that concrete in the lower w/c ratio has reducing effect of latex addition on compressive strength that the corresponding reduction in w/c ratio cannot compensate this effect.

- The reducing effect of latex addition on compressive strength of latex modified concrete could be attributed to incorporation of soft rubbery material in the matrix. Maximum reduction of compressive strength 22.87% at 28 days was observed at 15% latex addition in15% Mix
- Flexural strength increased with the increase of polymer binder ratio. Maximum increase of flexural strength was 21 at 15% latex addition for Mix at the age of 28 days. Flexural strength increased with the increase of polymer binder ratio..
- Elastic modulus decreased over unmodified concrete tendency is in agreement with increased deformability of latex modified concrete over unmodified concrete. The elastic modulus reduces by 20% Mix
- Because of the water reducing effect of styrene butadiene latex the porosity and effective chloride ion decreases Improved durability property of in respect of resistance to chloride ion resistance is due to latex film interpenetrating into hydrated cement gel.

The good results will be founded by the substitution of Mix i.e. 10%, 15% . To find the force of concrete, the concrete evaluated for the test of compression force of high strength concrete in which the replacement of material Latex and Concrete testing 7days, 28days. In every trail mix of our concrete mix will be tested by compressive, flexural Test. The Compressive Strength increases with the use of latex material. The maximum strength achieved in concrete having 15% latex , i.e., Mix 3.the strength increased 2.3% as compare to CC. The Flexural-Strength(force) also shows the enhancing in concrete strength with the presence of Latex, The maximum strength achieved in concrete having 15% Mix, i.e., Mix4.the strength increased 1.6% as compare with the normal

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concrete. Hence for an above experimental research has concluded that concrete with latex 15% partial replacement gives an optimum good result of forces and also helps in the strength & durability improvement properties of high strength concrete.

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