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Effect of elevate temperature on properties of self- compacting concrete containing steel fibers, glass fibre and polypropylene fibers

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ABSTRACT--*In this paper, an endeavour has been made to consider the utilization of Glass fibre, Steel fibre, and Polypropylene fibre on the properties of Self-Compacting-Concrete (SCC, for example, compressive quality mass misfortune when presented to raised temperatures. The impact Glass fibre, Steel fibre and polypropylene fibre as fractional substitution of concrete, added fibre (steel fibre, glass fibre, Polypropylene) content 1.2% for mixture of concrete material and utilizing M sand on the properties of SCC are researched. In solid blend utilized three kinds of M20, M25, M30 evaluation of cement. The examples of each solid blend were warmed up to various temperatures (Room temperature, 100°C,200°C). Every example testing utilized on three kinds of temperature the temperature was held steady at the greatest incentive for 0 hours, 60 minutes, 2 hours before cooling. Utilizing Ordinary Portland concrete, an expansion of around 20–23% in compressive quality. was seen at 28 days when polypropylene content was diminished from 20% to 30% Also test results obviously show that there is little improvement in compressive quality inside the temperature scope of 100°C–200°C. Testing of Steel fibre on temperature 100°C, 200°C, has expanded compressive quality contrasted with the ordinary steel fibre concrete.*

Keywords-- *Steel fibre, Glass fibre, Polypropylene Fibre, Self-compacted concrete, High temperature, Strength properties, Super plasticizer*

I. INTRODUCTION

In this exploratory examination, we will do throwing, relieving and testing process. In this assurance of pressure quality. Throwing will be accomplished for M20, M25, M30 grades. Here we are utilizing Glass fiber, Steel fiber, Polypropylene fiber of 1.2 % in the solid from this we can get a Compressive quality following 28 days of relieving.

After the restoring procedure, we put the cube 1 hour in daylight to cube for dry. After that applying the various temperatures on the cube, for example, room temperature, 100°C, and 200°C. Thy utilizing temperature timing for cube are 0 hours, 60 minutes, 2 hours, than we taking compressive quality of each solid shape.

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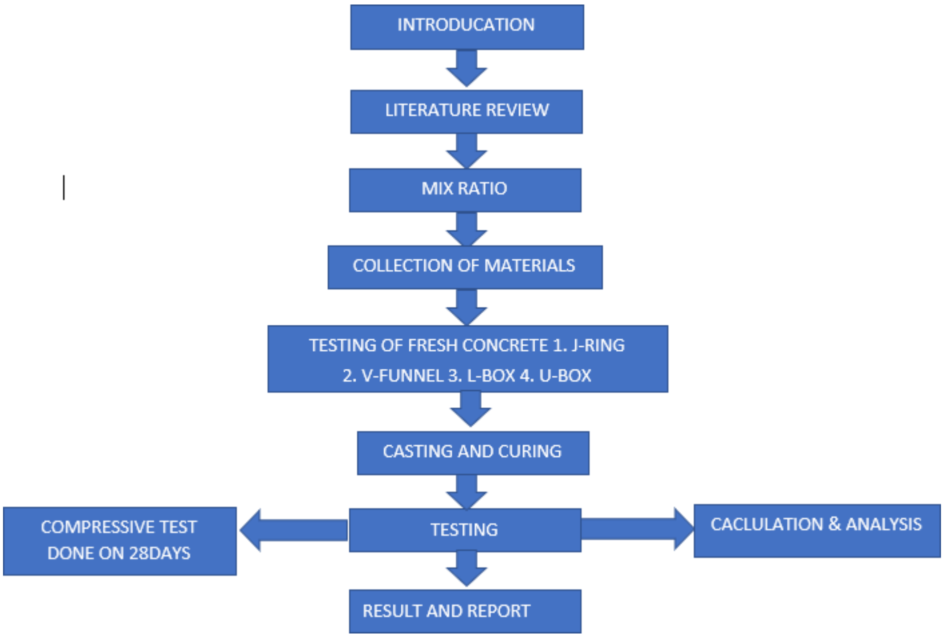
II. METHODOLOGY

The task work was begun by gathering all the materials required for example concrete, fine totals, fine totals, sand, concoction admixture (TECH - MIX550), and glass filaments. When the materials were gathered, sieving was accomplished for totals, utilizing mechanical sieving by which we gathered 20mm reviewed totals. Sand sieving was done physically and the sand going through 4.75mm sifter was gathered. 9 solid shapes were thrown with M-Sand subsequent to doing the droop cone test, stream table No: test, and J-Ring test. After 24hours they were saved for restoring 9cubes for 28 * day of the compressive test.



III. MATERIALS

1.1 CEMENT

In this trial work OPC, 53 evaluation is utilized .53 evaluation OPC gives high quality and solidness to structures on account of its ideal molecule size dispersion and predominant solidified structure. Being a high-quality concrete, it gives various focal points any place cement to the exceptional high-quality application is required, for example, in the development of high rises, spans, flyovers, smokestacks, runways, solid streets, and other substantial burden- bearing structures.

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Table 1 properties of cement

so no	properties	values
1	Fineness (%)	3
2	soundness (cm)	2.5
3	Initial setting time (min)	35
4	final setting time (min)	450
+	specific gravity	3.13

1.2 FINE AGGREGATE M-SAND

- It is well graded in the required proportion.
- It does not contain an organic and soluble compound that affects the setting time and properties of cement, thus the required strength of concrete can be maintained.
- It does not have the presence ofimpurities such as clay, dust and silt coatings, increase water requirements as in the case of river sand which impair bond between cement paste and aggregate. Thus, increased quality and durability of concrete.
- M-Sand is obtained from the specific hard rock using the state of the art International technology, thus the required property of sand is obtained.

Table 2 properties of fine aggregate

so no	properties	Values
1	specific gravity	3.6
2	fineness modules	3.7
3	water absorption (%)	4.16

1.3 COARSE AGGREGATE

- Coarse total is the bit of the solid which is comprised of the bigger stones inserted in the blend
- The size of coarse total is utilized is 20mmTable 3 properties of coarse aggregate

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so no	properties	values
1	specific gravity	2.9
2	fineness modules	7.468
3	water absorption (%)	2.68

1.4 SUPER PLASTICIZER

In this superplasticizer is used TECH MIX 550. It acts as the water reducer agent and it is especially used in high strength concrete. In this experimental work for M60 grade, 1 % of superplasticizer is used in the Cementitious material.

1.5 FIBRES:

2..5.1 Properties of Glass Fibre:

Glass Fiber:

Properties	Descriptions
Length	12mm
Chemical Resistance	Very High
Tensile Strength	1700Mpa
Specific Gravity	2.69g/cm³
Melting Point	1720°C to 3128°C

3.5.2 Properties of Steel Fibre:

Steel Fiber:

Properties	Descriptions
Cross Section	Hook-end
Diameter	0.3mm
Length	50mm
Density	7900kg/m³
Heat Resistance	Good
Tensile Strength	500-2000N/mm²
Specific Gravity	7,90 g/cm³

3.5.3 Polypropylene Fibre:

Polypropylene Fiber:

Properties	Descriptions
Diameter	0.04 mm
Length	12 mm
Heat Resistance	<130
Tensile Strength	450(Mpa)
Specific Gravity	0.91 g/cm³
Melting Point	165°C
Elongation Break	15-15%

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IV. MIX RATIO

Blend configuration is accomplished for every one of the three evaluations for example M20, M25, M30. Configuration is finished by the IS technique from IS 10262:2009 and IS 456: 2000. Including the 1.2 % of glass fiber, steel fiber, and polypropylene fiber and utilizing Self- compacting cement and superplasticizer is utilized 1.5% in the cementitious material.

Table: mix proportion

Grade of concrete	Mix Ratio	W/C	Admixture	Fibre
M20	1:1.8:2.27	0.45	Super plastizer (Tech Mix 550) Using 01%	1.2 % of Glass Fibre, Steel Fibre, Polypropylene Fibre
M25	1:1.6:2.9			
M30	1:1.4:2.6			

2. Workability test (slump cone test)

- Slump test esteem 79mm for each evaluation
- The solid droop test gauges the consistency of new cement before it sets.
- It is performed to check the usefulness of newly made cement, and accordingly the simplicity with which solid streams.
- It can be likewise be utilized as a pointer of an inappropriately blended clump.

A droop cone test is directed for every one of the three evaluations of cement for example M20, M25, and M30. On account of utilizing superplasticizer shows greater functionality when contrasted with M20, M25, and M30.

V. COMPRESSION STRENGTH

- The pressure quality of cube gives us the data about the potential quality of the solid blend from the which it is examined.
- It helps in deciding if right blend extents of different materials were utilized to get the ideal quality.
- It helps in deciding the pace of addition of solidarity of solid examples if shapes from the example are squashed at various timeframes

Figure: Compression strength test

The size of the cube is 150 X 150 X 150 . The test has been done for 28 days. The obtained result is compared with conventional concrete and concrete along with glass fiber, steel fiber and polypropylene fiber.

2.1 *Compression Strength for Addition Steel fibre Concrete M20 28 Days.* Table no: 4.4 compression strength for Addition Steel fibre Concrete

Addition Mixture	No. of cubes	No. of cubes for testing	Compression Strength (N/mm2) 28Days	
		Room temp		
			37.7	
		3	31.7	33.5
			31.1	
Steel Fibre	9	100°C		
			25	31
		3	32	
			36	
		200°C		
			21	26.1
		3	28	
			29.4	

2.2 Compression Strength for Addition Glass fibre Concrete M20 28 Days.

Table no: 4.4 compression strength for Addition Glass fibre Concrete

Addition Mixture	No. of cubes	No. of cubes for testing	Compression Strength (N/mm2) 28Days	
Glass Fibre	9	Room temp		
		3	26.6	2 3 . 6
			20.7	
			23.7	
		100°C		
		3	21	2 4 . 5
			23.8	
			28.9	
		200°C		
		3	24.4	2 4 . 9
			26.8	
			23.7	

2.3 Compression Strength for Addition polypropylene fibre Concrete M20 28 Days.

Table no: 4.4 compression strength for Addition polypropylene fibre Concrete

Addition Mixture	No. of cubes	No. of cubes for testing	Compression Strength (N/mm2) 28Days	
Polypropylene Fibre	9	Room temp		
		3	23.6	2 0 . 5
			20.5	
			17.6	
		100°C		
		3	21.3	2 0
			21.8	

			18.7	.5
		200°C		
		3	17.6	19.1
			19.7	
			20	

VI. CONCULSION:

GLASS FIBER:

The compressive strength is increasing 8-9% till on 200°C of temperature compare to normal concrete and same thing happening with the M25 and M30 grade of concrete.

STEEL FIBER:

The compressive strength is increasing 15-25 % till on 200°C of temperature compare to normal concrete and same thing happening with the M25 and M30 grade of concrete.

POLYPROPLYENE:

The compressive strength is increasing 10-11% till on 100°C of temperature compare to normal concrete.

But on 200°C the Compressive strength id decreasing gradually and same thing happening with the M25 and M30 grade of concrete.

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