ASSESS THE STRENGTH OF CONCRETE WITH M-SAND USING ADMIXTURE - SIKA

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ABSTRACT : The experiment is carried out to assess the strength and workability of concrete using M sand. We add the admixture of SIKA to increase the strength at very short days of curing. As decreasing the days of curing that result in increases the time management in construction. The specimens were allowed for curing and determine the compressive strength, flexural strength and split tensile strength.

***Keywords*: M-sand, sika, compressive strength ,flexural strength and split tensile strength.**

INTRODUCTION

General:

The global consumption of natural sand is very high due to extensive use of concrete. In general, the demand of natural sand is quite high in developing countries to satisfy the rapid infrastructure growth, in this situation developing country like India facing shortage in good quality natural sand. Particularly in India natural sand deposits are being depleted and causing serious threat to environment as well as society. Hence for upcoming sustainable construction an alternative for natural sand is must. Usage of artificial sand helps to overcome environmental problems and protect the river bed against erosion also sustain as filter for ground water.

SIKA ADMIXTURE:

Sika was found in 1910 with the advent of the very first construction chemical called Sika 1. Their admixture range includes super plasticizers, high performance plasticizers, water proofing admixture, mineral admixture, accelerators/sprayed concrete, air entraining agents, pumping aids, quick setting compounds, corrosion inhibitors and curing compounds. Sikament is a new concrete. Its use allows the design of concrete to obtain high and exacting structural standards. Sikament additive with their high water reduction and workability retention properties gives,

1. High early strength
2. High ultimate strength
3. Low permeability
4. High flow ability
5. Optimum cement content
6. Pumpable concrete

Sikament has been used in several construction project namely

1. Second Howrah Bridge
2. Metro Rail, Kolkata
3. Thane Creek Railway Bridge
4. Sampada Railway station

It is used in the production of self compacting concrete. It is extremely cohesive and flowable without segregration, which makes SCC capable of being placed without vibration.

ADVANTAGES:

PERFORMANCE:

Its fluid and soft consistency allows fast placing of concrete.

NOISE REDUCTION:

Placing the concrete without vibration gives a dramatic reduction in noise.

ECONOMY:

Speed of placing and possible reduction in man power and equipment result in lower overall cost.

FLOW ABILITY:

It allows production of complex and fine elements even through congested reinforcement.

DURABILITY:

A more homogeneous surface layer is formed which will reduce the permeability and increase resistance against chloride ingress, and other chemical attack.

DOSAGE:

Permitted dosage - ≤5% by weight of the cement [the effect of a higher dosage on the performance and durability of the concrete must be verified]. Low dosage – admixture quantities <0.2% of the cement are only allowed if they are dissolved in part of the mixing water. If the total quantity of liquid admixture is >3L/m³ of concrete, the water quantity contained in it must be included in the W/C ratio calculation. If more them one admixture is added, their compactability must be verified by specific testing.

LITERATURE REVIEW:

Shanmugapriya et al.(2012) concluded from experimental researches that compressive and flexural strength of concrete can be improved by partial replacement of cement by silica fume and manufactured sand for natural fine aggregates. They suggested that optimum replacement of natural sand by manufacture sand is 50%.

Saeed Ahmad et al.(2008) have found that compressive strength of various mix ratios increased from 7% to 33% whereas workability decreased from 11% to 67% with increasing proportion of manufacture sand .

Shyam prakash et al.(2007) says that manufacture sand satisfies then requirements fine aggregate such as strength, gradation, shape angularity. It is also possible to produce manufacture sand falling into the desired grade. They say that the mechanical properties of manufacture sand depend upon the source of its raw material i.e., parent rock. Hence the selection of the quarry is very important ton quality fine aggregate.

Mahendra R Chitlange et al.(2010) experimentally proved that due to addition of steel fiber to natural sand concrete and manufacture sand concrete there is a consistent increase in flexural and split tensile strength whereas there is only a marginal rise in compressive strength.

METHODOLOGY:

The methodology is carried out as shown below**:**

- Journals are collected and reviewed for more classify of experimental work. Therefore basically the research is experimental oriented.
- The materials were procured as per the quantities in the design and tests were performed to evaluate the properties of materials.
- Conventional concrete was prepared and kept as a reference mix
- Further, the admixture Sika is added to the concrete with complete replacement of river sand by M sand.
- Concrete cubes, beams and cylinders are casted and cured for a period of 7,14and 28 days.
- The water level was maintained in such a way that to keep the specimens completely immersed.
- After the curing period is achieved, compressive strength test, flexural strength test, split tensile strength test were performed.
- Lastly the results were tabulated and compared with respect to conventional concrete and conclusions remarked.

MIX DESIGN – M 30:

The bureau of Indian Standards, recommended a set of procedure for design of concrete mix mainly based on the work done in national laboratories. The mix design procedures are covered in IS:10262-2009.Those methods can be applied for both medium strength and high strength concrete. The following mixes are designed are based on Indian Standards recommended methods of concrete mix design IS:10262-2009.

Ratio:

Cement	**Fine Aggregate**	**Coarse Aggregate**	**Water**
492.90	745.53	1207.77	0.40
1	1.51	2.45	

Material Test and Properties:

Cement: Ordinary portland cement of 53 grade satisfying the requirements of IS 12269 – 1987 was used in preparation of cement mortar. The properties of cement were tabulated below**.**

S.No	**Properties**	**Findings**
1	Fineness	1%
2	Initial Setting Time	30 minutes
3	Final Setting Time	290 minutes
4	Specific Gravity	3.0

Fine Aggregate: The properties of manufacture sand is found out and the results are given. It was used as the fully replacement of river sand. This material was confirm to zone Ⅱ of IS 383 : 1970. Manufacture sand consists of elongated particles and rough surface texture.

S.No	Properties	Manufactured Sand
1	Specific Gravity	2.8
2	Moisture Content in %	0.30
3	Sieve Analysis weight of fine Aggregate Zone	500 g 2

Coarse Aggregate: Crushed angular aggregate with maximum grain size of 20mm.

S.NO	Properties	Findings
1	Impact Test	11%
2	Abrasion Test	20.95%
3	Specific Gravity	2.8
4	Water absorption Test	0.8%

Water: Portable Drinking water was used for mixing and curing of the concrete.

Experimental Procedures:

In this, the strength characteristics of concrete is calculated using manufacture sand for the grade of concrete M30. The M-sand is fully replaced for fine aggregate. For the present investigation, concrete cubes, cylinders and prism must be casted and test after 28 days of curing. The tests were carried out to obtain. Compressive strength, split tensile strength and flexural strength of concrete at the age of 28 days**.**

Compressive Strength Of Concrete Cubes:

- To obtain compressive strength 18 cubes were casted
- Compressive strength of concrete was investigated by 7,14,&28 days curing age.
- The summary of the result are tabulated.

Compressive strength of concrete:

Sl. No	Days	Concrete without admixture	Concrete with admixture
1.	7 days	34.07	36.09
2.	14 days	41.18	46.46
3.	28 days	57.77	61.32

Result:

- We found that the target compressive strength is achieved by adding the admixture sika.
- There was increases in compressive strength when compared with conventional concrete

Flexural Strength Of Concrete Prisms:

- To obtain Flexural strength 18 prisms were casted
- Flexural strength of concrete was investigated by 7,14,&28 days curing age.
- The summary of the result are tabulated

Flexural strength of concrete:

Sl. No	Days	Concrete without admixture	Concrete with admixture
1.	7 days	2.55	3.10
2.	14 days	3.73	3.66
3.	28 days	3.60	3.92

Result:

- We found that the target Flexural strength is achieved by adding the admixture sika.
- There was of increases in Flexural strength when compared with conventional concrete.

Split Tensile Strength Of Concrete Cylinders:

- To obtain split tensile strength 18 cylinders were casted
- Split tensile strength of concrete was investigated by 7,14,&28 days curing age.
- The summary of the result are tabulated.

Tensile strength of concrete:

Sl. No	Days	Concrete without admixture	Concrete with admixture
1.	7 days	2.03	2.42
2.	14 days	3.46	3.81
3.	28 days	3.75	4.02

Result:

- We found that the target split tensile strength is achieved by adding the admixture sika.
- There was of increases in split tensile strength when compared with conventional concrete.

Conclusion:

The following conclusion can be drawn based on result obtained; the admixture sika is used for best results in producing high early strength for concrete structures.

Maximum compressive strength was observed for mix containing admixture sika. The compressive strength was increase when compared with conventional concrete.

Result of split tensile strength show the same trend as in case of compressive strength, Maximum split tensile strength was observed for mix containing admixture sika. There was increase in flexural strength when compared with conventional concrete.

The maximum flexural strength was observed for mix with admixture sika. There was increase in flexural strength compared with conventional concrete.

It is observed that the compressive strength, split tensile strength and flexural strength of concrete is improved by using admixture sika.

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