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Self Curing of Concrete

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ABSTRACT: As water is becoming a scarce material day-by-day, there is an urgent need to do research work pertaining to saving of water in making concrete and in constructions. Curing of concrete is maintaining satisfactory moisture content in concrete during its early stages in order to develop the desired properties. However, good curing is not always practical in many cases. Curing of concrete plays a major role in developing the concrete microstructure and pore structure and hence improves its durability and performance. Keeping importance to this, an attempt has been made to develop internal-curing concrete by using Poly Ethylene (PEG-400). In this experimental investigation the strength characteristics of Normal Strength Concrete and high strength concrete, cast with the self-curing agent PEG-400 have been studied and compared with the corresponding conventionally cured concrete. IS method of mix design was adopted, for the normal strength internal curing concrete of grade M20 and for M50 grade of concrete is design on trial and error basis. For producing internal-curing concrete trial dosage of 1%, 2% and 3% of PEG-400 by weight of cement was used and tested. It was observed that after implementation of new technique the water consumption for Curing was significantly reduced by 100%
Keyword- To prevent evaporation from temperature, compressive strength, economical at desert, etc.

I.INTRODUCTION

Curing plays a chief function in the growth of concrete properties throughout construction. Curing is often used to provide the method by which hydraulic cement concrete mature and increase hardened property more than time as a product of the constant hydration of the cement in the occurrence of enough water (ACI, 2008). The function of curing is to lessen water disappearance from concrete and keep acceptable moisture content, especially throughout early ages, for continuance of the hydration method that is essential for the growth of cement microstructure. This will lead to a improved class cement adhesive and concrete and will help to attain the preferred properties. Though, good curing is not realistic in lots of cases and a amount of researchers have questioned whether it is feasible to set up self-curing concrete. It was establish that the improvement of use self-curing agent is to lessen water fading from concrete, therefore rising its water preservation capability compare with that of conservative concrete and that water soluble polymers may have this potent. Building industry make use of bunch of water in the name of curing. The days are not far-off that all the building industry has to button over to an substitute curing system, not simply to save water for the sustainable growth of the atmosphere but also to encourage inside and open-air construction behaviour even in inaccessible areas where there is shortage of water.

II.NEED OF SELF-CURING

When mineral admixtures respond totally in blend system, their require for curing can be lot larger than that in a conservative normal cement concrete. When this water do not willingly obtainable, due to percolation of capillary porosity. Due to contraction happening throughout cement hydration, vacant pores are formed inside cement paste, most important to a diminish in its interior relative dampness and also to contraction which may reason early-age crack. This state is intensified in HPC due to normally advanced cement content, abridged water/cement (w/ c) percentage (fly ash, silica fume). The unfilled pores formed during self-desiccation bring contraction stresses and also control the kinetics of cement hydration procedure, restraining the last degree of hydration. The strength achieve by IC might be additional than that probable under soaked curing circumstances. frequently especially in HPC, it is not simply achievable to offer curing water from the top face at the rate necessary to gratify the current chemical contraction, due to the particularly low permeability's frequently achieved.

III.SIGNIFICANCE OF SELF-CURING

When mineral admixtures reply entirely in a combine cement structure, their order for curing water can be a lot better than that in a conservative ordinary cement concrete. When this water is not willingly obtainable, important autogenously bend and cracking may consequence. Due to chemical contraction taking place throughout cement hydration, vacant pores are created inside the cement adhesive, chief to a decrease in its inner relative dampness and to contraction which can reason early-age cracking.

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Potential material for internal curing:-

The subsequent materials can give internal water reservoir:

- Aggregate
- Fine aggregate
- OPC cement
- Polyethylene Glycol PEG

IV.METHODOLOGY

Self-Curing of Concrete using Polyethylene Glycol PEG-400

Experimental Programme:

The experimental program was designed to investigate the strength of internally cured concrete by adding **polyethylene glycol PEG-400 @ 1%, 2% and 3%** by weight of cement to the concrete. The experimental program was aimed to study the compressive strength. In this investigation cube compressive strength of conventionally cured normal strength and high strength concrete has been compared with normal strength and high strength internal cured concrete for this experimental program mixes of M20 GRADE and M50 GRADE as normal strength and high strength respectively were considered.

Mix Design Tests:

The test done on the materials for the mix design:

- Sieve Analysis of fine Aggregates (IS: 2386 Part I 1963)
- Specific Gravity of Sand (IS: 2386 Part III 1963)
- Water Absorption of aggregates (IS: 2386 Part III 1963)
- Specific Gravity of Coarse Aggregate (IS: 2386 Part III 1963)

V.CONCLUSION

TABLE NO.5.1 : Compressive strength results

Grade	Mix	Average compressive strength(N/mm$^{2)}$			
		3 days	7days	14days	28 days
M20	CC	14.56	15.82	18.32	24.53
	1% PEG	19.43	20.46	22.8	25.93
	2% PEG	14.66	18.8	21.10	23.13
	3% PEG	12.33	14.53	17.23	20.96
M50	CC	31.96	35.02	40.39	51.13
	1% PEG	34.02	42.24	46.29	53.20
	2% PEG	35.09	47.15	50.42	56.98
	3% PEG	31.81	38.13	43.52	52.23

➢ The self-curing agent PEG-400 was found to be effective.

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- It was found that every grade of concrete has one optimum percentage of dosage which it requires to give the maximum strength.
- It was found that PEG at an optimum dosage gives a better results whereas adding it in excess may decreases the strength of concrete
- Also it was found that the optimum dosage for M20 was 1% and for M50 it was 2% so with this we can conclude that with the increase in grade of concrete it is required to increase the dosage of self-curing agent for better results.
- Compressive strength of concrete with 1% and 2% PEG-400 dosage gives higher compressive strength as compared to conventionally cured concrete.
- As the dosage of PEG-400 increases the strength of concrete reduces.
- The compressive strength of conventional concrete at 28 days can be obtained in 7 days and 14 days by adding 1% and 2% PEG-400 respectively with conventional concrete.
- By the use of PEG-400 it is observed that the workability of concrete also increases and concrete becomes flowable.
- We conclude that use of PEG-400 is a better option to form an internally cured concrete which does not require any external curing water without compromising with its strength
- 100% curing water can be saved as there is no need of curing process required for internally cured concrete.
- It has been observed during testing, internally cured concrete (conventional mix + PEG400) shows lesser cracks than the conventional concrete.
- It is observed that price of PEG-400 is 544Rs/kg whereas PEG-4000 is 800Rs/litre hence PEG-400 is more economical self-curing agent.
- The cost of conventional concrete was same as internally cured concrete.
- As Gujarat sand was used in this investigation which is of superior quality, therefore the cost of concrete is higher than the usual hence this factor might have come different if locally available sand would have been used.

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