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"STUDY ON DIFFERENT TYPES OF CURING METHODS ON COMPRESSIVE STRENGTH OF CONCRETE"

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Abstract: ***The use of super absorbent polymer (SAP) in concrete is proven to have many positive effects on the properties of concrete in its both stages; fresh concrete and hardened concrete. This study focuses on the use of an optimum amount of Sodium Polyacrylate as a super absorbent polymer in ordinary plain concrete. One of the major improvements that the SAP can contribute to the concrete is by providing internal water source. This internal water source acts as internal curing agent after the final setting of concrete. At the same time the SAP releases water at relatively slower rate at the fresh concrete stage. The SAP also provides additional voids in the concrete mass. These voids affect the concrete strength negatively at the same time improve the concrete performance by improving the concrete workability and placeability, reducing the concrete susceptibility to freezing thawing cycles, and improving concrete stability***

The leaching of major and trace elements from concrete made with Portland cement, fly ash and GGBS (ground granulated blast-furnace slag) was studied using pH static availability and tank leach tests. The release of substances during the tank leach test occurs by surface dissolution of phases at the concrete surface and diffusion inside the concrete, the amounts depending on the phases controlling solubility and concrete porosity. Alkali release is controlled by diffusion and is thus reduced by lower water/binder ratios and the replacement of Portland cement by fly ash. Ca, Al and S release occurs mainly by surface dissolution of portlandite and AFt/AFm, respectively. The release of V is determined by surface dissolution of V substituted ettringite and/or calcium vanadate. Although fly ash can increase the total V content of concrete, enhancing release, only 2% of the total V content in concrete was available for release.

Keywords –M30Grade Concrete Curing, Concrete Strength, Gel, Super Absorbent Polymer, Voids,Flyash,GGBS.

I . INTRODUCTION

1.1 INTRODUCTION:

The SAP absorbs water and converts it into gel, then releases it slowly with time. This property was very useful when it comes to watering plants over time. This study showed similarity between concrete and plants when it comes to the need of continuous water supply. Excess amount of SAP will leave the concrete with large amounts of voids, which in turn reduces the concrete strength and durability. Small amount of SAP, on the other hand, will have negligible effect on the concrete performance. The amount of water added to the fresh concrete is one of the most

important key factors that affect the concrete properties, including durability and strength. The water is an essential ingredient needed for the hydration process in the fresh concrete and for the curing process in the hardened concrete at its early stages.

Excessive amount of water added in the fresh concrete improves the concrete workability in general, reduces the concrete strength, and increases the drying shrinkage of the hardened concrete.Different admixtures were used to reduce the amount of water demand in the fresh concrete without jeopardizing the workability.Water reducer admixtures were used extensively in the ready mix plants. The mostcommon admixture used nowadays is the superplasticier.

Concrete has been the major instrument for providing stable and reliable infrastructure since the days of Greek and roman civilization. Concrete is the most world widely used construction material. The increase in demand of concrete more the new method and materials are being developed for production of concrete. Concrete is a mixture of cement, water, and aggregates with or without chemical admixtures. The most important part of concrete is the cement. Use of cement alone as a binder material produces large heat of hydration. Since the production of this raw material produces lot of CO2 emission. The carbon dioxide emission from the cement raw material is very harmful to the environmental changes. Nowadays many researchers have been carried out to reduce the CO2. The effective way of reducing CO2 emission from the cement industry is to use the industrial by products or use of supplementary cementing material such as Ground Granulated Blast Furnace Slag (GGBS), Fly Ash (FA), and Silica Fume (SF) and Meta kaolin (MK). In this present experimental work an attempt is made to replace cement by GGBS to overcome these problems. River sand has been used as a major building material component. Its wellgraded and that all sizes grains are well distributed in a givensample.

II. PROBLEM STATEMENT

To solve the issues related to curing of slab such as evaporation loss, strength parameter, excessive materials requirement and labor costs that is incurred in conventional method of curing.in scarcity period water curing problems.

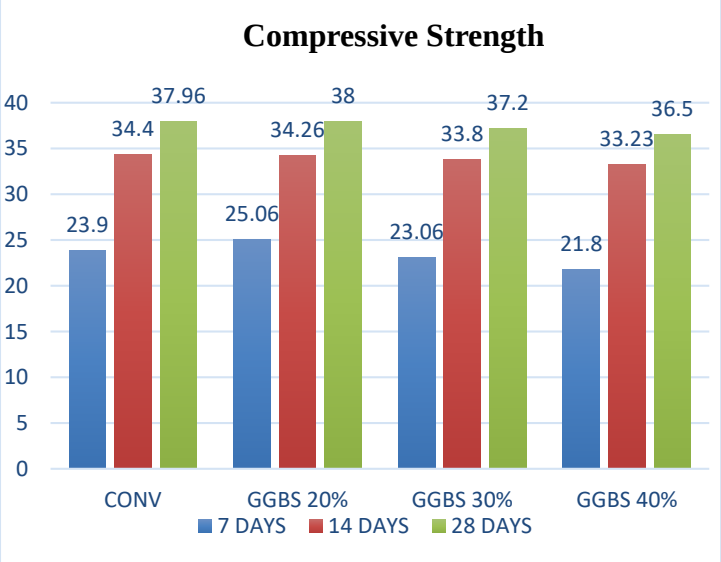
III. OBJECTIVES OF THE WORK

1. Design for M30 grade concrete.
2. To study the characteristic strength of concrete when cement replace with GGBFS & FLY ASH by 20%,30% &40%.its cured with different curing techniques and compare the result.
3. We analyze the below outcome
   1) water curing
   2) super absorbent polymer
4. Make the concrete cubes various curing methods and compare its result.
5. To analyse the most effective curing method.

IV. RESULT & DISCUSSION

WATER CURING

Normal concrete block M30

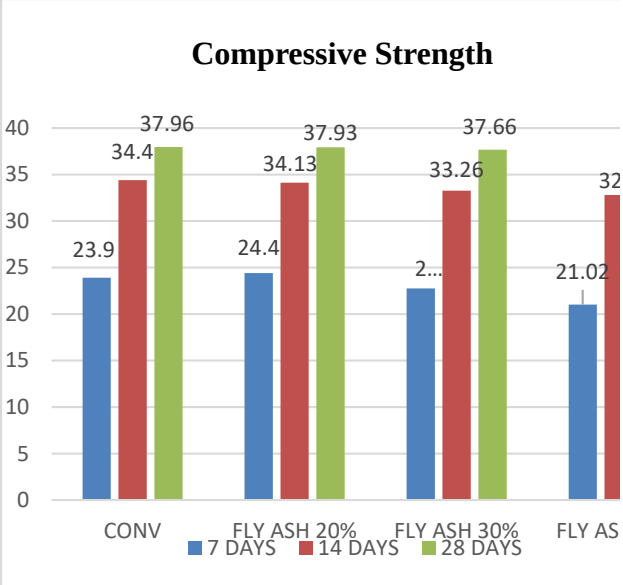


Graph.1 Compressive Strength (Replace cement 20%,30%,40% by GGBS)
Water Curing

Discussion

1. In 7 days acquire 63% strength.
2. In 14 days acquire 85% strength.
3. In 28 days acquire 98% strength.
4. The outcomes of compressive strength prove that there is compare with 20% replacement of GGBS & compare of 40% replacement of GGBS compressive strength of concrete going decrease as compare with 20% replacement in water curing.
5. It is observe that GGBS is good replacement for cementious material in concrete.
6. If proportion of GGBS increases strength will be decreases.

Replace20%,30%,40% CEMENT by FLY ASH



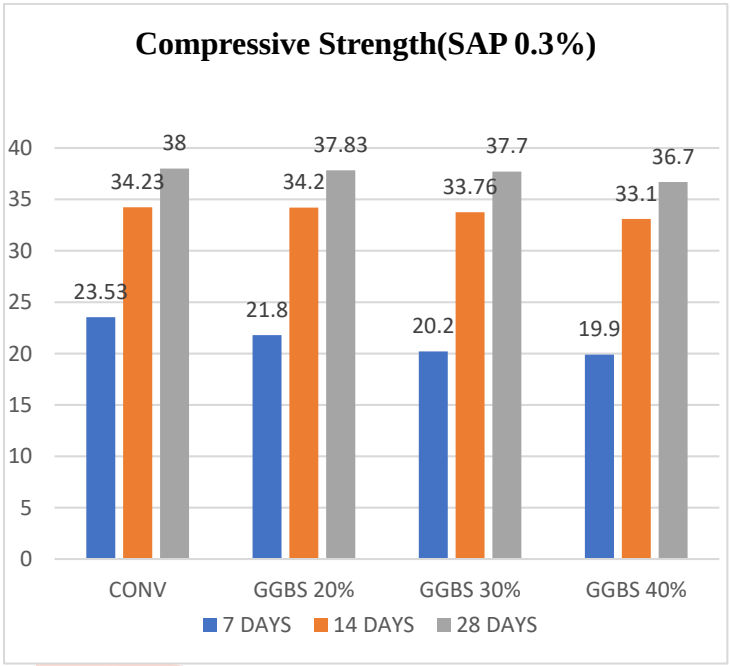
Graph.2 Compressive Strength (Replace cement 20%,30%,40% by Fly ash)
Water Curing

Discussion

1. In 7 days acquire 63% strength.
2. In 14 days acquire 84% strength.
3. In 28 days acquire 93% strength.
4. The outcomes of compressive strength prove that there is compare with 20% replacement of Fly ash & compare of 40% replacement of Fly ash compressive strength of concrete going decrease as compare with 20% replacement in water curing.
5. If proportion of Fly ash increases strength will be decreases.
6. If we increase replacement percentage of Fly ash & GGBS the compressive strength will be decrease as compare with Less percentage replacement and normal concrete block(OPC).
7. In replacement of GGBS and Fly ash,GGBS acquire more compressive strength than fly ash.

Self curing concrete by using super absorbent polymer (SAP)

Normal concrete block M30
Adding SAP 0.3 % Of Cement



Graph.3 Compressive Strength (Replace cement 20%,30%,40%by GGBS)

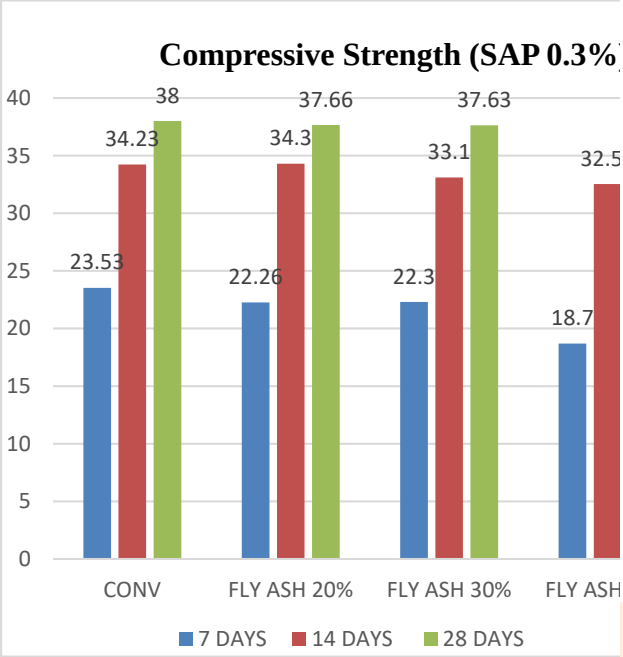
Self Curing (SAP)

Discussion

1. In 7 days acquire 60% strength.
2. In 14 days acquire 87% strength.
3. In 28 days acquire 98% strength.
4. The outcomes of compressive strength prove that there is compare with 20% replacement of GGBS & compare of 40% replacement of GGBS compressive strength of concrete going decrease as compare with 20% replacement.
5. It is observe that GGBS is good replacement for cementious material in concrete.
6. If we increase replacement percentage of Fly ash & GGBS the compressive strength will be decrease as compare with Less percentage replacement and normal concrete block(OPC).
7. The self cured concrete in which sap was used in scarcity area,and its very helpful for curing.its reducing curing problem.
8. The self curing admixture sap in the concrete mixes helps to increase properties of concrete of which to the good water retention.

Replace 20%,30%,40% CEMENT by FLY ASH

Normal concrete block M30
Adding SAP 0.3 % Of Cement



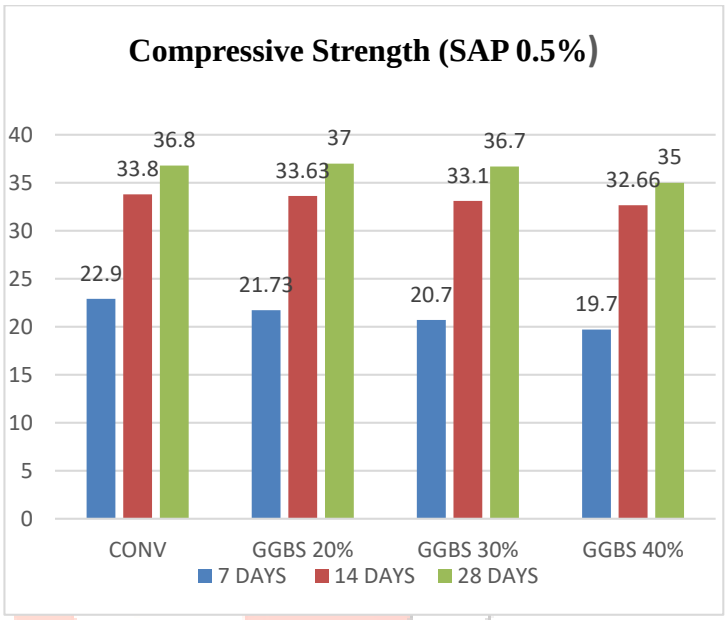
Graph.5 Compressive Strength (Replace cement 20%,30%,40% by Fly ash)
Self Curing (SAP)

Discussion

1. In 7 days acquire 57% strength.
2. In 14 days acquire 86% strength.
3. In 28 days acquire 96% strength.
4. The outcomes of compressive strength prove that there is compare with 20% replacement of Fly ash & compare of 40% replacement of Fly ash compressive strength of concrete going decrease as compare with 20% replacement in water curing.
5. If proportion of Fly ash increases strength will be decreases.
6. If we increase replacement percentage of Fly ash & GGBS the compressive strength will be decrease as compare with Less percentage replacement and normal concrete block(OPC).
7. In replacement of GGBS and Fly ash,.GGBS acquire more compressive strength than fly ash.
8. The self curing admixture sap in the concrete mixes helps to increase properties of concrete of which to the good water retention.

Self curing concrete by using super absorbent polymer (sap)

Normal concrete block M30
adding sap 0.5 %



Graph.5.Compressive Strength (Replace cement 20%,30%,40% by Fly ash)
Self Curing (SAP)

Discussion

1. In 7 days acquire 60% strength.
2. In 14 days acquire 80% strength.
3. In 28 days acquire 97% strength.
4. The outcomes of compressive strength prove that there is compare with 20% replacement of GGBS & compare of 40% replacement of GGBS compressive strength of concrete going decrease as compare with 20% replacement.
5. It is observe that GGBS is good replacement for cementious material in concrete.
6. If we increase replacement percentage of Fly ash & GGBS the compressive strength will be decrease as compare with Less percentage replacement and normal concrete block(OPC).
7. The self cured concrete in which sap was used in scarcity area,and its very helpful for curing.its reducing curing problem.
8. The self curing admixture sap in the concrete mixes helps to increase properties of concrete of which to the good water retention.
9. The optimum dosage of sap for M30 concrete is 0.3% for maximum strength of concrete as compare with 0.5%

Fig..1 Material mixing

Fig.2 Cube cating

Fig.3 Water Curing

V. CONCLUSION

1. The outcomes of compressive strength prove that there is compare with 20% replacement of GGBS & compare of 40% replacement of GGBS compressive strength of concrete going decrease as compare with 20% replacement.
2. The outcomes of compressive strength prove that there is compare with 20% replacement of Fly Ash & compare of 40% replacement of Fly Ash compressive strength of concrete going decrease as compare with 20% replacement.
3. The concrete cured by using Water curing method its effectively succeded get more strength as compare with Self curing concrete (SAP).
4. It is observe that GGBS is good replacement for cementious material in concrete.
5. Addition of 20%,30%,40% GGBS in concrete and cured in water curing & Sap curing its acquire more strength compare with replacement of fly ash.
6. If we increase replacement percentage of Fly ash & GGBS the compressive strength will be decrease as compare with Less percentage replacement and normal concrete block(OPC).
7. The self curing admixture sap in the concrete mixes helps to increase properties of concrete of which to the good water retention.
8. The optimum dosage of sap (expressed in wt. of cement) fo M30 grade concrete 0.3% & 0.5% Respectively
9. The further increase in dossages of sap in concrete,mixes the strength is reduce it specifically.
10. The optimum dosage of sap for M30 concrete is 0.3% for maximum strength of concrete.
11. The self cured concrete in which sap was used in scarcity area,and its very helpful for curing.its reducing curing problem.
12. From the test conducted its observed that self curing concrete does not have shrinkage as compared with conventional concrete.

VI. SCOPE OF THE PROJECT WORK

1. The scope of this project can be summarized as obtaining an end product that will facilitate economical and eco-friendly method of slab curing, help the achieve design strength,
2. In scarcity period water is not available in more quantity.which method of curing is sutaible in that area is also known.
3. Various absorbing materials are tested for water absorption capacity and wear and tear. Tests are performed on the product and results are compared with those conventional method.

Fig.4 Material compaction by using tamping rod

Fig.5 Self Curing

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