An Experimental Study On Strength Characteristics Of Fiber Rinforced Concrete By Using Pozzolanas

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Abstract: **High Performance Concrete Is Defined As Concrete That Meets Special Performance Sets And Standardization Requirements That Cannot Always Be Routinely Achieved Using Conventional Ingredients And Normal Mixing, Formulation And Curing Practices. It Has Been Widely Used In Large-Scale Concrete Construction Requiring High Strength, High Flow Capacity, And High Durability. High-Strength Concrete Is Always High-Strength Concrete, But High-Performance Concrete Is Not Always High-Strength Concrete. Durable Concrete Selecting High-Strength Concrete Does Not Guarantee The Achievement Of Durable Concrete. It Is Very Difficult To Get A Product That Meets All The Characteristics At The Same Time. So Various Pozzolanic Substances Like Granular Floor Kiln Slag (Ggbs), Silica Fume, Rice Husk Ash, Fly Ash, And Highly Reactive Methacholine Are Some Of The Pozzolanic Materials That Can Be Used In Concrete. As A Partial Substitute For Cement, Which Are Very Basic Ingredients To Produce High-Performance Concrete. We Prepare Grout, Cube, Cylinder, Sawing And Finally Compression Test, Split Test And Bending Test. Finally, The Porosity And Permeability Test Was Carried Out. Furthermore, To Obtain Such Performances That Cannot Be Obtained From Conventional Concrete And With The Current Method, A Large Number Of Experimental Mixtures Are Required To Determine The Desired Combination Of Materials That Meet The Particular Performance.**

Keywords: **Pozzolana Cement; Strength Properties; Marine Environment;**

INTRODUCTION:

It Is Obtained By Mixing Cementations Materials, Water, Aggregates And, Sometimes, Additives In The Required Proportions. Fresh Concrete Or Plastic Concrete Is A Freshly Mixed Material That Can Be Cast Into Any Form Of Hardening Into A Rock-Like Mass Known As Concrete [1]. The Hardening Is Caused By A Chemical Reaction Between The Water And The Cement, Which Lasts A Long Time And Becomes Stronger With Age. Utility And Elegance Plus The Durability Of Concrete Structures, Which Were Built During The First Half Of The Last Century Using Ordinary Portland Cement (Opc) And Regular Round Mild Steel Rods, The Ease Of Availability Of Component Materials (Whatever Their Qualities) Of Concrete And The Knowledge That Any Combination Of Components Actually Leads Into A Piece Of Concrete That Generated Disdain. The Setback In The Health Of Newly Constructed Concrete Structures Has Provided The Most Direct And Unquestionable Evidence In The Last Two To Three Decades Of The Lifetime Performance Of Our Facilities And The Resulting Challenge We Face Is The Unacceptable Rate Of Disruption To Our Facilities. Infrastructure Systems Around The World That Suffer Degradation When Exposed. For Real Environments. Fly Ash, Ground Granular Furnace Slag, Rice Husk Ash, Highly Reactive Methacholine, Silica Fume Are Some Pozzolanic Substances That Can Be Used In Concrete As A Partial Substitute For Cement [2]. There Are Several Ongoing Studies In India And Abroad To Study The Effect Of Using These Pozzolanic Materials As A Substitute For Cement And The Results Are Encouraging. The Strength, Durability And Other Characteristics Of Concrete Depend On The Properties Of Its Components, The Mixing Ratio, The Method Of Compaction And Other Controls During Casting And Curing.

RELATED STUDY:

Durability Properties Of High Performance Concrete. He Studied The Durability Problems Of Normal Concrete That May Be Associated With Environmental Stress And High Water / Bond Ratios. High-Performance Concrete With A Water / Bond Ratio Between 0.30 And 0.40 Is Usually More Durable Than Normal Concrete, Not Only Because It Is Less Porous, But Also Because Its Capillary Networks And Pores Are Somewhat Separated Due To Development [3]. Of Self-Cavitation. In High Performance Concrete (Hpc), The Penetration Of Aggressive Agents Is Very Difficult And Only Superficial. However, Self-Drying Can Be Very Harmful If Left Unchecked During The Initial Stage Of The Water Reaction Development, So Hpc Must Be Treated Very Differently Than Normal Concrete. Field Experience In The North Sea And Canada Has Shown That Hpcs, When Properly Designed And Handled, Perform Satisfactorily In Extremely Harsh Environments. However, The Fire Resistance Of Hpc Is Not As Good As Normal

Concrete, But It Is Not As Bad As Some Pessimistic Reports Sometimes Write. Concrete, Regardless Of Its Type, Remains A Safe Material From The Point Of View Of Fire Resistance Compared To Other Construction Materials. It Is Found That As The Ggbs Content Increases, The Ratio Of Water To Binder For The Same Workability Decreases. The Initial Strength Of The Ggbs Concrete Was Lower Than That Of The Control Concrete. However, With The Extension Of The Curing Period, The Strength Increase Was Greater For Ggbs Concrete [4]. The Compressive Strength Of Ggbs Concrete Increases As The Ggbs Content Increases To The Optimum Point, After Which The Compressive Strength Decreases. The Optimal Strength Of The Ggbs Content For Maximum Strength Is Around 55-59% Of The Total Binder Content. The Traditional Method Of Using Mineral Slag In Cementations Materials Is Too Partially Replace Portland Cement, Which Generally Results In Lower Initial Strength And Longer Set Times. The Presence Of The Activator (S) Can Accelerate The Fragmentation Of The Structure And Wet The Slag [5]. Numerous Research Results Indicated That Clinker-Free Alkaline Activated Slag Exhibits Even Higher Strength, Denser Structure, And Better Durability Compared To Portland Cement. Copper Phosphorus Slag.

3. METHODOLOGY AND MATERIALS:

Ground Granulated Blast Furnace Slag (Ggbs) Is A By-Product Of Iron Ore Manufacturing And Is Obtained By Quenching Or Quenching Molten Slag. Here Molten Slag Is Produced Which Is Used And Quenched Instantly With Water. This Rapid Removal Of Molten Slag Facilitates The Formation Of "Grainy Slag". Ggbs Slag Is Processed From Granular Slag. If The Slag Is Processed Properly, It Develops Hydraulic Properties And Can Be Used Effectively As Pozzolanic Materials. However, If The Slag Is Slowly Air Cooled, It Is Hydraulically Inert And This Crystalline Slag Cannot Be Used As A Pozzolanic Material. Although The Use Of Ggbs In The Form Of Slag Portland Cement Is Not Uncommon In India, The Experience Of Using Ggbs As A Partial Substitute For Cement In Concrete In India Is Minimal. Ggbs Is Mainly Composed Of Calcium Aluminosilicates And Other Bases Developed In A Molten State Simultaneously With Iron In A Blast Furnace. The Chemical Composition Of The Oxides In Ggbs Is Similar To That Of Portland Cement But The Proportions Differ [6]. Crushed Granular Blast Furnace Slag Is Now Mainly Used In India. Recently For Marine Business Outside Of Fall In Bandra, Mumbai. It Was Used To Replace The Cement With Approximately 70%. Therefore, Every Day It Is More Popular.

Sio_2	39.18
Al_2o_3	10.18
Fe_2o_3	2.02
cao	32.82
Mgo	8.52
Na_2o	1.14
K_2o	0.30

Table 3.1. Chemical Composition (%) Of Ggbs

Even With Small Doses, For Example, 10 Percent By Weight Of Cement Rice Husk Ash Can Produce A Very Strong Transition Zone And A Very Low Permeability Index In Concrete Mixes. Rice Hull Ash Particles, Which Are Micro Porous, Are Introduced Into Cement Containing Large Particles, Improving The Flow Channels And Internal Pores Of The Concrete. The Main Advantage Of Rice Husk Ash And Silica Fume Is That They Are A Very Strong Absorber Of Sodium, Potassium And Other Ions And Are Good Conductors Of Electricity. High-Strength Concrete With Little Or No Corrosion Can Be Obtained In A Harsh Environment By Improving The Electrical Resistance Of The Concrete By Adding Rice Hull Ash Or Silica Fume.

4. EXPERIMENTAL ANALYSIS:

Rice Husk Ash Is A Product That Meets Engineering Requirements In Terms Of Physical And Chemical Properties. Therefore, In Our Present Study We Will Do Our Best To Study Rha That Can Be Manufactured As Partial Cement Replacement Materials At The Same Time To Achieve The Required Strength Test In Mortar Buckets. The Four Main Factors That Affect The Hydraulic Activity Of Slag Are Glass Content, Chemical Composition, Mineral Composition, And Smoothness. The Granular Material When The Soil Is Less Than 45 Microns Will Have A Defined Surface Around 400-600 M2 / Kg (Blaine) Where We Use Ggbs Passing Through A 75 Micron Sieve. Here The Specific Surface Is About 275-550 M2 / Kg. We Will Use Ggbs As A Partial Substitute For Cement Due To Its Characteristics Such As Low Energy Cost, High Resistance To Corrosion, Low Heat Development From Water, And Subsequently Higher Resistance. Synthetic Fibers, I.E. Recron Fiber, Are Used In Concrete To Produce Fiber-Reinforced Concrete. We Will Use Recron Fibers In Different Proportions Such As 0%, 0.1%, 0.2%, 0.3% For The Weight Of The Concrete And We Will Study The Compressive Strength For 7 Days And 28 Days, The Tensile Strength And The Bending Of The Concrete To Normal, Keeping The Percentage Of Cement In Water In The Range Of

0.35-0.41. Then With Different Proportions Of Silica Fume, That Is, 10%, 20%, 30% Fixed Fiber Proportion Set At 0.2% In Cubes, The Cylinders And Prisms Were Melded And Tested To Analyze The Change In Resistance To Corrosion. Compression, Resistance To Breakage And Bending. We Use Portland Clinker Cement And Regular Portland Cement (Grade 53). Capillary Absorption And Porosity Tests Were Performed On Various Samples To Analyze The Effect Of Silica Fume On Concrete.

% of cement replaced by GGBS (%)	Consistency (%)
0	31.0
10	32.0
20	33.0
30	34.5
40	36.5

Table 4.1. Effect Of Ggbs In Normal Consistency Of Cement

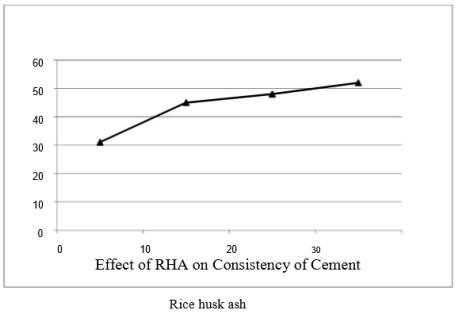

Fig. 4.1 Variation In Consistency Of Cement With Different % Of Rha

5. CONCLUSION:

The Use Of Ggbs As A Substitute For Cement Increases Consistency. Although The Smoothness Greatly Influenced The Correct Pozzolanic Reaction, The Ggbs Passing Through 75 Micron Sieves Did Not Give Good Resistance To The Mortar. With Ggbs Greater Than 10% In Slag Portland Cement, The Strength Decreases Rapidly. As The Cement Is Replaced By Rha, The Consistency Increases. The Use Of Rha That Burns Properly At A Controlled Temperature Improves The Strength Of The Mortar. But The Use Of Rha Does Not Give A Satisfactory Resistance Result. Whereas, Replacing Cement In Different Proportions With Silica Fumes Increase Consistency. Capillary Absorption Coefficient (K) With A Sign Of Significant Decrease As The Percentage Of Sf6 Increases At A Fixed Fiber Ratio, I.E. 0.2%. At 20% Sf Content, The K Value Gradually Decreases With A Reduction Of 70% Without The Sf Concrete Content.

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