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AN EXPERIMENTAL INVESTIGATION ON CELLULAR LIGHTWEIGHT CONCRETE BY USING FIBER

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Abstract - *Cellular Lightweight concrete is a lightweight concrete which is made by adding foam which is generated from foam agent. CLC is a light weight, water resistant, fire-proof, sound proof and environment friendly. The main feature ofCLC is light in weight. CLC are made of fly ash, cement, and foaming agent. Since fly ash is being accumulated as waste material in large quantity near thermal power plants it made concrete economical. The behavior of a lightweight concrete structural member is dependent on mechanical and durability properties of concrete. In this experimental study the work was focused on improving the lightweight concrete by replacing fly ash by Marble sludge powder of various proportions such as 10%, 20% and 30% of replacement for flyash. Specimens of cubes and cylinders were casted. Physical and Strength properties of the developed mixes including compressive strength, split tensile test were investigated.*

Key Words: **CLC, marble sludge powder, durability, light weight**

1. INTRODUCTION

In the past years, for the design of building, the choice was normally between a concrete structures and a masonry structure. But the failure of many multi-storied, low-rise R.C.C and masonry buildings due to earthquake has forced the structural engineers to look for the alternative method of construction. Use of foam concrete can provide extremely economical structural systems with high durability and superior seismic performance characteristics

1.1RECRON FIBER

Reliance industry limited (RIL) has launched Recron 3s fibers with the objective of improving the quality of plaster and concrete. The general properties and applications of RECRON 3s fiber reinforced concrete used in construction. The thinner and stronger elements spread across entire section, when used in low dosage arrests cracking.

1.2 OBJECTIVE

- To study the feasibility of using cellular foam concrete for structuralpurpose.
- To study the properties of Cement, Fly ash and foaming agent.

To study the fresh and hardened properties of light weight cellular concrete

II. LITERATURE REVIEW

Hock yongThis paper is aimed to evaluate the effects of crushed steel slag, as partial replacement of sand with specific gradation, on performance of lightweight foamed concrete (LFC) with density of 1600 kg/m³ to 1700 kg/m³ in terms of compressive and tensile strengths. Different steel slag based LFCs were developedby replacing 0, 25, 50, 75 and 100% of steel slag for sand. Different water to cement ratios (w/c) and dosages of super-plasticizer (sp) were adopted to confirm certain workability, strength properties was then studied for ages of 7 and 28 days. The laboratory results showed that lightweight foamed concrete with incorporation of crushed steel slag has decreased strength however it still achieves structural strength of 17 MPa when replacement level is less than 25% at density of 1600 kg/m³ to 1700 kg/m³.

Kongus ruiwenThis paper works on preparing foam concrete of density 1300 kg/m³ to 1600 kg/m³ by using GGBS and Silica Fume. Foam concrete containing sand with higher fineness showed higher strength. The foam with density of 1530 kg/m³ gives compressive strength of 51.8 Mpa. The following conclusions have been made based on the materials and mix proportions used in this study, GGBS-4000 could be used to produce high-strength foam concrete with 28-day compressive strength comparable to the mix containing GGBS-8000. The use of silica fume up to cement replacement ratio of 8% did not result in higher strength. There exists a minimum and maximum flow value of the premixed paste for the production of foam concrete

MSP and CRD can be used as filler and helps to reduce the total voidscontent in concrete. Consequently, this contributes to improve the strength of concrete. An experimental investigation has been carried out to study the combined effect of addition of MSP and CRD on the strength and durability of SCC. The study on physical, chemical and

mechanical properties such as compressive strength and split tensile strength and the durability tests include water absorption test, water permeability, rapid chloride permeability; electrical resistivity and half cell potential are carried out in this study.

2. EXPERIMENTAL INVESTIGATION

Material testing is essential for the mix design of concrete. It gives the optimum amount of material required for a given strength and workability of concrete. Hence the properties of the following materials were found.

2.1 CEMENT :

Cement is a material that has cohesive and adhesive properties in the presence of water. Such cement are called hydraulic cement. Cement is a binding material in concrete, which binds the other material to form a compact mass. Generally OPC is used for all Engineering Construction works. OPC is available in three grades of 33, 43, and 53. In this project, 53 grade cement is used for the experimental study.

2.2Fly Ash

The fly ash generation has already crossed 200 million tons per and likely to increase to more than 300 million tons by the year 2017. The utilization and disposal of such large quantity of fly ash is a herculean task which has to be performed within various environment protection laws.

The effective utilization of resource material would not only minimize the disposal problem but help in conservation of scarce minerals, reduce emission of green house gases and enhance performance and durability of structure.

2.3MARBLE SLUDGE POWDER

Marble powder is one of the waste produces in marble industry. It isobtained during the processes of sawing and shaping. It is collected as slurry near the dumpsite of the industry. It mixes with the water and makes it unfit forreuse. Due to the presence of heavy metals it affects the environment and also the human health. To reduce its effect we have to use this waste. The Waste marble powder can be utilized in concrete in different ways. Waste marble powder can be used as filler in concrete and helps to reduce the total void content in concrete. Waste marble powder can be used as an admixture in concrete, so that the strength can be altered. In this project, the marble sludge powder collected from PANDIAN GRANITES at sivakasi. agents. Their self-lise is about 14 year under sealed conditions

CASTING ON RECRON FIBER CONCRETE WITH

FLY ASH AND MARBLE SLUDGE POWDER

CUBE

CYLINDER :

MIX DESIGN

Density =1600Kg/m^3

Cement = 516 Kg/m^3

Fly Ash = 516 Kg/m^3

Water = 361.29 lit

Foam =206.45 lit

RESULTS AND DISCUSSION

Table: 1 Test Results on Compressive Strength

S.NO	MIX	COMPRESSIVESTRENGTH(MPA)	
		7 DAYS	28 DAYS
1	M1	11.11	16.65
2	M2	8.44	12.67
3	M3	13.33	19.99
4	M4	10.89	16.33
5	M5	10.22	15.33

Optimum value of the cube specimenin20% MSP concrete & 80 % Fly ash value for 7 days 13.33 MPa and 28 days 19.99 MPa.

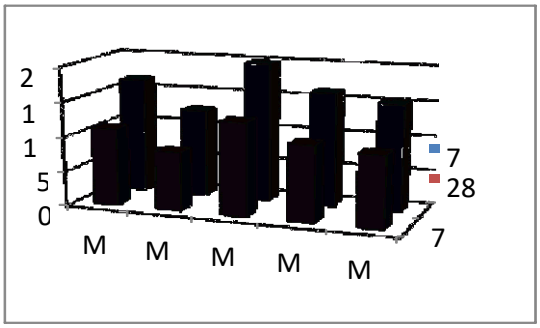
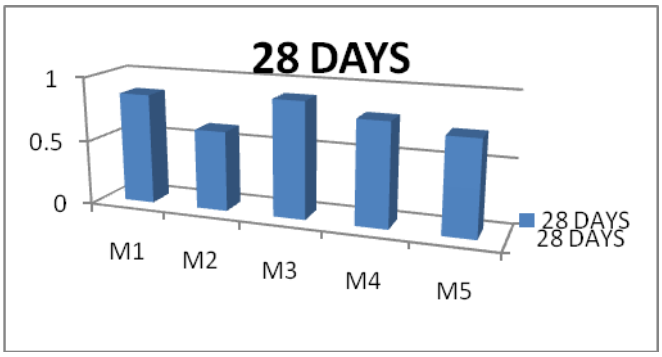


Table -2: Test Resluts On Split Tensile Test

S.NO	MIX	Split Tensile Strength(MPa)
		28 days
1	M1	0.86
2	M2	0.62
3	M3	0.9
4	M4	0.8
5	M5	0.73

Optimum value of cylinder specimen in 1% jute fiber concrete value for 28 days 9.6 MPa.



Split tensile strength for cylinder

3. CONCLUSION

- From the comparison study, it is concluded that the foamed concrete which is having 80% flyash and 20% marble sludge powder shows higher strength in foam concrete. This foam concrete is more economical for non structural elements compared to conventional concrete.

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