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EXPERIMENTAL STUDY Of CONCRETE USING COIR POWDER & FLY ASH

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Abstract -*Cement is the second most consumable product by human beings. By producing tonnes and tonnes of cement it leads to 7% of global pollution. One of the practical solutions to economize cement is to replace cement with supplementary cementitious materials like fly ash and coir powder for reduce the self weight of concrete. Majority of fly ash produced is of Class F type. Fly ash is generally used as replacement of cement, as an admixture in concrete. Based on the experimental results, the initial strength of 70% replacement of coir powder has increased in 7 & 28 days compressive strength. But it attains the excessive strength at 90 days. Owing to that, replacement of cement materials by coir powder content will attain initial strength with lower self weight.*

Key Words: coir powder, cement, fly ash, experimental test.

1.INTRODUCTION

Concrete is the most important material used for construction. In the modern world, the use of concrete has been increasing and it is being widely used for the construction of most of the buildings, bridges etc. Hence, it has been properly labeled as the backbone to the infrastructure development of a nation. Ordinary Portland cement (OPC) is by far the most important type of cement. One of the most important benefits is the faster rate of development of concrete to improve the fieldpaper.

concrete and the demand far exceeds the supply and makes the construction activities very costlier. Also production of 1tonne of cement releases 1tonne of Co2 thus causing large scale degradation of environment so there is need to conserve the cement. Hence, currently, the entire construction industry is in search of a suitable and effective waste product that would considerably minimize the use of cements and ultimately reduces the construction cost.

1.1 High Volume Fly ash

The quantity of fly ash produced from thermal power plants in India is approximately 80 million tons each year, and its percentage utilization is less than 10%. Majority of fly ash produced is of Class F type. The disposal of remaining fly ash has become a serious problem. One of the practical methods for conserving and economizing cement and also to reduce the disposal problem of fly ash is to popularize the high volume fly ash concrete system. High volume fly ash concrete is a concrete where in 50 to 60% fly ash is incorporated.

1.2 Coir Powder

Laboratory experiments were conducted to study the physical, chemical and microbiological properties of coir. The addition of coconut fiber to coconut dust increased the airspace (Air at - 10cm tension) but reduced easily available water. The water buffing capacity was lower in coir than in peat. Levels of air space, however, varied considerably. It should be possible to get predetermined levels of airspace by mixing the appropriate levels of fiber to coconut dust. In incubation studies carried out over 20 weeks there was a significant nitrogen retention in one case probably due to the age of coir but the addition of fiber.

1.3 Need For The Project

- To increase the initial strength of high volume flyash concrete.
- To reduce the usage of cement and sand in the construction activities.
- To get an innovative construction material.
- To effectively use the waste product (Flyash) without any adverse effect on the society.

Materials:

The materials which are used for producing the HVFC are as follows

Cement:

Specific gravity of cement is 3.14. The cement was brought from Priya cements, Salem.

Fly ash:

Class F fly ash collected from thermal plant mettur with a specific gravity of 2.12 determined as per IS 1727:1967 confirms to (ASTM C 618).

Water:

Clean potable water conforming to IS 456-2000 was used, Generally water has a pH of 7. The specific gravity of water is One.

Fine aggregate:

Ordinary river sand is used as the fine aggregate of Zone II as per IS 383-1987. The specific gravity of fine aggregate is 2.53.

Coarse aggregate:

The ordinary coarse aggregate is sieved in 20mm sieve and the aggregate passing through the sieve is used as coarse aggregate. The specific gravity of coarse aggregate is 2.68.

Superplasticizer:

The super-plasticizer used for the concrete in this project is Conplast. The specific gravity of Conplast is 1.22.

2. EXPERIMENTAL INVESTIGATION

2.1 Compressive Strength Test & Tensile Strength For Cube

Compression test was carried out on cube specimens. The dimension of the specimen is 150mm X 150mm X 150mm. Three specimens were tested for each percentage at 7 and 28days and average of three was taken.

The cylindrical specimens were tested for split tensile strength at an age of 28. The dimension of the specimen is 150mmX300mm.Three specimens were tested for each percentage at 28days and average of three was taken.

Fig 1: tensile strength test

3. RESULT AND DISCUSSION

Table 1: compressive strength of concrete for Replacement

% of replacement	Average comp strength (N/mm²)		
	Fly ash & coir powder		
	7 days	14 days	28 days
30% fly ash & 40% coir	16.082	21.879	34.566
40% fly ash & 50% coir	17.467	23.471	32.577
50% fly ash & 60% coir	18.061	23.489	36.943
60% fly ash & 70% coir	18.456	22.976	35.952

Table 2: Tensile strength of concrete for Replacement

% of replacement	Average Tensile strength (N/mm²)		
	Fly ash & coir powder		
	7 days	14 days	28 days
30% fly ash & 40% coir	2.111	3.088	5.076
40% fly ash & 50% coir	2.344	6.953	8.081
50% fly ash & 60% coir	8.922	10.024	10.934
60% fly ash & 70% coir	8.027	9.527	9.782

4. CONCLUSIONS

- The following conclusions are drawn from the study of strength characteristics of concrete using Fly ash and coir powder in their applicable range parameters and materials used in this study.
- The compressive strength of Coir powder replaced concrete is more than the compressive strength of the conventional concrete at 60% replacement.
- Currently there is huge demand for cement, while using this Fly ash as a partial replacement to cement, it will definitely reduce the usage of cement.
- To increase the early strength of concrete in 50% replacement of fly ash and 60% of coir powder are added to concrete.

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