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A Experimental Investigation on Performance of Concrete with Partial Replacement of Coarse Aggregate and Fine Aggregate with EPS and Iron Slag

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***Abstract*- A rice transplanter is a specialized machine fitted with a transplanter mechanism (usually having some form of reciprocating motion) driven by the power from the live axle, in order to the transplant rice seedlings onto paddy field. Rice is a major food grain crop of world. Unlike upland row crops, cultivation of low land rice crop is a labour intensive process. In spite of the common belief of availability of surplus agricultural labour in India, there actually exists a scarcity of skilled agricultural workers during the peak transplanting seasons. If this operation is not done in time the yield goes down. In view of this, there is an urgent need to mechanize this operation. The rice translation process is generally manual which involves number of labour. The process of manual rice transplantation is not so efficient as compared to the mechanical rice transplantation. Machine transplanting using rice transplanter requires considerably less time and labour than manual transplanting. It increases the approximate area that a person can plant.**

***Keywords*- Rice transplanter, crops, cultivation. Machine transplanting.**

I. INTRODUCTION

Concrete comes from Latin word “Concretus” which means compact (or) condensed. Concrete is a mixture of cement, coarse aggregate, fine aggregate, water etc. The usage of concrete was from thousands of years ago. In Roman, Egyptian times it was rediscovered that it under water to set concrete volcanic ash is used. Heinrich Schliemann a German Archaeologist found the “concrete floors”. In concrete floors lime, pebbles are used. In 1400- 1200 BC in Greece “lime mortars” are used.

In 300BC-476AD in Roman the “Roman concrete” was discovered which is made up of quick lime, pozzolono, aggregates of pumice. In the middle ages of 500-14 century burned lime, pozzolana are used. In 18 century use of cement gradually returned. In the industrial era “reinforced concrete” was invented in 1849 by “Joseph Monier”.

Cement is a hydraulic binder and the basic ingredient of concretes and mortars. It acts as a kind of glue to stick sand and gravel together. The investigations of L.J.VICAT led him to prepare an artificial hydraulic lime by calcining an intimate mixture of limestone and clay. It was used by the Egyptians and then the Romans, it was rediscovered in the early 19th century. Cement has evolved over the decades. With study, it has become a technological product. In the beginning a mixture of lime, clay, sand and water was used in ancient construction. The Egyptians were already using it 2,600 years ago. Around the 1st century, the Romans used this "binder". On adding volcanic soil from the region of Pozzuoli, near Naples, they discovered that they could get this mixture to "set" underwater.

II. OBJECTIVES

The main objective of this project is to compare the compressive strength of normal concrete with partial replacement of EPS and iron slag.

- To improve the economical use of latest waste materials into concrete.
- To compare the compressive strength of coarse aggregate with EPS.
- To compare the compressive strength of fine aggregate with iron slag.
- To know at what percentage of EPS and IRON SLAG we will attain maximum strength.

III. SCOPE

- To provide a most economical concrete.
- It should be easily adopted in fields.
- To reduce the cost of construction.
- To promote low cost housing for people
- To find the optimum strength of partial replacement of concrete.

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IV. METHODOLOGY

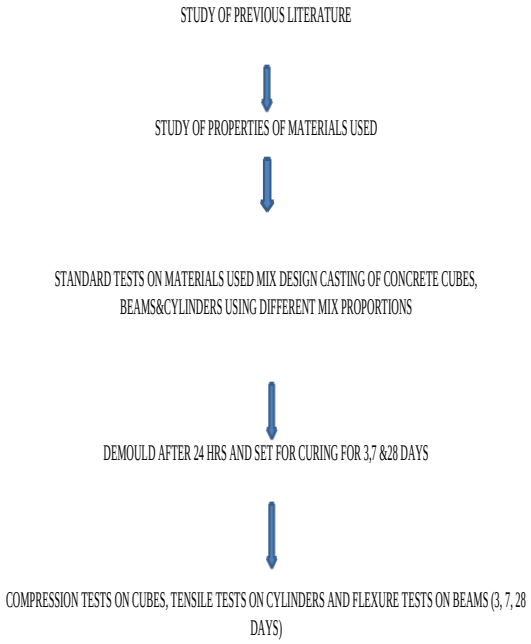

Fig 1. Methodology.

V. VARIOUS TESTS AND ITS PROCEDURES

Table 1. Specific Gravity of Cement.

S. No.	Particulars	Cement
1	Weight of specific gravity of bottle(w1)grams	9.15
2	Weight of specific gravity bottle +cement(w2)grams	42.04
3	Weight of specific gravity bottle +cement +kerosene(w3)grams	77.94
4	Weight of specific gravity bottle+ kerosene(w4)grams	69.04
5	Specific gravity of cement =((w2-w1)/(w4-w1)-(w3-w2))*1.76	3.26

Table 2. Fineness of Cement.

Weight of the sample(W) grams	Weight of the residue remains (w) grams	Fineness(w/W)x100
100	5	5%
100	10	10%
100	10	10%

VI. MIX DESIGN

1. Test Data for Materials:

- Cement used : OPC 53 grade
- Specific gravity of cement: 3.15
- Specific gravity of EPS: 0.02
- Specific gravity of Iron slag: 3.2
- Specific gravity of:

Coarse aggregate: 3.17
Fine aggregate: 2.73

- Water absorption:
- Coarse aggregate: 1.08
- Fine aggregate: 0.5

The grade of concrete used is M40 (1:1.36:2.59) a nominal mix with a water cement ratio of 0.40.

VII. TEST ANALYSIS

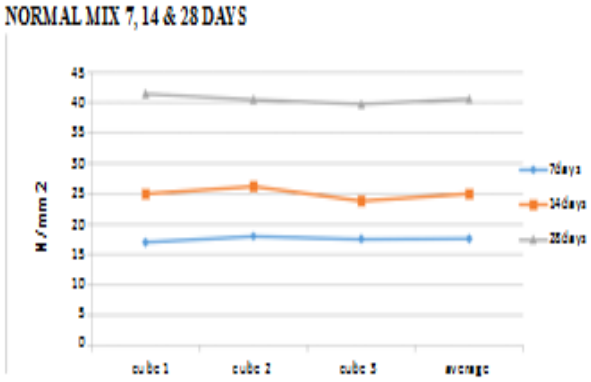

Fig 2. The compressive strengths that we have got for 10% of EPS and iron slag for 7,14&28 days and also the average value are plotted in the below graph.

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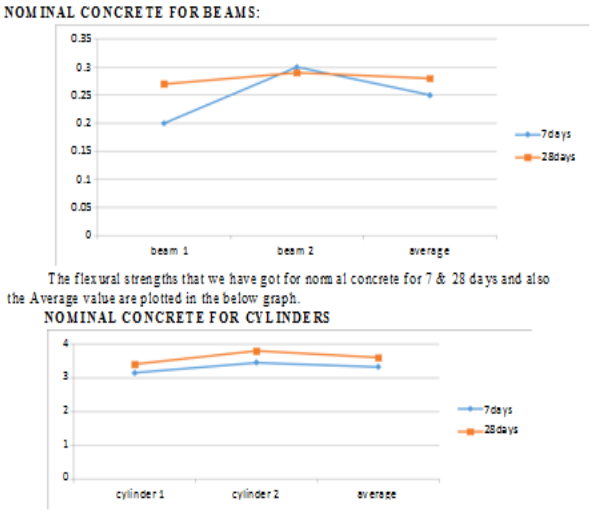

Fig 3. Beams For 10% Of Eps &Amp; Iron Slag In Cylinders

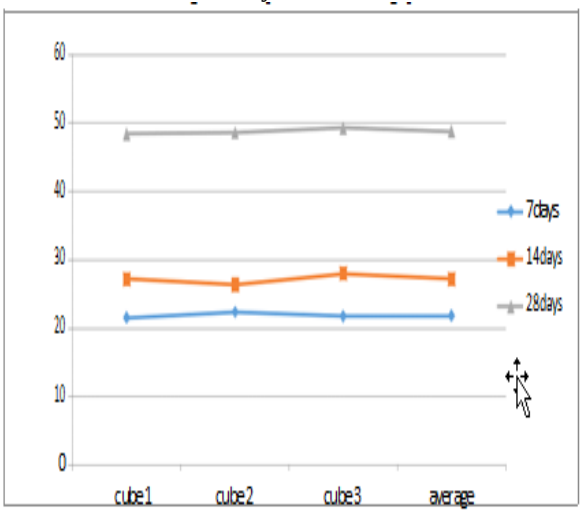

Fig 4. For 10% Of Eps &Amp; Iron Slag In Cylinders

The compressive strengths that we have got for 10% of EPS and iron slag for 7,14&28 days and also the average value are plotted in the below graph.

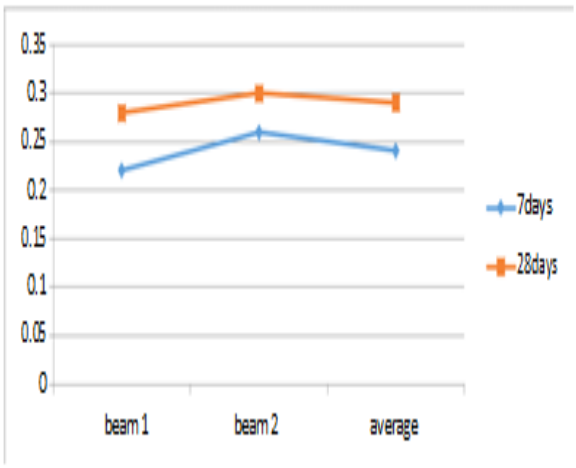

Fig 5. For 10% of Eps & Iron Slag in Beams.

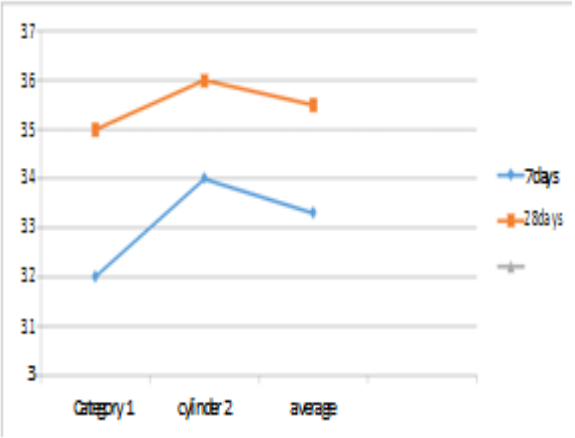

Fig 6. For 10% of Eps & Iron Slag in Cylinders.

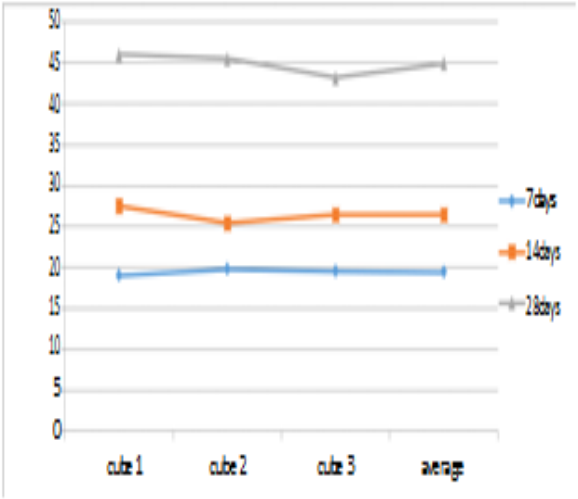

Fig 7. For 20% of EPS and iron slag for 7,14& 28 days and also the average value are plotted in the below graph.

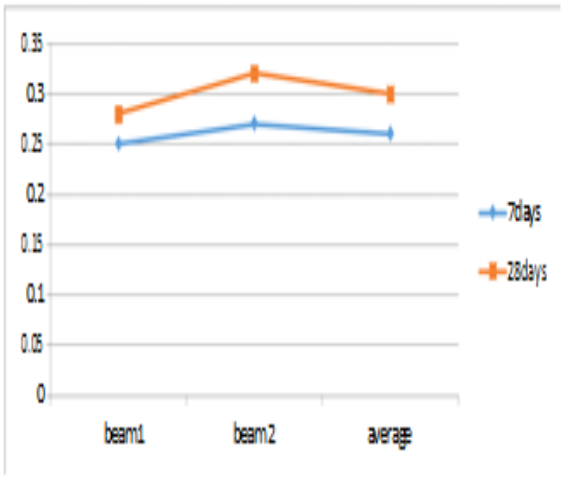

Fig 8. For 20% of Eps & Iron Slag in Beams.

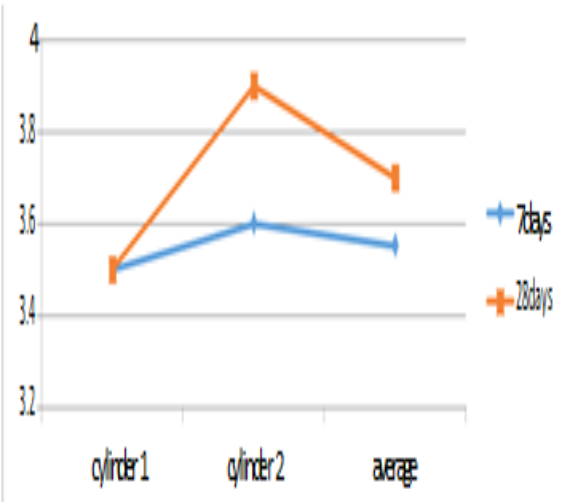

Fig 9. For 20% of Eps & Iron Slag in Cylinders.

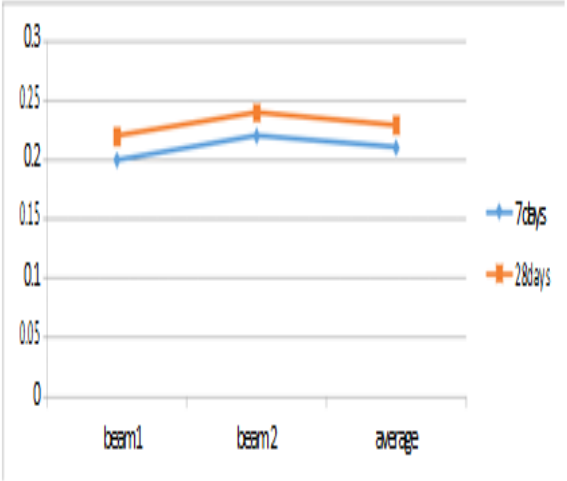

Fig 10. For 30% of Eps & Iron Slag in Beams.

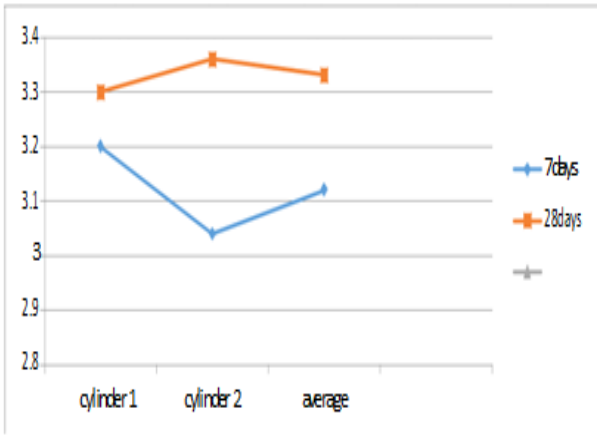

Fig 11. For 30% of Eps & Iron Slag in Cylinders.

VIII. CONCLUSIONS

Based on limited experimental study investigation the compressive strength draws the following conclusions
By using the EPS and iron slag as replacements the concrete became Eco – friendly, economical.By replacing the coarse and fine aggregate with EPS and iron slag the compressive strength increases. So that it can be replaced up to a maximum percentage of 27.5. Since the EPS is using in place of coarse aggregate, it can reduce the dumping problems in paper industries & also reduce weight of concrete members.Finally this type of concrete can be replaced depending upon the percentage of replacement and used for side walls, partition walls, slabs for small residential buildings & etc small structures.

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