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DEVELOPMENT OF LIGHT WEIGHT CONCRETE USING PUMICE STONE

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Abstract – Light weight concrete plays an important role by reducing dead load and thermal insulation. This project deals with the development of light weight concrete to make float the concrete in water using light weight aggregate (pumice stone).Pumice stone is a light weight aggregate of (specific gravity) bulk density in the range from 850kg/m^3 to 1850kg/m^3.It is formed by the consideration of magma. The disadvantage of the light weight concrete is that low strength that is 2.0N/mm^2 to 7N/mm^2.The objective of the project is to improve the strength of the concrete by filling voids with waste recycle powder of polypropylene (specific gravity 0.92).It hence the specific gravity less than one it will not affect the bulk density of concrete much. In compressive strength tested from the various proportion of concrete mix design recommended by IS 6042.1969.The concrete achieve the strength of 7 days 8.6 N/mm^2 and 28 days strength 13.8 N/mm^2

Keywords— Pumice Stone; Light weight; Strength; Density, Concrete

1. INTRODUCTION

Researchers around the world are attempting to develop low density or lightweight concrete by using different admixtures in concrete up to certain proportions. This study deals with the development of Floating concrete by using lightweight aggregate (Pumice stone) and foaming agent powder as an air entraining agent. Floating concrete is made by introducing air or gas into concrete slurry, so that when the mix sets and hardens, uniform cellular structure is formed. Thus it is a mixture of water, cement and finely crushed sand.

The hydrogen gas when contained in the slurry mix gives the cellular structure and thus makes the concrete lighter than the conventional concrete. Pumice stone is a lightweight aggregate of low specific gravity. It is a highly porous material with a high water absorption percentage. In this we do not use the conventional aggregate and replace it by the pumice stone. Pumice is the specimen of highly porous rocks having density approximately 500-600 Kg/m3. Pumice is produced when super-heated**,** highly pressurized rock is violently ejected from volcano. The unusual foamy configuration of pumice happens because of simultaneous rapid cooling & rapid depressurization. Pumice has an average porosity of 60-80% and initially floats on water.

2. OBJECTIVE AND SCOPE

- To increase the compressive strength of concrete.
- To achieve the strength as compared to Conventional concrete.
- To reduce the self weight of the concrete structures
- To produce economical concrete.

3. MIX DESIGN

In this the cement/plastic powder taken is 1/3 Also the water cement ratio taken is foaming agent 150ml added in 500ml of water.

Cement (OPC):1.5 kg

Aggregate : 1.4 kg

Fly ash : 0.6 kg

Fig-1: Floating of concrete cube

4. TEST ON CONCRETE

Compressive strength 8.3 N/mm^2, which is good for lightweight concrete. Also it gives average density 1024.66 kg/m^3, but we have to reduce the density of concrete to nearly equals to density of water, so it is to be required that reduce the quantity of crush sand and that's why we reduced the quantity of crushed sand and also replaced it with pumice sand passing through IS sieve of size 4.75 mm. in next sample

Fig 2- Compression Test on concrete cubes

Table -1: Compressive strength of concrete cube

Sample	7days (N/mm²)	14 days (N/mm²)	28 days (N/mm²)
1	5.26	6.14	8.3
2	6.17	8.48	10.29
3	9.58	11.27	13.6

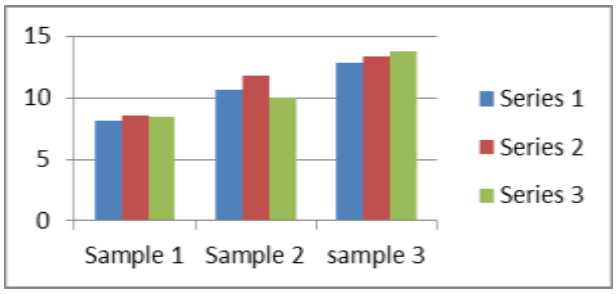

Chart -1: Comparison of compressive strength of concrete

5. RESULTS AND DISCUSSIONS

- After the thorough study, it will be recommended to use incorporated concrete to such structures where compressive strength up to 13.6N/mm2 is required.
- The 60% of weight is reduced by adding pumice stone.
- The density of the concrete also gets reduced 50% while adding pumice stone.

6. CONCLUSION

The floating concrete is a much lighter concrete and can float on water. It does not contain coarse aggregates. It is composed of cement, water-cement ratio and foaming agent. Just as mix, the expansion in the volume can be observed. Within 5minutes it expands by 30%. It consists of many pores and thus is not structurally strong. It is a good insulator of heat and sound and thus can be used in place of conventional bricks. The compressive strength of floating concrete is achieving strength equal and above normal brick. The incorporated concrete does not require any particulars regarding to mixing, placing and finishing

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