STUDY ON CELLULAR LIGHTWEIGHT CONCRETE USING BASALT ROCK FIBRE

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ABSTRACT
CellularLightweightConcrete (CLW C) isnot a new invention in concreteworld.It hasbeen knownsince ancient times. It wasmade using natural aggregates of volcanic origin such as pumice, scoria, etc. The Greeksand the Romans used pumice in building construction. In this paper, parametric experimental study for producingCLW C using fly ash is presented. The performance of cellular lightweight concrete in term of density andcompressivestrengthare investigated. From the result, itcanbe seenthatcompressive strengthfor cellularlightweightconcrete islow forlowerdensity mixture.Theincrementsof void throughout the samplecaused by the foam in themixturelowersthe density. As a result, compressive strength will also decrease with the increments in void. As strength increases itsdensity also increases. The test result shows that the compressive strength of replacement mixture with 1% of foam ishigher thanof 1.4%foam.Compressivestrength of mixturewith1.2%foam isslightlyhigher thanthatof 1.4%foam.In this experimental study, two gradesof cement such as53 and 43 grade cement areused. Compressive strength of 53gradecementisslightlyhigherthan43gradecement.

KEYWORDS:cellularlightweightconcrete,CLWC, Basalt rock fibre volcanic, pumice, foam, Compressivestrength.

1.1 INTRODUCTION

Concrete is most important construction materials. Concrete is a material used in building construction, consisting of ahard,chemicallyinertparticulatesubstance,knownasanaggregatethatisbondedtogetherbycementand water.

In upcoming years there has been an increasing worldwide demand for the construction of buildings, roads and anairfield which has mitigate the raw material in concrete like aggregate. In some ruler areas, the huge quantities ofaggregate that have already been usedmeansthat local materialsarenolonger availableand the d eficithasto bemadeup by importingmaterialsfrom other place. Therefore a new direction towardsCellular Lightweight Concrete inbuildingandcivilengineeringconstructionisused.

The origin of the CLW C is difficult to assess, it would not be an e xaggeration to say that its roots are from the ancientperiod. With the increase in the demand ofCLW C and the unavailability of the aggregates, technology for producinglightweight aggregates has been developed. Lightweight concrete is the type of concrete which includes an expandingagent in that it increases the volume of the mixture and lessened the dead weight. It is lighter than the conventionalconcrete. It was first introduced by the Romans in the second century where 'The Pantheon' has been construct ed usingpumice.Itismostcommontype ofaggregate usedinsecondcentury. CLW C canbe achievedbyomittingthefinersizesof the aggregate or replacing them by a light weight, cellular or porousaggregate. Particularly, lightweightconcretecanbecategorizedintothreegroups:

i) No-finesconcrete.
ii) Lightweightaggregateconcrete.
iii) Aerated/Foamedconcrete/cellularconcrete/gas concrete

I. **Materials:-**

Cellular lightweight concrete is slurry of cement, sand, water, basaltrockfiber and preformed stable foam generated by foam generating machine. 53 and 43 grade Ordinary Portland

FIG.1 SHOWS MIX PREPAREDFIG.2 SHOWS CUBE

Cement is used. In this mix, one part of cementious material (i.e. cement and fly ash) and 3

part of sand is used. This dry material is properly mixed in a concrete mixer. After dry mixing, water is added and mixed it until homogeneous mix is formed. While mixing, 1% foaming agent (of cementious material) are added and mixed it. Due to foaming agent and mixing process, air voids are generated resulting decrease in density. Then this material is poured in a concrete mould and after 24 hours put it for curing. Compressive strength is

determined for 3days,7 days and 28 days. The tests aretaken

average of these three is taken. Materials Used: 1) Ordinary Portland cement: –53 grade and 43 grade cement is used 2) Sand: - Sand passing through 2.36 mm IS sieve. 3) Water: - Potable water as per IS 456:2000 is used. 4) basalt rock fiber: - basalt rock fiber is taken from ash-silo KhaperkhedaTherma l power plant, Nagpur. 5) Foaming agent: - Foam generating admixture by SIKA .

PREPARED FOR TEST III. Test Results In this section, discussions are focused on the performance of lightweight concrete. The results presented are regarding the compressive strength test and density for 53 and 43 grade OPC mix for Cellular lightweight concrete.

Table1 :shows 28 days compressive strength and density for 53 Grade OPC

53gradeOPC	Avg. compressive Strength in MPa	Avg.densityin kg/m^3
1	14.73	1850
2	13.72	1822.10
3	13.69	1820
4	10.96	1819
5	10.47	1817
6	10.03	1817
7	9.64	1816
8	9.45	1815
9	9.45	1814.45
10	6.68	1649.27
11	6.38	1620.11
12	6.20	1615.15
13	6.18	1615.15
14	6.20	1613
15	5.07	1507.58

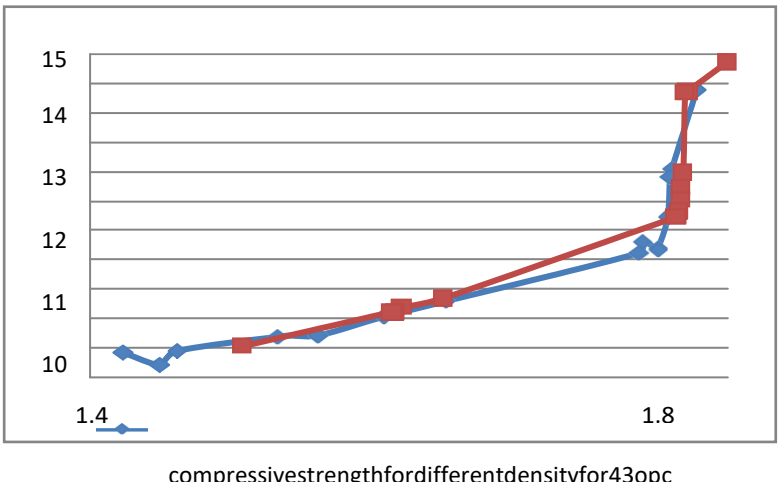
FromTable1,itcanbeseenthatcompressivestrengthforcellularlightweightconcreteislowforlowerdensity

TABLE 2:- Shows28dayscompressivestrengthanddensityfor43 Grade OPC

43 grade OPC	Avg.compressive strengthinMPa	Avg.density inkg/m^3
1	13.78	1828.58
2	11.09	1811.60
3	10.84	1810
4	9.43	1808
5	8.35	1801.31

6	8.39	1801.26
7	8.61	1790.82
8	8.23	1788.23
9	6.58	1651.31
10	6.07	1607.58
11	5.41	1561.80
12	5.38	1532.65
13	4.89	1461.35
14	4.41	1449.27
15	4.84	1423.65

FromTable2, it can be seen that compressive strength for cellular light weight concrete is low for lower density mixture



From Graph1,it canbe foundthatCompressive strengthof 53grade cement isslightlyhigher than43 grade cement,but asstrengthincreasesitsdensityalsoincreases.

III.CONCLUSION

The purpose of this experiment study is to identify the performance of cellular lightweight concrete in term of densityand compressive strength. The results are presented in Table No. 1, 2 and graphical representation of compressivestrength and density isillustrated inGraph(1).Based on resultitcan be seen that compressive strength for cellularlightweight concrete is low for lower density mixture. The increments of voids throughout the sample caused by thefoam in the mixture lower the density. As a result, compressive strength also decreases with the increment of thosevoids.Compressive strength of 53 grade cement is slightly higher than 43 grade cement, but as strength increases itsdensity also increases. Cellular lightweight concrete is acceptable for framed structure. Cellular light weight concretecanbesuitableforearthquakeareas.

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