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STUDY OF RECYCLED AGGREGATE IN CONCRETE BY USING MINERAL ADMIXTURE (GGBS) & MANUFSCTURED SAND.

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ABSTRACT:

Reuse of concrete waste concrete grade M:30 use of manufactured sand in replacement of natural sand in concrete, GGBS, ground granulated blast furnace slag (GGBS) m:30 to study the difference properties like work ability compressive strength and flexural strength test. Fresh and hardened concrete and also compare above properties with normal concrete.

1. ***In construction materials are making the idea of sustainable construction more believable everyday. In this paper GGBS & 5%, 10% weight cement and manufactured sand in concrete. 7 days and 28 days are has been done M:30 grade of concrete.***
2. ***This research is carried 25% RCA 5% GGBS M.S 20%.***

This research is carried out in the phase. In M:30 grade concrete out to determine the 25% RCA 5% GGBS 20% M.S are optimum percentage of replacement at which maximum compressive strength is achieved.

KEYWORDS:
Cement ground granulated blast furnace slag (GGBS) R.C.A recycled coarse aggregates, natural stands, aggregates, manufactured sand.

1. INTRODUCTION

Demolition of structures produces large quantities of concrete wastes every year and it is increasing every year. A concrete mix consists of substantial amount of supplementary cement utilities materials like GGBS as partial replacement to cement and recycle concrete aggregate instead of natural aggregate can be considered as concrete for sustainable construction.

Sustainable energy and cost of savings can result when industrial by products are used as partial replacement for the energy intensive Portland cement

This investigation attempts to study the feasibility of using locally available GGBS, R.C.A and M.S as partial replacement for cement and sand in concrete. In this research we prepared of cubes for compressive strength test for flexure strength test permeable voids test. The samples were tested at the age 7 days & 28 days. While the destructive test includes compressive strength test as per 516-1954 it.

1. To find the optimum percentage of replacement of natural sand with m. sand at which maximum strength obtained.
2. To use Pizzolanic materials such as GGBS and cement in concrete by replacement of it.
3. To conduct compressive strength test and flexural test.
4. To study and find permeable voids of the concrete mix and its relation with compressive strength of concrete.
5. To provide economical construction material.
6. Provide safety guard to the environment by utilizing waste property.
7.

2.MATERIALS USED

The material used in experimental investigation include:

2.1 cement:
ordinary Portland cement S3 grade was used in this study. Specific gravity 3.68,normally consistency 36%.

2.2 water:
in this research potable water free from organic substance was used for mixing as well as curing of concrete.

2.3 Ground granulated blast furnace slag (GGBS):

The used GGBS in research is obtained from JSW steel plant. It is a granular product with very limited crystal for motion is highly cementious in nature and ground to cement finess and hydrates like port, land, cement. The 5 specific gravity of GGBS 2.85.

2.4 R.C.A:
Specific gravity R.C.A 3.69 zone 2 aggregate IS 383-1997.

3. Compressive strength test

For Compressive Strength test, cube specimens of dimensions 150 x 150 x 150 mm was cast for M 30 Grade of concrete. The mold filled with 50% 75 % and 100% Replacement of Manufactured sand and Recycled coarse aggregate with natural aggregate and natural sand. Vibration was given to the molds using table vibrator. The top surface of the specimen was leveled and finished. After 24 hours the specimens were demoded and were transferred to curing tank were in they were allowed to cure for 7,28 days and. After 7 ,28 days and 56 days These cubes tested on digital compression testing machine as per I.S 516-1959. The Failure load was reported .The compressive strength was calculated follows.

Compressive Strength (MPa) = Failure load / Cross sectional area

3.1 Result of compressive strength

Table 1 shows that compressive strength of M30 C.C cubes having different % of recycled aggregate, manufacturing sand, GGBS and NA.

Sr no.	Day	Replacement of proportion ID	Replacement of C.A with R.C.A	Replacement of cement with GGBS	Replacement of FA with M.S	Compressive strength(N/mm^2)
1	7	C1	25%	5%	20%	27.10
2	7	C2	25%	10%	20%	22.50
3	7	C3	50%	5%	40%	16.90

Table 1 Results

Sr no.	Day	Replacement of proportion ID	Replacement of C.A with R.C.A	Replacement of cement with GGBS	Replacement of FA with M.S	Compressive strength(N/mm^2)
1	28	C1	25%	5%	20%	39.40
2	28	C2	25%	10%	20%	31.82
3	28	C3	50%	5%	40%	24.40

Table 2 Results

Sr no.	Day	Replacement of proportion ID	Replacement of C.A with R.C.A	Replacement of cement with GGBS	Replacement of FA with M.S	Compressive strength(N/mm^2)
1	7	C4	50%	10.%	40%	15.50
2	7	C5	0%	5%	0%	27.90
3	7	C6	0%	10%	0%	26.90

Table 3 Results

Sr no.	Day	Replacement of proportion ID	Replacement of C.A with R.C.A	Replacement of cement with GGBS	Replacement of FA with M.S	Compressive strength(N/mm^2)
1	28	C4	50%	10.%	40%	22.60
2	28	C5	0%	5%	0%	40.00
3	28	C6	0%	10%	0%	38.60

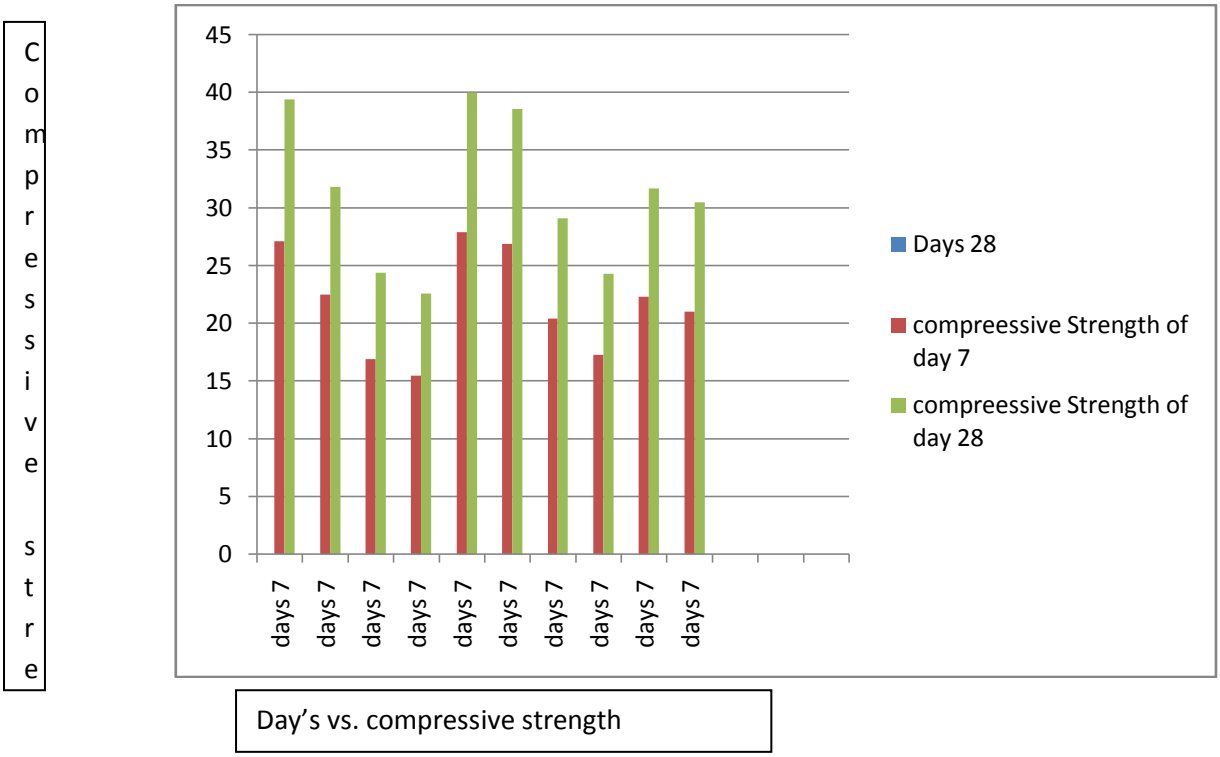
Table 4 Results

Sr no.	Day	Replacement of proportion ID	Replacement of C.A with R.C.A	Replacement of cement with GGBS	Replacement of FA with M.S	Compressive strength(N/mm^2)
1	7	C7	25%	0.%	0%	20.40
2	7	C8	50%	0%	0%	17.30
3	7	C9	0%	0%	20%	22.30
4	7	C10	0%	0%	40%	21.00

Table 5 Results

Sr no.	Day	Replacement of proportion ID	Replacement of C.A with R.C.A	Replacement of cement with GGBS	Replacement of FA with M.S	Compressive strength(N/mm^2)
1	28	C7	25%	0.%	0%	29.10
2	28	C8	50%	0%	0%	24.30
3	28	C9	0%	0%	20%	31.70
4	28	C10	0%	0%	40%	30.50

Table 6 Results



Day's vs. compressive strength

4. Flexural Strength Test

100mmX100mmX500mm were casted. Flexural strength, also known as modulus of rupture, bend strength, or fracture strength,[dubious – discuss] a mechanical parameter for brittle material, is defined as a material's ability to resist deformation under load.The transverse bending test is most frequently employed, in which a rod specimen having either a circular or rectangular cross-section is bent until fracture using a three point flexural test technique. The flexural strength represents the highest stress experienced within the material at its moment of rupture. The beam tests are found to be dependable to measure flexural strength.

Calculations: $\frac{PL}{bd^2}$

Where

b= width in cm of specimen

d= depth in cm of specimen at point of failure

L= length in cm of specimen on which specimen was supported

Result of Flexural Strength

Table number from 6.29 shows that Flexural strength of M30 C.C cubes having different % of recycled aggregate, manufacturing sand, GGBS and NA.

Sr no.	Day	Replacement of proportion ID	Replacement of C.A with R.C.A	Replacement of cement with GGBS	Replacement of FA with M.S	Compressive strength(N/mm^2)
1	28	C1	25%	5.%	20%	9.78
2	28	C2	25%	10%	20%	8.50
3	28	C3	50%	5%	40%	7.59

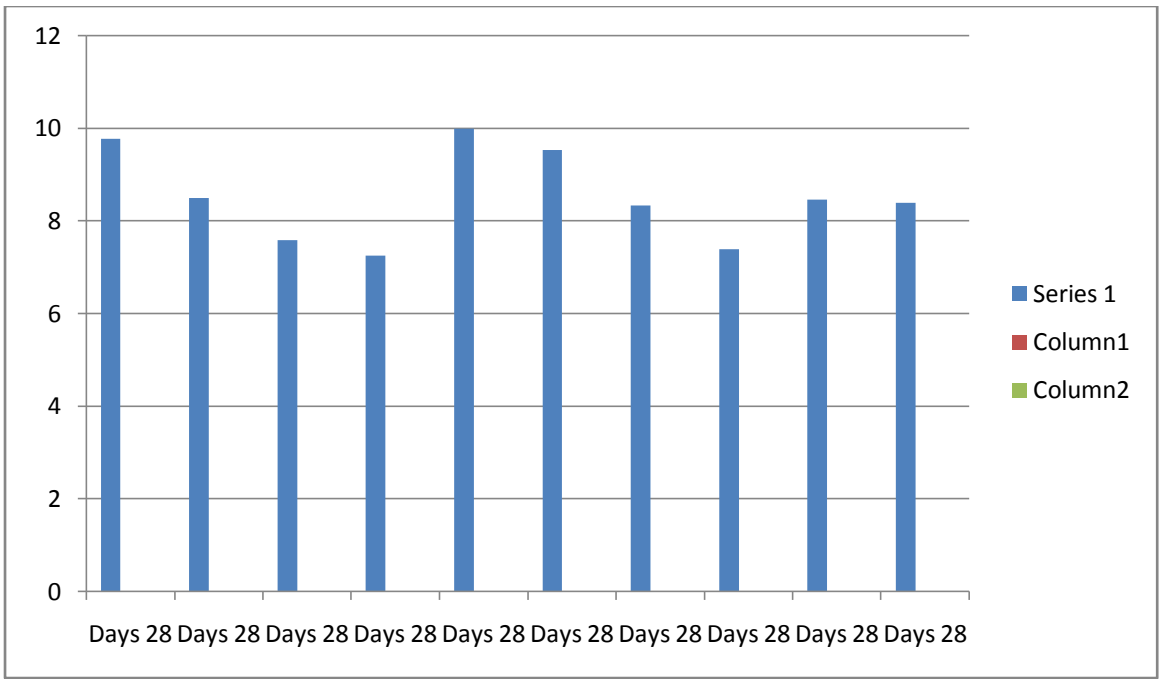
Table 7 Result of Flexural Strength

Sr no.	Day	Replacement of proportion ID	Replacement of C.A with R.C.A	Replacement of cement with GGBS	Replacement of FA with M.S	Compressive strength(N/mm^2)
1	28	C4	50%	10.%	40%	7.25
2	28	C5	0%	5%	0%	10.00
3	28	C6	0%	10%	0%	9.54

Table 8 Result of Flexural Strength

Sr no.	Day	Replacement of proportion ID	Replacement of C.A with R.C.A	Replacement of cement with GGBS	Replacement of FA with M.S	Compressive strength(N/mm^2)
1	28	C7	25%	0.%	0%	8.34
2	28	C8	50%	0%	0%	7.39
3	28	C9	0%	0%	20%	8.47
4	28	C10	0%	0%	40%	8.40

Table 9 Result of Flexural Strength



CONCLUSION

- **Compressive Strength:** 25% Replacement of Course Aggregate with Recycled Aggregate and 20% Replacement Of Natural Sand with Manufactured Sand and 5% Replacement of GGBS With Cement Gives Maximum Compressive Strength In Comparison with Other Replacement.
- **Workability:** 0% Replacement of Coarse Aggregate with Recycled Aggregate and 10% Replacement Of Natural Sand with Manufactured Sand and 0% Replacement of GGBS With Cement Gives Gives Higher Workability in Comparison with Other Replacement.
- **Flexural Strength:** 25% Replacement of Coarse Aggregate with Recycled Aggregate and 20% Replacement Of Natural Sand with Manufactured Sand and 5% Replacement of GGBS With Cement Gives Maximum Flexural Strength In Comparison with Other Replacement.
- Looking Into the Result of all Proportion with Different Replacement Percentage of Recycled Coarse Aggregate with Manufactured Sand with Normal Coarse aggregate and natural sand 20 % replacement of both material with natural material give good compressive strength and workability and also satisfactory and flexural strength. So 20% replacement of material will proposed to used for producing M-30 Grade Concrete by Using Recycled Coarse Aggregate and Manufactured Sand And GGBS For Save Environment and Natural Source Of Material.

7.2 Future scope

- If we achieve Desire Strength in M-30 Mix Concrete then we can use this Concrete.
- In Pavements to Make C.C Roads R.C.C Construction .To study variety of recycled aggregates samples, laboratory controlled conventional concrete.
- The maximum size of well graded recycled coarse aggregates is restricted to 20mm, Hence recycled coarse aggregates above 20 mm were out of the scope of present investigation.
- Hence only coarse recycled aggregates with the maximum nominal sizes of 10 mm and 20 mm were used in this study. The fine aggregate used in this study was natural river sand with a fineness modulus of 2.11.
- All coarse aggregates were used here were with chemical treatment. In the treatment the recycled coarse aggregate is soaked for 24 Hrs. so that the matrix attached to coarse aggregate can be removed. By Using Such Concrete of Recycle Coarse Aggregate & Manufacture Sand we save natural Source of aggregate.

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