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Partial Replacement of Cement in Concrete with Granite Powder and Fine Aggregate with Saw Dust

Koneti Vamsi[1], Rajarapu Bhushaiah[1], Gangavarapu Manohar[1], Kakani Krupasagar[1], Shaik Mohammad[1], Rama Harshitha[2]

[1]*UG Student, Department of Civil Engineering, Pace Institute of Technology & Sciences, Ongole.*
[2]*Assistant Professor Department of Civil Engineering, Pace Institute of Technology & Sciences, Ongole.*

Abstract - *The concept of partial replacement of cement and fine aggregate with granite powder and saw dust when it is capable for sustainable development is characterized by application, we aware that a lot of damage is done to environment in the manufacturing of cement that the ton of cement manufacture releases half ton of carbon dioxide and control of the granite powder same way granite powder and saw dust is cheaper. In this investigation of granite slurry and saw dust was used to partial substitute in proportions varying from 10%, 20%, 30% by weight to cement in concrete and tested from compressive strength, tensile strength and flexure strength. Concrete cubes measuring. 150 x 150 x 150 mm were cast and their compressive strength, tensile strength and flexure strength is evaluation at 7, 14, 21, 28 days. It was observed that substitution at 10% of cement by weight with granite powder in concrete was the most effective in increasing compressive and flexural strength compare to other ratios. The test results were plotted for 10% ratio of granite slurry and saw dust having great compressive strength, tensile strength and flexure strength compared to 20%, 30% ratio. So it can be concluded that when locally available granite slurry and saw dust is a good partial replacement to concrete and improves compressive, tensile, workability, flexure characteristics of concrete, while simultaneously offsetting the overall cost of concrete substantially.*

Key Words: Granite slurry, saw dust, sound absorption, compressive strength, flexibility, workability.

1. INTRODUCTION

In present decade the industrial waste causes tremendous impact on environmental pollution which it is utilized as garbage waste was disposed in land areas, which get polluted to the geosphere, lithosphere, atmosphere, hydro sphere as in present Sicario of project the industrial waste of granite powder and saw dust all consider not only to reduce the environmental pollution but also to reduce the CO2 of cement and silica content in sand by replacing with granite slurry and saw dust respectively.

The granite slurry and saw dust it is highly produced at chimakurthy and surrounding of Ongole. The granite slurry was waste produced by the all industrial in their region may be approach 2000 tones per week in India and recent study has shown that amount of sawdust waste produced in our country 30000-33000 tons annually. This industrial waste it can be carried away from the environmental impact and granite powder it have highly silica content so it is effect of human health causes many diseases it like lung cancer, kidney disease and chronic obstruction pulmonary diseases because the silica content has (60-67%) so it can be damage of the human effect and land effect but the silica content it can cement concrete because it have good boding of cement .the saw dust and granite slurry it can be utilized with cement concrete because it can be reduced with the carbon dioxide and used with silica. It is lot of damage is done to environment in the manufacturing of cement it can be released to tons of cement manufacturing is released half tone of carbon dioxide and it pollution of the environmental and majorly controlled with granite slurry and saw dust because they have highly silica content so it can be reduced with carbon dioxide.

The saw dust it can utilized of fine aggregate because it has the less workability because it has chemical properties like carbon (61.58%), oxygen (33.04%) so it can be absent has water absorption it can received it have mostly advantage it can be reduced at sound absorption but it not supported with the fire resistance. The saw dust it can be used has better insulation properties and it can be resistance to the water absorption because it has low compressible strength it can be used to benefit to normal weight concrete because it has lightness in weight concrete it reduces damage and extended life of form work. The saw dust it can used concrete with large void ratio with improve the sound absorption property

The granite powder and saw dust it can mixing with the cement concrete cubes it has highly compressive strength, tensile strength, flexure strength and workability it can conventional to the normal cement concrete. And it cost of construction it can be reduced of objective it can help overview to the environment problem. To find the investigation have used to study of granite slurry and saw dust it is partial replacement of the different percentage of the concrete cubes and cylinder by using the experiment of the compressive strength, split tensile strength and flexural strength of concrete.

Number the reference items consecutively in square brackets. However, the authors name can be used along with the reference number in the running text. The order of reference in the running text should match with the list of references at the end of the paper.

2. OBJECTIVE

- Identification of granite powder with different mineralogical composition in and around Nellore region.
- Collection of granite dust from two different granite.
- Testing of the collected samples for various physical and chemical properties.
- Testing of fresh concrete containing granite slurry for workability.
- Identification and usage of admixture for better workability and strength.
- Testing of hardened concrete cubes for strength at different ages.

3. SCOPE

Granite slurry and saw dust is used to make durable concrete structures in combination with ordinary Portland cement or other pozzolanic materials. Granite slurry and saw dust has been widely used in India, increasingly in the United States and in Asia for its superiority in concrete durability, extending the life span of buildings from fifty year to a hundred years. Two major uses of granite slurry and saw dust waste content ranging typical from 30 to 70 % and in the production of ready-mixed or site batched durable concrete. Concrete made with granite slurry and saw dust cement sets more slowly than concrete made with ordinary Portland cement, depending on the amount of granite slurry and saw dust in the cementation material, but also continues to gain strength over a longer period in production conditions. This results in lower heat of hydration and lower temperature rises, and makes avoiding cold joints easier, but may also affect construction schedules where quick setting is required.

4. METHODOLOGY

- Collection of materials.
- Mix Design.
- Test on concrete.
- Results.
- Discussion.
- Conclusion.

5. COLLECTION OF MATERIALS

- Ordinary Portland cement it is 53 grade cement was used it brand of UltraTech
- Fine aggregate-it is used from river sand as it is passing 4.75 mm sleeve
- Coarse aggregate-it is shape of angular and retaining 20 mm size of sleeve is used
- Water -generally we can take the tap water having the pH value using the IS CODE is used
- Granite slurry-Granite slurry waste is obtained from the granite industries is nearly to Ongole
- Saw dust -saw dust waste is obtained from the saw industries.

Table-1: Chemical properties of granite slurry

Sl. No	Specification	Values
1	silica	70-77%
2	Alumina	11-13%
3	Potassium oxide	3-5 %
4	Soda	2.7-5.3%
5	lime	1.2%
6	Iron	2-3%

Table-2: Physical properties of granite slurry

Sl. No	Specification	Values
1	Color	Gray, light gray, dark gray.
2	Hardness	6.5
3	Particle Shape	Irregular
4	Melting point	1215-1260°C
5	Density	2.65 – 2.75 g/cm^3
6	Boiling point	2219-2300°F
7	Thermal conductivity	2.2
8	Specific gravity	2.43-2.58
9	Vapor pressure	None

Table-3: Chemical properties of saw dust

Sl. No	Specification	Values
1	Carbon (C)	61.58%
2	Hydrogen (H)	5.30%
3	Oxygen (O)	33.40%
4	Hollo Cellulous	82.40%
5	Nitrogen (N)	0%

Table-4: Physical properties of Saw dust

Sl. No	Specification	Values
1	Color	SW 6158
2	Fineness	75μm
3	Particle Shape	Irregular
4	Density	0.21 g/cm^3
5	Specific gravity	2.02
6	Vapor pressure	None

5.1 Testing of Cement

Cement is a binding material called calcareous and argillaceous materials. Decan-53 grade ordinary Portland cement conforming to IS: 12269 was used. There are about

70 varieties of cement and available in powder, paste and liquid form but we are only concerned here with constructional cement commonly known as Portland cement. Portland is the town South England where cement was originally made.

Table-5: Testing of cement

Sl. No	Tests on cement	Result	Remarks
1	Normal consistency	30.2%	Take it as 'p'
2	Specific gravity	3.16	
3	Fineness modulus	2%	Cement is finest in nature
4	Initial setting time	35 min	More than 30 minutes
5	Final setting time	250 min	Less than 600 minutes
6	Soundness	a) 1mm b) 3.33%	Less than 10 mm

5.2 FINE AGGREGATE

The standard sand used in this investigation was obtained from PENNA River in NELLORE. The standard stand shall be of quartz, light grey or whitish variety and shall be free from silt. The sand grains shall be angular; the shape of the grains approximating to the spherical from elongated and flattened grains being present only in very small or negligible quantities. The standard sand shall(100 %) pass through 2-mm IS sieve and shall be (100 %) retained on 90-micron IS Sieves and the sieves shall conform to IS 460 (part:1): 1985.

Table-6: Fine aggregate test result

Sl. No	Test	Result
1	Specific gravity	2.59
2	Free moisture	1%
3	Fineness modulus	2.68

5.3 COARSE AGGREGATE:

According to IS 383:1970, coarse aggregate may be described as crushed gravel or stone when it results from crushing of gravel or hard stone. The coarse aggregate procured from quarry was sieved through the sieved of sizes 20 mm and 10 mm respectively. The aggregate passing through 20 mm IS sieve and retained on 10 mm IS sieve was taken. Specific gravity of the coarse aggregate is 2.76.
The physical properties of gravel are given by

Table 7: Coarse aggregate testing result

Sl. No	test	result	Remark
1	Fineness modulus	More than 3.2	Is 2386-part-3 1963
2	Specific gravity	2.79	20mm size
3	Impact strength	25%	Not more than 45%
4	Los angle abrasion testing	52.5%	
5	Crushing strength	26.91%	
6	Water absorption	1%	Not more than 3%
7	Flakiness index	14.50%	Not more than 40-45%
8	Elongation index	13.33%	

6 MIX DESIGN

- Mix proportion of concrete =M30 grade
- Indian standard recommendation method is 10262-2009 mix design for M30 grade

6.1 STIPULATION FOR PROTIONTIG

Grade designation = M30
Type of cement = OPC 53 grade
Mineral admixture = NO
Max. nominal size aggregate =20 mm
Max. water content = 0.45
Workability =100 mm(slump)
Exposure condition = server (reinforced concrete)
Degree of supervision = GOOD
Type of supervision = crushed angular aggregate
Chemical admixture = NO

6.2 TEST DATA FOR MATERIAL

Cement used = OPC 53
Specific gravity of cement = 3.15
Specific gravity coarse aggregate = 2.80
Specific gravity of fine aggregate = 2.70
Water absorption coarse aggregate= 0.5 %
Water absorption fine aggregate = 1.0 % free moisture
Free moisture coarse aggregate = NILL
Free moisture fine aggregate =NILL

6.3 DESIGN

Target strength for mix,
Proportion f_{ck} $=f_{ck}' + (1.65 \times s)$

=30 + (1.65 x 5)
=38.25 N/mm^2.

6.4 SELECTION OF WATER CONTENT RATIO

From the experience of designer 38.25N/mm^2 can achieved in 28 days by using a water cement ratio is 0.40 form as per table 5 IS :456:2000 maximum w/c ratio permitted is 0.45
Hence adopt water cement ratio is 0.45.

6.5 PROPORTION OF VOLUME OF COARSE AGGREGATE AND FINE AGGREGATE CONTENT

From table 3: volume of coarse aggregate =20 mm of fine aggregate for water cement ratio 0.50 =0.60.
In present water cement ratio is 0.45 the volume of coarse aggregate is required increase to decrease the fine aggregate content as water cement ratio is lower by 0.10 the proportion of volume of coarse aggregate is increase by 0.02 (at the rate of 0.01 for every +/- 0.05 change in water cement ratio)
Proportion of volume of coarse aggregate for the water cement ratio of 0.45 =0.63
For pumpable concrete these values should be reduced to 10 %
Volume of coarse aggregate =0.62 x 0.9
=0.56
Volume of fine aggregate =1-0.56
=0.44.

6.6 MIX CALCULATION OF CUBES

Grade of concrete = M30 (1:0.75:1.5)
Volume of cube = 0.15 x 0.15 x0.15 (m)
= 0.003375 m3
Factor of safety = 1.54 to 1.57
We can take factor of safety= 1.57
Multiply, = 0.003375 x 1.57
= 0.00529 m^3
M30 = 1 +0.75+1.5 = 3.25
Volume of cement = $\frac{1}{13.25}$ x 0.00529
= 0.001627
Volume of cement x density = 0.00162 x 1400
= 2.24 kg/m^3
They have three cubes = 2.24 x 3
= 6.72 kg/m^3
Water cement ratio =2.24 x 0.45
=1.008 x 1000 ml
=1008 ml
Three cubes of water cement ratio =1008 x 3
= 3024 ml
Volume of Fine aggregate = (0.75/3.25) x 0.00529
= 0.00122 m^3
Volume of fine aggregate x density
= 0.00122 x 1700
= 2.074 kg /m^3
Converted to grams = 2.074 x 1000
= 2074 grams
Volume of coarse aggregate = (1.5/3.25) x 0.0052
= 2.441 x 10^{-3}
= 0.00244 m^3
Volume of coarse aggregate x density of coarse aggregate (1650)
= 0.00244 x 1650
= 4.026 kg/m^3
Convent = 4.026 x 1000
= 4026 grams.

GRANITE SLURRY

Granite slurry we are replacing with the cement 10%,20 % and 30%.

10% OF GRANITE SLURRY

Volume of cement = 2240 x 0.10
= 224
= 2240 – 224
= 2016.2gms
We are taking the cement = 2.016kg /m^3
Granite slurry = 224 grams.

20 % OF GRANITE SLURRY

Volume of cement = 2240 x 0.20
= 448
= 2240 – 448
= 1792
We are taking the cement = 1792 gm or 1.79 kg/m^3
Granite slurry = 448 gm (or) 0.448 kg/m^3.

30%OF GRANITE SLURRY

Volume of cement = 2240 x 0.30
= 672 gm
= 2240-672
= 1568 gm
Cement = 1.568 kg/m^3
Granite slurry = 0.672 kg/m^3.

SAW DUST

Saw dust we are replacing with the fine aggregate at 3%, 5% and 7%.

3%OF SAW DUST

Volume of fine aggregate = 2074 x 0.03
= 62.22 gm
= 2074 - 62.22
= 2011.78 gm
Fine aggregate = 2011.78 gm
Saw dust = 62.22 gm

5% OF SAW DUST

Volume of fine aggregate = 2074 x 0.05
= 103.7
= 2074 - 103.7
= 1970.3 gm
Fine aggregate = 1970.3 gm
Saw dust = 103.7 gm

7% OF SAW DUST

Volume of fine aggregate = 2074 x 0.07
= 145.18.
2074 - 145.18 = 1928.82 gm.
Fine aggregate = 1.93 kg/m^3
Saw dust = 145.18 gm
= 0.14 kg/m^3

6.7 CALCULATION OF CYLINDER:

Dimension of cylinder of radius = 150mm
Height = 300mm.
Perimeter = 150 x 300
= 4500 mm
= 0.15 x 0.3
= 0.045 m
Volume of cylinder = $\frac{\pi}{4}$ x $(0.15)^2$ x 0.3
= 0.0053 m^2
1m^3 = 0.00530

By Interpolation method,
1400 = X
1400 x 0.0053 = 7.42
Assuming X = 1m^3
= $\frac{7.420}{3.25}$
= 2.28 kg
Cement = 2.28 x 1.57
= 3.57 kg
Three cyclinder = 3.57 x 3
= 10.7 kg
Water cement ratio = 3.57 x 0.45
= 1.60 lit
Three cyclinder = 1.60 x 3
= 4.81 lit
Total water cement ratio = 4.81 lit
Fine aggregate = 3.57 x 0.75 = 2.67 x 1.57
= 4.203 m^3
Fine aggregate x density = 4.203 x 1700
= 7145.1 gm
= 7.14 kg/m^3
Coarse aggregate = 3.57 x 1.5
= 5.355 x 1.57
= 8.40 m^3
Coarse aggregate = 8.40 x 1650
= 13860 gm

GRANITE SLURRY

Granite slurry are replacement with the cement of 10%,20% and 30%

10 % OF GRANITE SLURRY

Volume of cement = 3570 x 0.10
= 357 gm
= 3570 – 357
= 3213 gm
Cement = 3213 gm
Granite powder = 357 gm

20 %OF GRANITE SLURRY

Cement = 3570 x 0.20
= 714
= 3570 – 714
= 2856 gm
Cement = 2856 gm

30%OF GRANITE SLURRY

Volume of cement = 3570 x 0.30
= 1071gm
= 3570 – 10
= 2500 gm
Cement = 2500 gm
Granite slurry = 1071 gm

SAW DUST:

We are replacement of fine aggregate with 3%, 5%and 7%

3 %OF SAW DUST:

Fine aggregate = 7145.1 x 0.03
= 214.35
=7145.1 - 214.35

= 6930.75
Fine aggregate = 6930.75 gm
Saw dust = 214.35gm

5%OF SAW DUST:

Fine aggregate = 7145.1 x 0.05
= 357.255
= 7145.1 - 357.255
= 6787.85
Fine aggregate = 6787.85 gm
Saw dust = 357.255 gm

7% OF SAW DUST

Fine aggregate = 7145.1 x 0.07
= 500.15 gm
=7145.1 - 500.157
Fine aggregate = 6644.94 gm
Saw dust = 500.157gm.

TABLE 8: Mix design values of different proportion cube mix

Mix design	Nominal mix	Mix-1	Mix-2	Mix-3
% replacement of granite powder	0	10	20	30
% replacement of saw dust	0	3	5	7
Water/cement ratio	0.45	0.45	0.45	0.45
Cement content (kg)	2.200	2.016	1.792	1.568
Fine aggregate (kg)	2.07	2.01	1.97	1.92
Coarse aggregate (kg)	4.02	4.02	4.02	4.02
Water (Liter)	1.008	1.008	1.008	1.008

TABLE 9: Mix design values of different proportion cylinder mix

Mix design	Nominal mix	Mix-1	Mix-2	Mix-3
% replacement of granite powder	0	10	20	30
% replacement of saw dust	0	3	5	7
Water/cement ratio	0.45	0.45	0.45	0.45
Cement content (kg)	3.57	3.21	2.85	2.50
Fine aggregate (kg)	7.14	6.93	6.78	6.64
Coarse aggregate (kg)	13.86	13.86	13.86	13.84
Water (Liter)	4.81	4.81	4.81	4.81

7.1 COMPRESSIVE TEST ON CONVENTIONAL AND REPLACED GRANITE POWER AND SAW DUST CONCRETE SPECIMEN FOR 3, 7, 14 AND 28 DAYS

The main function of the concrete in structure is mainly to resist the compressive forces. When a plain concrete member is subjected to compression, the failure of the member takes place, in its vertical plane along the diagonal. The vertical cracks occur due to lateral tensile strain. A flow in the concrete, which is in the form of micro crack along the vertical axis of the member will take place on the application of axial compression load and propagate further due the later tensile strain. A flow in the concrete, which is in the form of micro crack along. The vertical axis if the member will take place on the application of axial compression load and propagate further due to the lateral tensile strain.

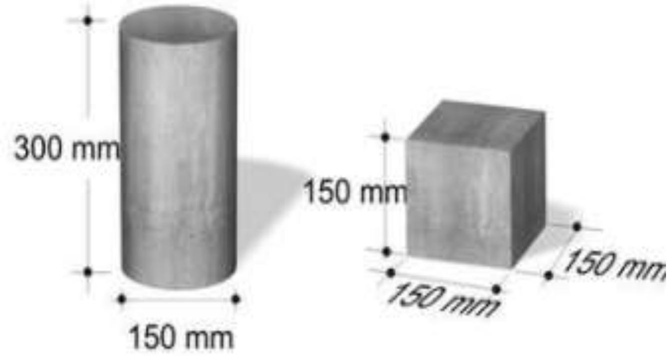

FIG 1: Cube and Cylinder Dimensions

7.2 TEST PROCEDURE FOR COMPRESSIVE STRENGTH

Test specimens of sizes 150 x 150 x150 mm prepared for testing the compressive strength of both controlled as well as based granite powder and saw dust as a partial replacement of sand and cement were prepared and cast into cubes. Compressive strength test results at curing ages of 7, 14, 21 and 28 days for control mix as well as for the modified mixes as shown in fig 1 for testing in compression, no cushioning material was placed between the specimen and the plates of the machine.

The load was applied axially without shock till the specimen was crushed. Fig 1.2 shows the test setup for the compressive strength. Three specimens for each mix were tested and the corresponding values were observed and average values were taken for discussion the variation of compressive strength with varying percentage replacement of cement with granite powder and saw dust.

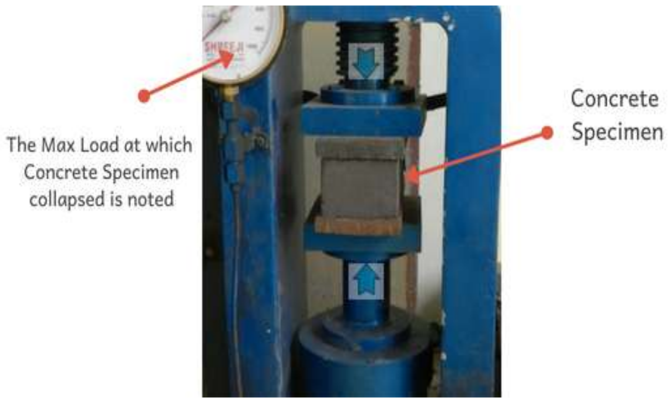

FIG 2: Compressive Testing Machine

7.3 TEST PROCEDURE OF THE TENSILE TESTS

Test specimens of size 100mm diameter and 300 mm length were prepared for testing the compressive strength of both controlled as well as granite slurry and saw dust-based concretes. The modified mixture with varying percentage of granite slurry and saw dust as a partial replacement of sand and cement were prepared and cast into cylinder.

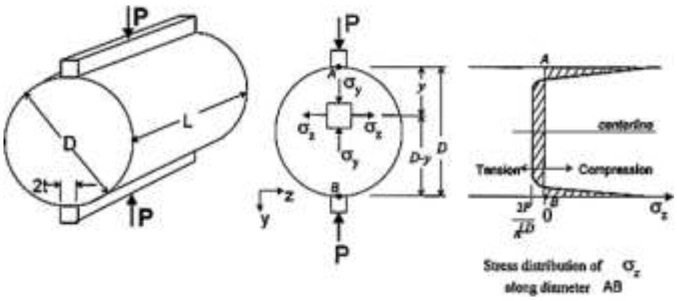

FIG 3: Tensile Load Acting on Cylinder

Tensile strength test results at curing ages of 7, 14 and 28 days for control mix as well. As for the modified mixes are shown in the table 10 for testing in compression, no cushioning material was placed between the specimen and the plates of the machine.

FIG 4: Split Cylinder Testing Machine

The load was applied axially without shock till the specimen and the plates of the machine. The load was applied without shock till the specimen was crushed the test set up for the tensile strength. Three specimens for each mix were tested and the corresponding values were observed and average values were taken for discussion. The tensile strength with varying percentage replacement of cement with granite powder and saw dust.

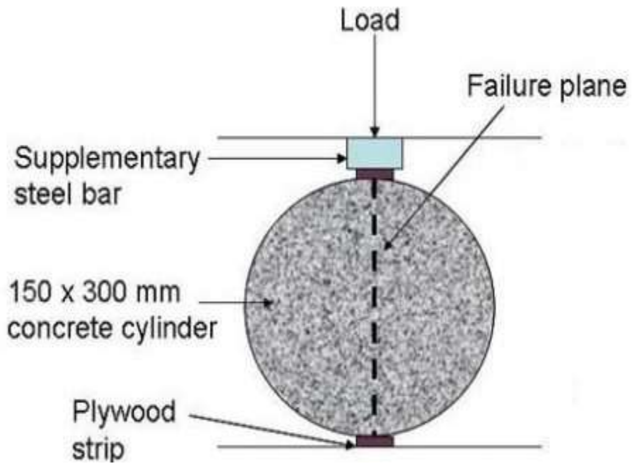

FIG 5: Tensile Load on Cylinder

8. RESULTS AND DISCUSSION

The determination of compressive strength and flexural strength is essential to estimate the load at which the concrete members may crack. The strength at failure is the modulus of rupture.

The following components are the noticed in the given below,

- C is the Compressive and tensile strength of normal concrete.
- Q_1 is the Compressive and tensile strength of granite powder of 10% and saw dust of 3%.
- Q_2 is the Compressive and tensile strength of granite powder of 20% and saw dust of 5%.
- Q_3 is the Compressive and tensile strength of granite powder of 30% and saw dust of 7%.

8.1 COMPRESSIVE STRENGTH

Table 10: Compressive strength in cubes for concrete in 7 days

Coding	Compressive strength for 7 days			
	1	2	3	Avg.
C (MPa)	24.66	24.88	24.97	24.83
Q_1 (MPa)	36.00	35.11	35.57	40.44
Q_2 (MPa)	41.33	39.55	45.55	43.55
Q_3 (MPa)	42.55	40.33	41.37	45.55

Table 11: Compressive strength in cubes for concrete in 14 days

Coding	Compressive strength for 14 days			
	1	2	3	Avg.
C (MPa)	33.33	32.00	32.23	32.52
Q_1 (MPa)	40.44	41.11	41.57	41.04
Q_2 (MPa)	43.55	43.33	43.42	43.43
Q_3 (MPa)	45.55	43.52	46.92	45.46

Table 12: Compressive strength in cubes for concrete in 28 days

Coding	Compressive strength for 28 days			
	1	2	3	Avg.
C (MPa)	48.00	48.88	48.69	48.52
Q_1 (MPa)	53.33	53.78	53.81	53.64
Q_2 (MPa)	51.11	46.22	49.95	49.09
Q_3 (MPa)	49.50	48.89	47.95	48.78

8.2 TENSILE STRENGTH

Table 13: Tensile strength in cylinder for concrete in 7 days

Coding	Compressive strength for 7 days			
	1	2	3	Avg.
C (MPa)	9.66	9.33	9.29	9.20
Q_1 (MPa)	7.92	9.33	9.45	8.90
Q_2 (MPa)	10.00	10.20	10.25	10.15
Q_3 (MPa)	10.20	9.52	9.02	9.58

Table 14: Tensile strength in cylinder for concrete in 14 days.

Coding	Compressive strength for 14 days			
	1	2	3	Avg.
C (MPa)	10.75	11.20	11.25	11.03
Q_1 (MPa)	10.75	12.44	12.25	11.81
Q_2 (MPa)	10.20	11.32	12.00	11.26
Q_3 (MPa)	10.05	11.50	11.52	11.05

Table 15: Tensile strength in cylinder for concrete in 28 days.

Coding	Compressive strength for 28 days			
	1	2	3	Avg.
C (MPa)	12.67	13.01	12.89	12.85
Q_1 (MPa)	13.88	14.71	13.96	14.08
Q_2 (MPa)	12.56	14.14	13.96	13.55
Q_3 (MPa)	12.67	13.10	12.94	12.90

Graph 1: Compressive strength in cubes for normal concrete. As the results were plotted in the below graph.

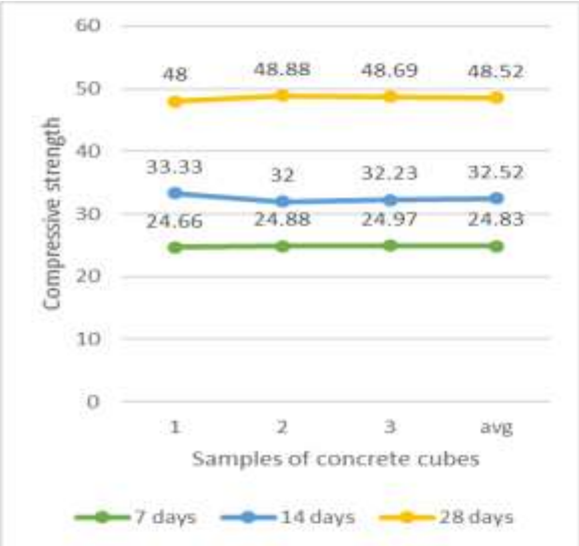

Chart 1

Graph 2: Compressive strength in cubes for granite of 10% and saw dust of 3% in concrete.

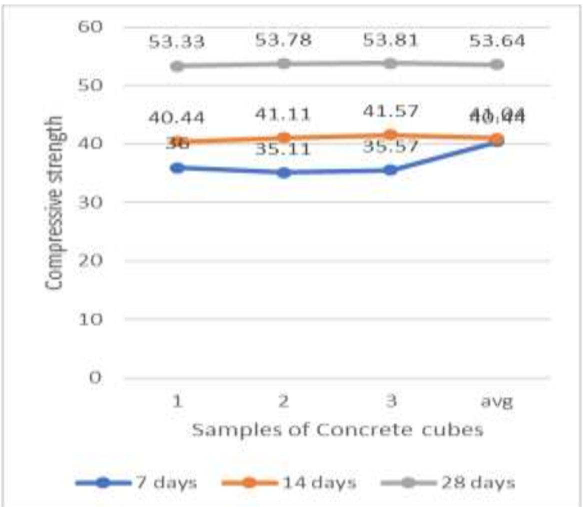

Chart 2

Graph 3: Compressive strength in cubes for granite of 20% and saw dust of 5% in concrete.

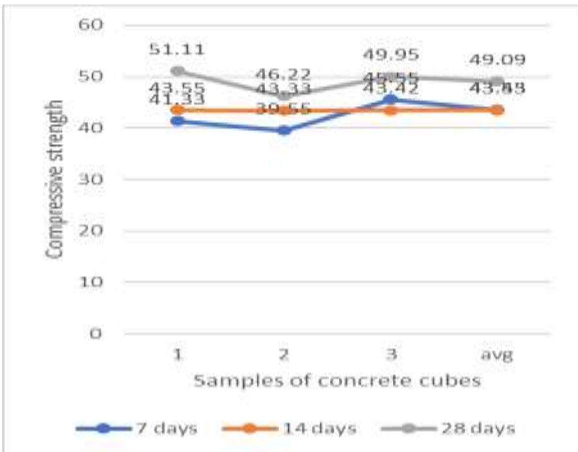

Chart 3

Graph 4: Compressive strength in cubes for granite of 30% and saw dust of 7% in concrete.

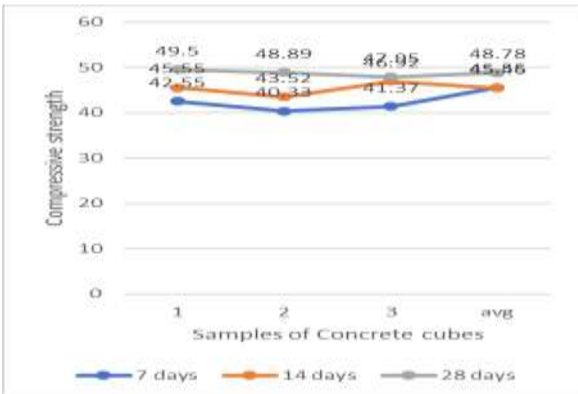

Chart 4

Graph 5: Tensile strength in Cylinders for normal concrete. As the results were plotted in the below graph

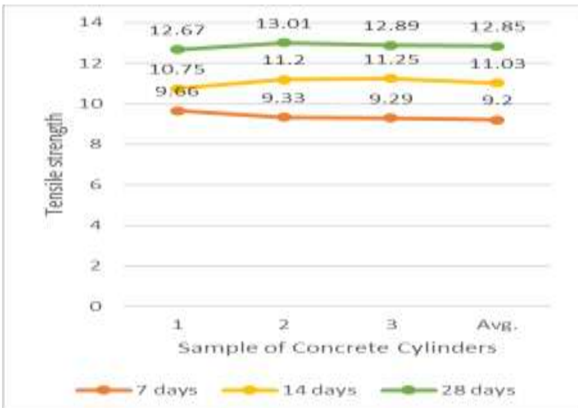

Chart 5

Graph 6: Tensile strength in Cylinders for granite of 10% and saw dust of 3% in concrete.

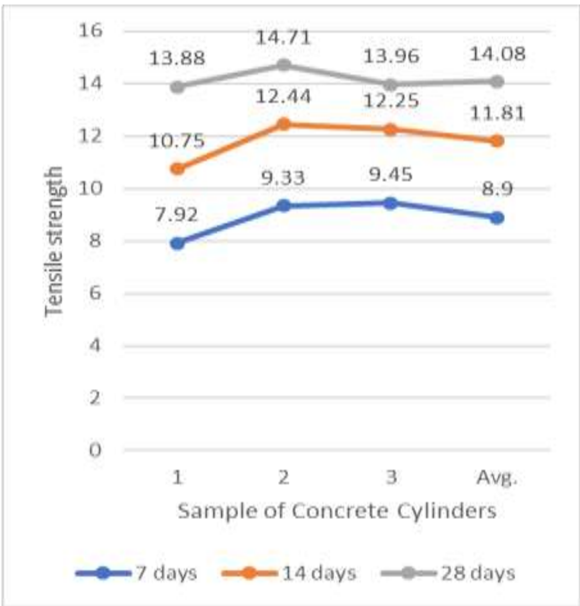

Chart 6

Graph 7: Tensile strength in Cylinders for granite of 20% and saw dust of 5% in concrete.

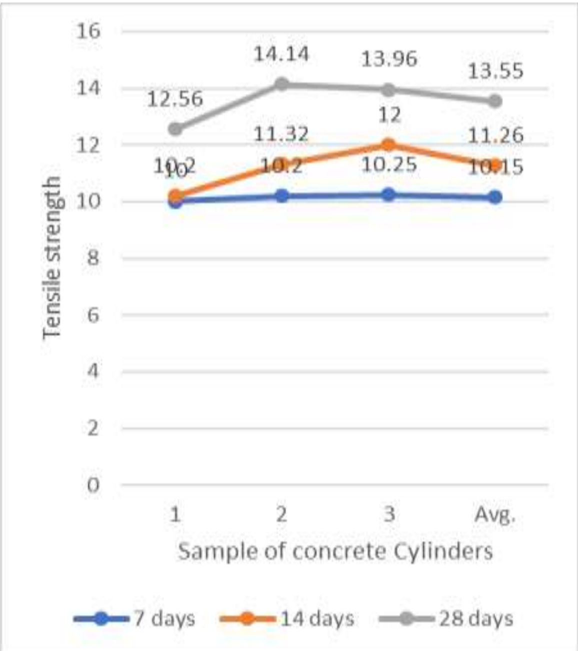

Chart 7

Graph 8: Tensile strength in Cylinders for granite of 30% and saw dust of 7% in concrete.

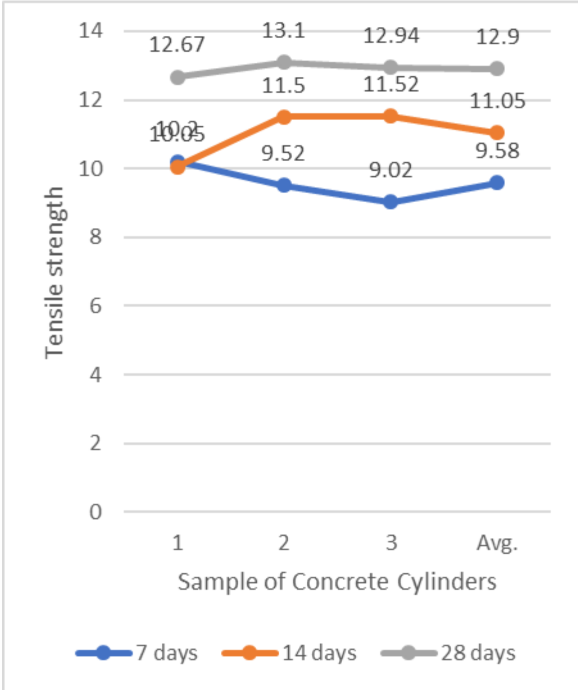

Chart 8

GRAPH 9: COMPRESSIVE STRENGTH IN CONCRETE CUBES FOR 28 DAYS AS THE RESULTS WERE PLOTTED IN THE BELOW GRAPH.

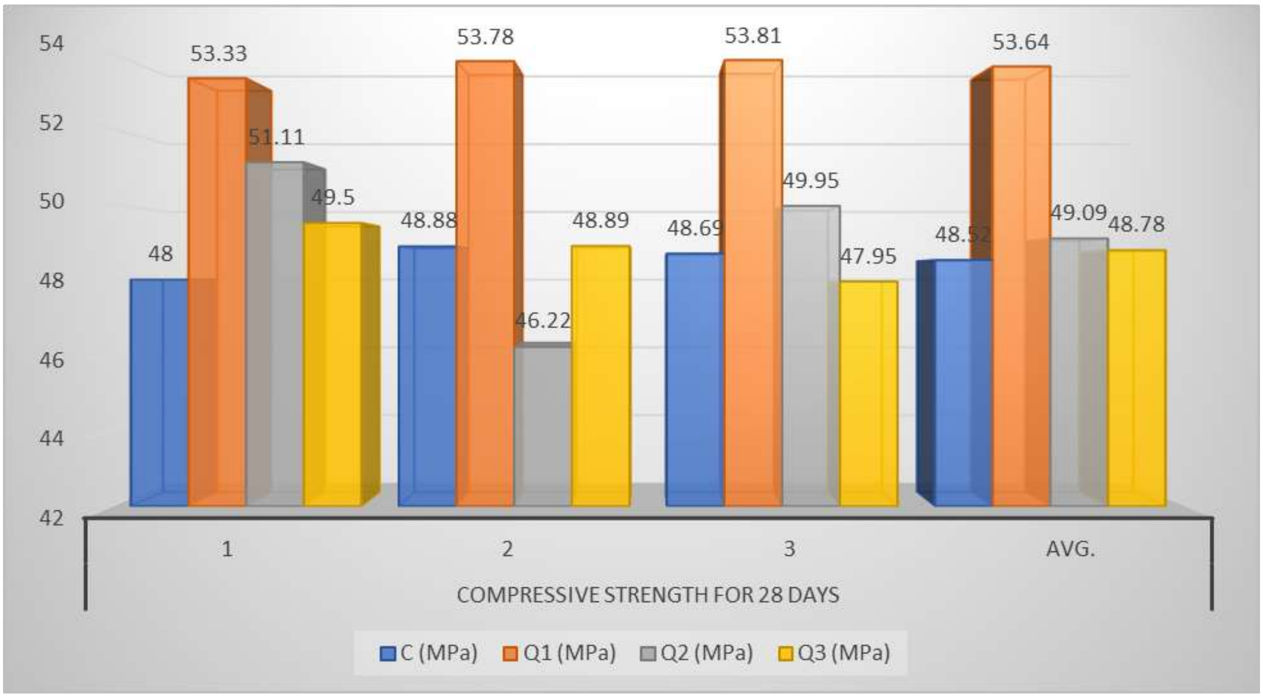

Chart 9

GRAPH 10: TENSILE STRENGTH IN CONCRETE CYLINDERS FOR 28 DAYS AS THE RESULTS WERE PLOTTED IN THE BELOW GRAPH.

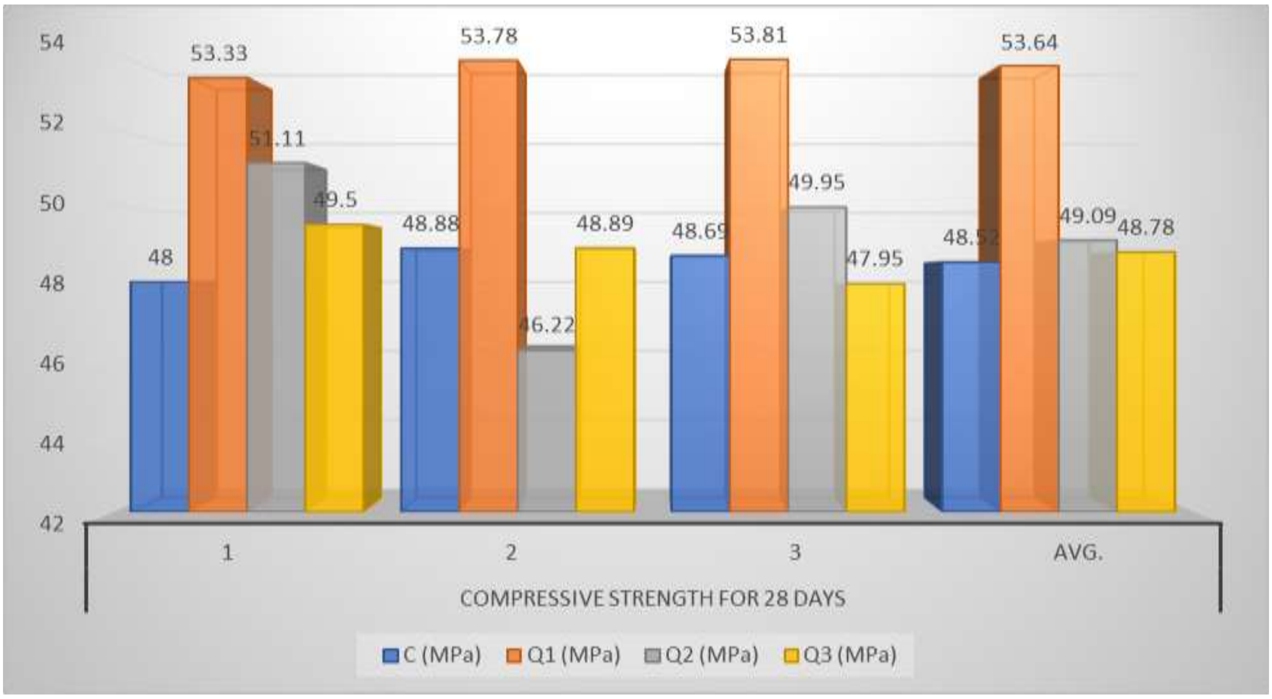

Chart 10

9. CONCLUSIONS

Based on the experiment investigation concerning about compressive strength and tensile strength obtain from the above experiments and graphs shall be shown in the above tables as followed. The granite powder and saw dust are shown the best results.

- By using Granite powder and saw dust in concrete the properties of concrete have certainly increased the physical properties of concrete.
- Compressive strength is increased with replacement of granite waste in concrete at 10% and saw dust in concrete at 3% is mixed was 53.81N/mm^2.
- When it is compared with normal concrete cube the compressive strength was 48.88N/mm^2.
- Similarly, tensile strength is increased with replacement of granite waste in concrete at 10% and saw dust in concrete at 3% is mixed was 14.71N/mm^2.
- When it is compared with normal concrete cube the compressive strength was 13.01N/mm^2.
- Therefore, instead of wasting the granite powder and saw dust was poured down to the Earth and it is thenceforth good for nothing, but to be cast out, and to be trodden under the foot of pupils and pretend nothing.

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BIOGRAPHIES

Shaik Mohammad,
B. Tech student,
Major field aspect be Seismic & blast resisting structures.
//Mohammad Madu//

Koneti Vamsi,
B. Tech student,
Major field aspect be
Site Engineer.

Rajarapu Bhushaiah,
B. Tech student,
Major field aspect to be Indian Engineering service (IES).

Gangavarapu Manohar, B. Tech student,
Major field aspect be Site engineering.

Kakani Krupasagar,
B. Tech student,
Major field aspect be Quantity Surveyor and Site Engineer.

Rama Harshitha,
M. Tech, Assistant Professor.
Major field aspect in Structural Engineering.