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Experimental Investigation On Concrete By Using Sinicon (Pp) And Peengan Waste As Partial Replacementof Aggregates

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Abstract: In our project we investigate the concrete as partial replacement of fine aggregate by using silicon pp and coarse aggregate by using peengan waste like peengan tiles. In here we replace the sinicon pp replaced as 0%, 10%, 20%, 30%, 40% and 50% of fine aggregate and coarse aggregate is replaced by 5% of peengan waste. To conduct the fresh concrete test and harden concrete test for the purpose of comparison of strength. Hence we make the cube, cylinder and prism for above mentioned percentage in M40 grade Mix concrete and compare the strength to conventional concrete with above mentioned concrete mix sinicon pp as fine aggregate and 5% of peengan tiles as coarse aggregate. The main aim of this project to attain the high strength of structure & to control the global warming.

INTRODUCTION: Concrete is a construction material composed of cement, fine aggregates (sand) and coarse aggregates mixed with water which hardens with time. Portland cement is the commonly used type of cement for production of concrete. Concrete technology deals with study of properties of concrete and its practical applications.In a building construction, concrete is used for the construction of foundations, columns, beams, slabs and other load bearing elements.There are different types of binding material is used other than cement such as lime for lime concrete and bitumen for asphalt concrete which is used for road construction.

OBJECTIVES OF STUDY

- To increase the mechanical properties of concrete such as compressive strength, tensile strength and flexural strength.
- To control the global warming.
- To study the effect on workability with varying percentage of Sinicon PP adding in concrete

LITERATURE REVIEW

Nirosha.N, Raja.A, Ashokkumar.S, Dineshkumar.M, Anu Anand(2017) "Experimental Investigation On Concrete With Partial Replacement Of Fine Aggregate By Using Sinicon Pp",represent, An attempt has been made to investigate the possibility of replacing locally available artificial material such as SiniconPP is concrete composites. The Sinicon PP increases the properties of concrete such as impact, compressive strength, tensile strength.etc.., The strength of the concrete increase for 10% of Sinicon PP used for M40 grade which is compared with conventional concrete. Based on strength properties it is concluded that optimum is 10% for M40 grade concrete. So finally, it is concluded that Sinicon PP concrete is more effective than conventional concrete.

D.Naveen Kumar , S.Sanjay Kumar , M.Karthikeyan,N.Nirosha(2018), "Experimental Study On Concrete In Partial Replacement Of Fine Aggregrate **By** *Using Sinicon (Pp) With Eggshell",conclude that***,** Here an attempt has been made to investigate the possibility of replacing locally available artificialmaterial such as SiniconPPis concrete composites.The Sinicon PP increases the properties of concrete such as impact, compressive strength and tensile strength etc.., The strength of the concrete increase for every 5% of Sinicon PP with Eggshell used for M40 grade which is compared with conventional concrete. Based on strength properties it is concluded that optimum is 20% for M40 grade concrete. So finally, it is concluded that Sinicon PP with Eggshell of concrete is more effective than conventional concrete.

T.Subramani, S.Gunalan, Hari Prasath, K.Vasantha Sethupathi, S.Priyanka, (2018)"Experimental Investigation Of Concrete Using Peengan Waste", investigate It about Strength of peengan waste containing in concrete was high compared with that of the conventional mix. The compressive strength of M40 concrete with peengan waste as coarse aggregate was optimum with a value of 45.20 N/mm2at 28 days curing. The split tensile strength of M40 concrete with peengan waste as coarse aggregate was optimum with a value of 2.98 N/mm2at 28 days curing.The flexural strength of M40 concrete with peengan waste as coarse aggregate was optimum with a value of 5.72 N/mm2at 28 days curing. Hence comparing concrete using peengan waste with conventional concrete, it can be concluded that the proposed concrete is 5% of peengan waste containing concrete is attain high strength compared with conventional concrete.

MATERIALS AND PROPERTIES

CEMENT

Cement is the most important ingredient of concrete. One of the important criteria for the selection of cement is its ability to produce improved microstructure in concrete. Some of the important factors, which play a vital role in the selection of the type of the cement are compressive strength at various ages, fineness, heat of hydration, alkali content, Tricalcium Aluminates (C3A) content, Tricalcium silicate (C3S) content, Dicalcium

silicate (C2S) content and compatibility with admixtures etc.

CEMENT

Test On Cement

S.NO	PROPERTY	VALUE
1	Specific Gravity	2.98
2	Initial Setting Time (Mins)	30
3	Final Setting Time (Mins)	550
4	Standard Consistency (%)	29
5	Fineness (m^2/kg)	225

FINE AGGREGATE

Fine-aggregate used for FRC should be properly graded to give minimum void ratio and be freedom deleterious materials like clay, silt and chloride contamination etc. Hence, grading of .aggregates is relatively different from that in CCC.

Fine aggregate

Test On Fine Aggregate:

S.NO	PROPERTY	VALUE
1	Specific Gravity	2.62
2	Finess Modulus	2.52%
3	Water Absorption	1.15%

COARSE AGGREGATE

The coarse aggregate is the strongest and the least porous component of concrete Presence of coarse aggregate reduces the drying shrinkage and other dimensional changes occurring because of moisture.

Properties such as crushing strength, durability, modulus of elasticity, maximum size, gradation, shape and surface structure characteristic, percentage of deleterious particles as well as flakiness and elongation indices need special consideration while selecting the coarse aggregate for FRC.The aggregate should be sound, free from deleterious materials and must have crushing strength, at least 1.5 times that of concrete.

Coarse aggregate

Test on Coarse Aggregate

S.NO	PROPERTIES	VALUE
1	Specific Gravity	2.62
2	Finess modulus	7.4%
3	Water absorption	1.2 %

4	Impact Strength	22%
5	Crushing Strength	2.14%

SINICON PP

It is a unique volcanic glass, a large deposit of which is found at only one location on the earth which is South Africa. Sinicon PP is made out of feed from this mines using patented manufacturing process to convert this volcanic glass into well-sealed tough glass granules which is ideally suited for use with cementitious and other binders. Under the microscope, each tough granules comprises a froth of glass-walled closed cells each enclosing a near vacuum. Sinicon PP is therefore best described as comprising millions of tiny sealed "thermos flasks", making it an absolutely unique and unrivalled insulating and fireproofing material.

Sinicon

Characteristics of Sinicon PP

- ✓ Exceptional Fire Resistance
- ✓ Compatibility with Portland Cement:.
- ✓ Superior Strength
- ✓ Light Weight
- ✓ Low Water Permeability
- ✓ Good Adhesion (in Plaster).
- ✓ Zero Smoke and Zero Fumes
- ✓ Vermin and Termite Resistant
- ✓ Non-Toxic Dust

Physical Properties Of Sinicon PP

- ➢ Not flamable. It is safe to handle like sand.
- ➢ Not explosive. It is safe to handle like sand.
- ➢ Not hazardous to skin. Could be cleaned with water.
- ➢ Not hazardous to eyes except abrasion. Washable with water.
- ➢ Not hazardous to Ingestion however avoid ingestion.
- ➢ If consumed, drink 2 x 250 ml of water to dilute. Not Toxic.
- ➢ A Substitute for sand in plastering and other applications

PEENGAN TILES

Peengan tiles aggregate are hard having considerable value of specific gravity, light weight than normal aggregate and rough surface on one side and smooth surface on other side. Replacement of ceramic aggregate is not only cost effective but also environment-friendly. The waste ceramic tiles are broken into pieces in nominal size (20mm as per IS 383- 1970) and mixed with concrete as partial replacement of coarse aggregate. The usage of waste tiles would lead to reduce the environmental pollution. The properties of peengan tiles are well within the range of the values of concrete making aggregate since, there are no harmful chemical on tiles.

Peengan Tiles

Physical Properties of Peengan Waste

S.NO	PROPERTIES	VALUE
1	Particle size	Irregular
2	Impact value	12.5%
3	Water absorption	0.13%
4	Aggregate Crushing value	0.19%
5	Specific Gravity	2.9

MIX DESIGN(M40)

Cement - 493kg/m^3

Water - 197 Lit/m^3

Fine aggregate - 635 kg/m^3

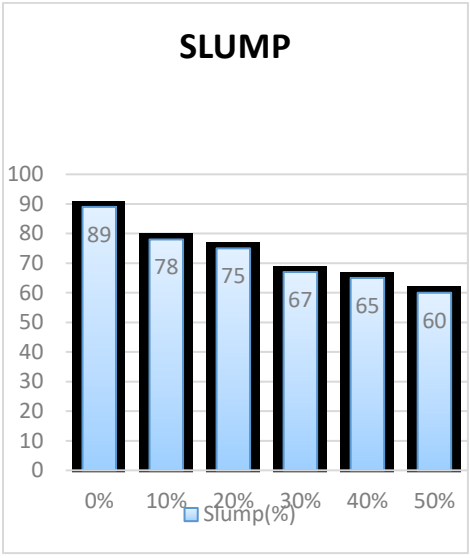
Coarse aggregate kg/m^3	-	1085
Water cement ratio 0.40		-

TEST REPORT OF SLUMP CONE TEST

Test Report Of Slump Cone Test

S.NO	PEENGAN TILES PROPORTION	SINICON PROPORTION	SLUMP (MM)
1	5%	0%	89
2	5%	10%	78
3	5%	20%	75
4	5%	30%	67
5	5%	40%	65
6	5%	50%	60

It is observed that, workability measurements from slump test, show the reduction of workability with increase of % replacement of fine and coarse aggregate by peengan tiles and Sinicon. The reduction of workability caused, is due to the sticking of very small nano-particles which inhibit the flow of concrete. Thus it may be concluded that, the workability of concrete goes on decreasing as the replacement of fine aggregate by sinicon increases.



Graphical Representation of Slump Cone Test

TEST REPORT OF COMPACTION FACTOR TEST

The Compaction Factor Test On concrete slightly decreased with the incorporation of Peengan tiles and Sinicon. This particle shape of Peengan tiles and Sinicon is responsible for the lower workability of fresh concrete. To improve the workability, the use of appropriate super plasticizer is suggested.

Test Report of Compaction Factor Test

S.NO	PEENGAN TILES PROPORTION	SINICON PROPORTION	COMPACTION FACTOR (%)
1	5%	0%	0.90
2	5%	10%	0.88
3	5%	20%	0.86
4	5%	30%	0.82
5	5%	40%	0.80
6	5%	50%	0.76

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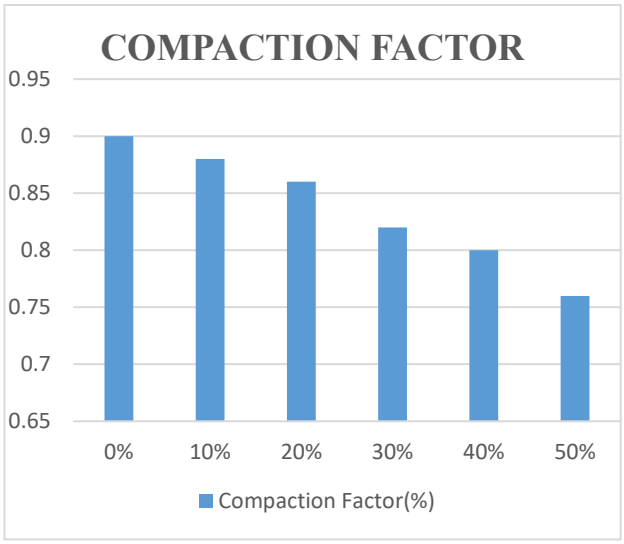


Graphical Representation of Compaction Factor Test

TEST REPORT OF COMPRESSIVE STRENGTH TEST

This may be due to the fact that, 20% replacement of Fine aggregate by Sinicon and coarse aggregate by Peengan Waste can fill all the pores of concrete there by improving the micro - structure of concrete. This improved micro-structure and the pozzolanic reaction between fine aggregate and sinicon will improve the compressive strength of concrete.

Thus it can be concluded that, the higher compressive strength for concrete may be obtained by replacing 30% Fine aggregate by Sinicon and coarse aggregate by 5% Peengan Waste. The variation of compressive strength at different percentage replacement of Fine aggregate by Sinicon and coarse aggregate by Peengan Waste can be depicted in the form of graph as shown in Fig.7.2. The compressive strength values of concrete are presented in table

Test Report Of Compressive Strength Test

S.NO	PEENGAN TILES (%)	SINICON (%)	COMPRESSIVE STRENGTH (N/mm²)		
			7 days	14 days	28 days
1	5%	0%	26	36	39.6
2	5%	10%	23.85	33.03	36.7
3	5%	20%	27.3	37.8	42
4	5%	**30%**	**28.99**	**40.14**	**44.6**
5	5%	40%	27.04	37.44	41.6
6	5%	50%	24.18	33.48	37.2

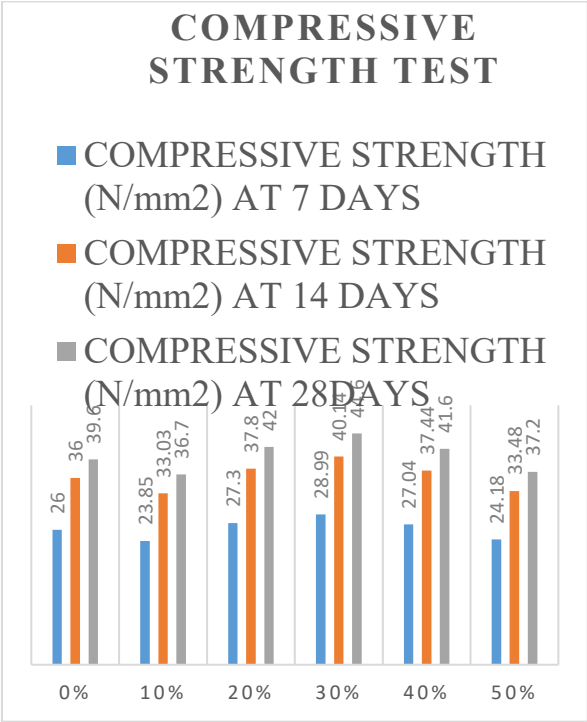


Figure 7.3.Graphical Representation Of Compressive Strength Test

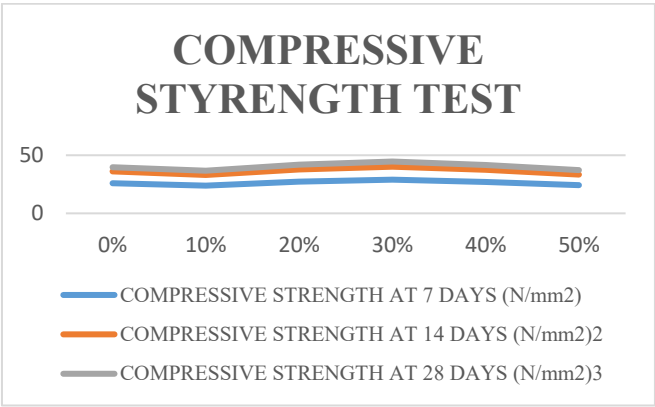


Figure 7.4.Line chart Of Compressive Strength Test

TEST REPORT OF SPLIT TENSILE STRENGTH TEST

Split tensile strength test was conducted for the cylinders of 150mm dia and 300mm length. The obtained values are

tabulated in Table.7.3 .Compared to conventional concrete crack width is for this fiber reinforced concrete. Splitting of specimens into two pieces can be controlled completely with this fiber. The elasticity of cement is one of the essential and vital properities. Part rigidity test on solid barrel is a strategy to decide the elasticity of cement.

The solid is extremely frail in elastic because of its weak nature and isn't relied upon to oppose the immediate strain. The solid creates splits when subjected to malleable powers. Along these lines, it is important to decide the elasticity of cement to decide the heap at which the solid individuals may break

Test Report Of Spilt tensile Strength Test

S.NO	PEENGANTILES (%)	SINICON (%)	SPILIT TENSILE STRENGTH (N/mm²)		
			7 days	14 days	28 days
1	5%	0%	2.0	2.36	3.58
2	5%	10%	1.82	2.24	3.09
3	5%	20%	1.92	2.56	3.48
4	**5%**	**30%**	**2.2**	**2.72**	**3.69**
5	5%	40%	1.76	2.35	3.4
6	5%	50%	1.45	2.21	3.2

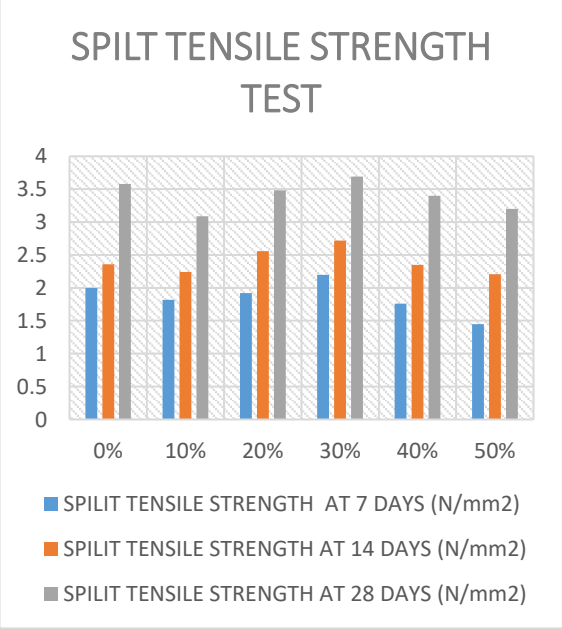
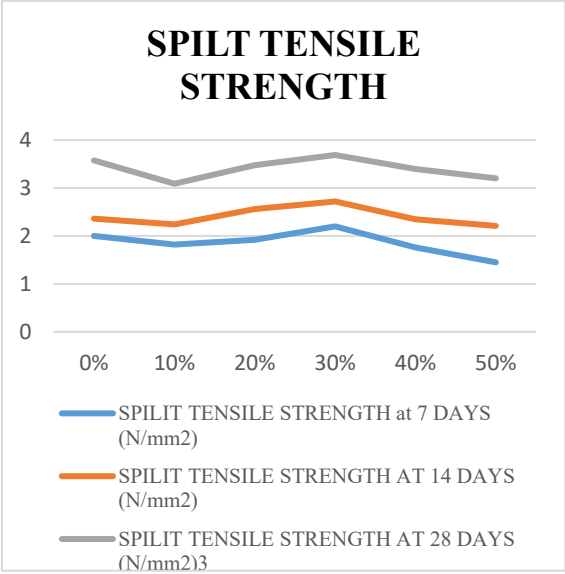


Figure 7.5.Graphical Representation Of Spilt Tensile Strength Test



Line chart Of Spilt Tensile Strength Test

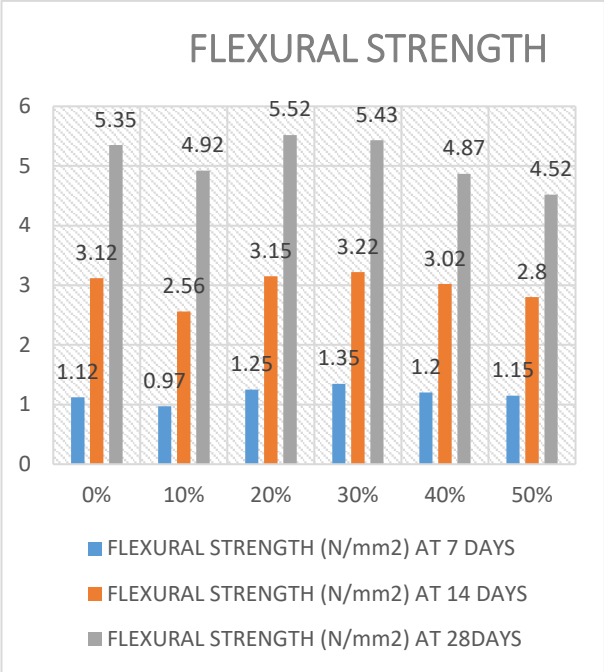
TEST REPORT OF FLEXURAL STRENGTH TEST

"Flexural quality is one measure of the rigidity of cement. It is a measure of an unreinforced solid bar or chunk to oppose disappointment in twisting. It is measured by stacking 6 inch * 6 inch solid pillar with a traverse length of no less than three times the profundity".

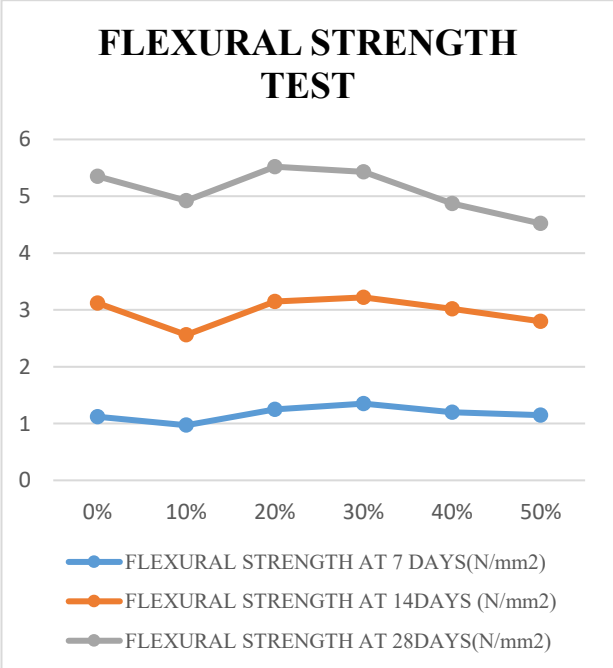
It is observed that, the flexural strength of concrete produced by replacing 30% Fine aggregate by Sinicon and coarse aggregate by 5% Peengan Waste shows higher results. After 30% replacement the flexural strength decreases. At 30% replacement level, the % increase in the flexural strength is found to be 5.43% with reference to reference mix. The flexural strength values of concrete are presented in table 7.3.

Test Report Of Flexural Strength Test

S.NO	PEENGANTILES (%)	SINICON (%)	FLEXURAL STRENGTH (N/mm²)		
			7 days	14 days	28 days
1	5%	0%	1.12	3.12	5.35
2	5%	10%	0.97	2.56	4.92
3	5%	20%	1.25	3.15	5.52
4	**5%**	**30%**	**1.35**	**3.22**	**5.43**
5	5%	40%	1.20	3.02	4.87
6	5%	50%	1.15	2.80	4.52



Graphical Representation Of Flexural Strength Test



Line Chart Of Flexural Strength Test

CONCLUSION: In our project , As per results shows that if increase the sinicon PP Percentage gradually strength also increased with 5% of Penngan Wastes as Partially replacement of Coarse aggregate.The Properties of concrete such as compressive strength , Tensile strength, flexural strength increase for every 10% of sinicon PP with 5% of Peengan waste which is compared with convential concrete.Optimum value is Obtained from 30% of sinicon PP replaced by Fine aggregate with 5%of Peengan waste.We effectively |Utilize the construction waste like Peengan in there Both are reduce the aggregate demand

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