Effect of Different Types of Sand and Their Mix Ratios on Compressive & Tensile Strength of Concrete

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Abstract: **The utilization of three types of sands and their mix ratios for concrete work is investigated in this project. Normal concrete is being produced from different types of sands and this imparts different property to resulting concrete. The most important property of concrete is its compressive strength. To evaluate compressive strength, three different types of sands with individual as well as mix proportion of sands were used. These types of sands obtained from different places such known as Ravi sand, Chenab sand and Lawrencepur sand. Preliminary laboratory investigation was conducted to ascertain the suitability of using the different sands and their mix ratios for construction work. Tests conducted include sieve analysis, bulk density and specific gravity. Nominal mix (1:2:4) was adopted for this work and mix compositions were calculated by absolute volume method. For each type of sands and mix ratio perform slump test, compaction factor test, compressive strength test by casting cylinders (300mm x 150mm) sizes and using machine to determine maximum compressive strength of concrete of the different mix at 7, 14, 28 days. Test result show that concrete made from Lawrencepur sand has the highest compressive and tensile strength and after the Chenab sand and Ravi sand respectively. Highest compressive strength also varies on different sand mix ratios according to percentage of Lawrencepur. We observe that when Fineness Modulus of Sand increases the Compressive Strength of Concrete also increased and other factors are also affect the Concrete strength which Connect with sand Properties.**

Keywords: **Compresive Strength, Tensile Strength, Mix Ratio**

I. INTRODUCTION

Concrete is stronger in compression and weaker in tension. Tensile strength of concrete is 10% to the total strength of concrete in compression. Concrete versatility, durability, sustainability, and economy have made it the world's most widely used as construction material. About four tons of concrete are produced per person per year worldwide and about 1.7 tons per person in the United States [1]. The term concrete refers to a mixture off aggregates usually sand and either gravel or crushed stone held together by a binder of cementation paste. The paste is typically made up of Portland cement and water and may also contain supplementary cementing materials, such as fly ash or sag cement and chemical admixtures. Erosion can also occur indirectly, as a result of near-shore marine dredging of aggregates, or as a result of sand mining in rivers. Damming and mining have reduced sediment delivery from rivers to many coastal areas, leading to accelerated beach erosion. The sand that is found in most deserts is paradoxically unsuitable for concrete and land reclaiming, as the wind erosion process forms round grains that do not bind well. Understanding the fundamentals of Concrete, it is necessary to produce quality concrete. In this study we will find out the effect of different types of sand and their mix ratios on Compressive and tensile strength of Concrete.

II. PROBLEM STATEMENT

Concrete plays the key role in construction and a large quantum of concrete is being utilize in every construction practice. There are different type of sand in Pakistan with respect to quarries named Ravi sand, Chenab sand and Lawrencepur sand (Harrow sand). These sands are different in properties and composition. Lawrencepur sand (Harrow sand) which is one of the most constituents used in the construction of concrete structures, has become very expensive.

These types of sands has not been practiced before instead of lawrencepur sand (Harrow sand) earlier in structures because of the different in quality, properties and less fineness modulus. Different areas have different types or different qualities of sand due to inclusion of their minerals. Also, it has no uniformity and similarity to lawrencepur sand (Harrow sand).

Although Ravi and Chenab sand are used for road work, the industry people are afraid to use it for concrete or such strong constructions due to their higher percentage of minerals other than quartz. Therefore, detailed studies on Ravi, Chenab and are needed to find out their suitability.

The main objective of this research is given below:

- To check the effect of different types of sand and their mix ratios on Fineness Modulus of Sand.
- To check the effect of different types of sand and their mix ratios on Workability of Concrete.
- To check the effect of different types of sand and their mix ratios on Compressive &Tensile Strength of Concrete.

III. MATERIALS AND METHODS

Concrete is a combination of cement, sand (fine aggregate) and crush (coarse aggregates), water. By hydration process, reaction of cement with water takes place in a short period and as a result, hard material is formed. Variety of building materials are there. They are usually classified from different angles for the sake of study, application and description. Building materials plays different roles, so they should possess corresponding properties. In this study, waste glass powder is used as a partial replacement of cement. Cement is replaced at different percentages which is 5%, 10%, and 15% of glass powder by the weight of cement.

IV. CONCRETE MIX DESIGN

Selection of suitable ingredient of concrete and determining their relative proportions with objective of producing concrete having strength, durability and less workability. There are four different mixes (Mix1, Mix2, Mix3 and Mix4) are prepared using cement replaced by glass powder at varying percentage of 0, 5, 10 and 15%. Forty-eight number standard specimens of dimensions 6" ×6" ×12" are cast according to the mix proportion (1: 2: 4, W/C ratio = 0.5) to achieve 7, 14, 21, 28 days strength.

M1 = C + A + S(R100)

M2 = C + A + S(Ch100)

M3 = C + A + SL100

M4 = C + A + SR10 + SCh10 + SL80

M5 = C + A + SR20 + SCh20 + SL60

M6 = C + A + SR30 + SCh30 + SL40

M7 = C + A + R40 + Ch40 + L20

M8 = C + A + R50 + Ch50 + L0

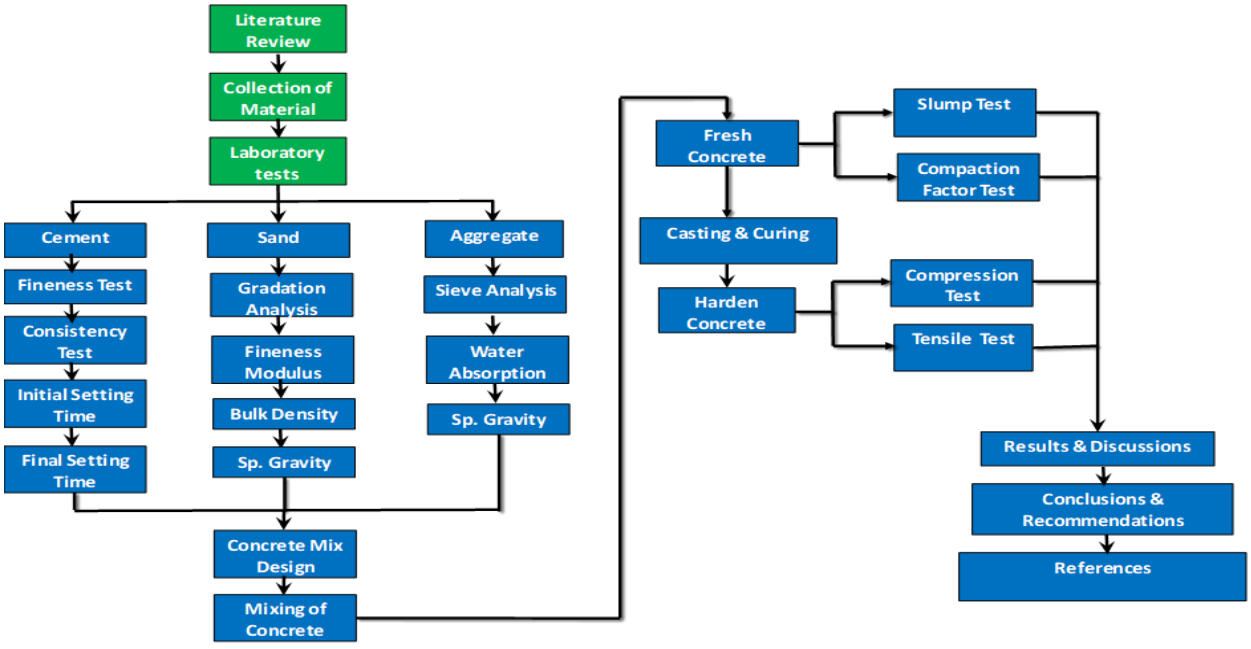

Fig. 1

V. RESULTS AND DISCUSSION

Table 1 Gradation Analysis Of 100% Ravi Sand

Gradation Analysis of Ravi Sand (100%)						
Total Weight of Sand = 300 g						
Sr. No.	Sieve No.	Sieve Size (mm)	Weight of Sand Retain (gm)	% Weight Retain	Cumulative Retain %	% Passing (Finer)
1	4	4.75	0	0	0	100
2	8	2.34	0	0	0	100
3	16	1.18	0	0	0	100
4	30	0.59	0	0	0	100
5	50	0.19	130	43.33	43.33	56.67
6	100	0.14	140	46.66	89.99	10
7	Pan	Pan	30	10	99.99	0.01

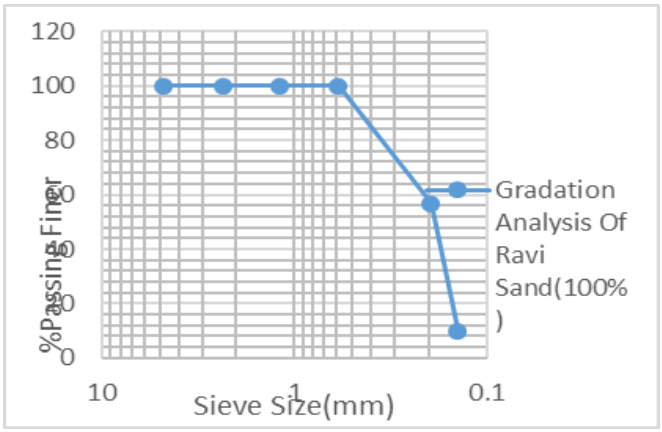

Fig. 1: Gradation Analysis Of 100% Ravi Sand

Table 2 Gradation Analysis Of 100% Chenab Sand

Gradation Analysis of Chenab Sand (100%)						
Total Weight of Sand = 300 g						
Sr. No.	Sieve No.	Sieve Size (mm)	Weight of Sand Retain (gm)	% Weight Retain	Cumulative Retain %	% Passing (Finer)
1	4	4.75	0	0	0	100
2	8	2.34	0	0	0	100
3	16	1.18	10	3.33	3.33	96.67
4	30	0.59	0	0	3.33	96.67
5	50	0.195	220	73.33	76.66	23.34
6	100	0.142	60	20	96.66	3.34
7	Pan	Pan	10	3.33	100	0

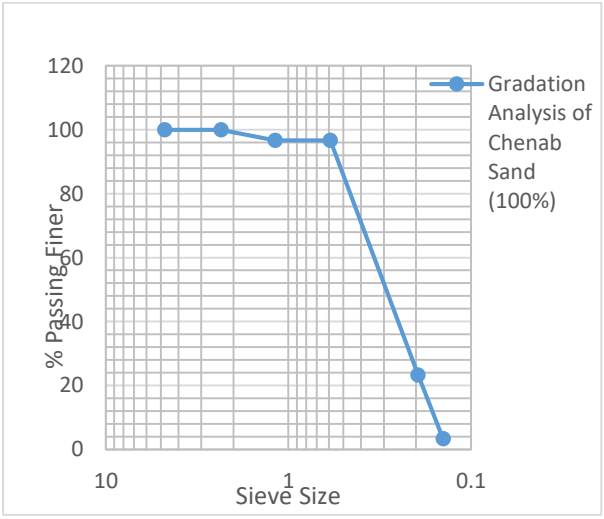

Figure 1 Gradation Analysis Of 100% Chenab Sand

Table 3 Gradation Analysis Of 100% Lawrencepur Sand

Gradation Analysis of Lawrencpur Sand (100%)						
Total Weight of Sand = 300 g						
Sr. No.	Sieve No.	Sieve Size (mm)	Weight of Sand Retain (gm)	% Weight Retain	Cumulative Retain %	% Passing (Finer)
1	4	4.75	0	0	0	100
2	8	2.34	10	3.33	3.33	96.67
3	16	1.18	20	6.67	10	90
4	30	0.59	70	23.34	33.33	66.67
5	50	0.195	140	46.66	79.99	20
6	100	0.142	60	20	99.99	0.01
7	Pan	Pan	0	0	100	0

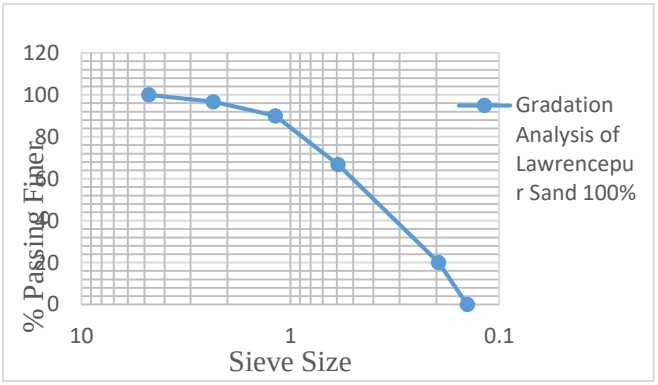

Fig. 2 Gradation Analysis Of 100% Lawrencepur Sand

Table 4 Gradation Analysis Of 10% Ravi, 10% Chenab, 80% Lawrencepur Sand

Gradation Analysis Of Ravi (10%), Chenab (10%) &Lawrencpur Sand (80%)						
Total Weight Of Sand = 300 g						
Sr. No.	Sieve No.	Sieve Size (mm)	Weight Of Sand Retain (gm)	% Weight Retain	Cumulative Retain %	% Passing (Finer)
1	4	4.75	5	1.66	1.66	98.34
2	8	2.34	5	1.66	3.32	96.68
3	16	1.18	15	5	8.32	91.66
4	30	0.59	50	16.67	24.98	75.02
5	50	0.195	145	48.33	73.31	26.69
6	100	0.142	60	20	93.31	6.69
7	Pan	Pan	20	6.66	100	0

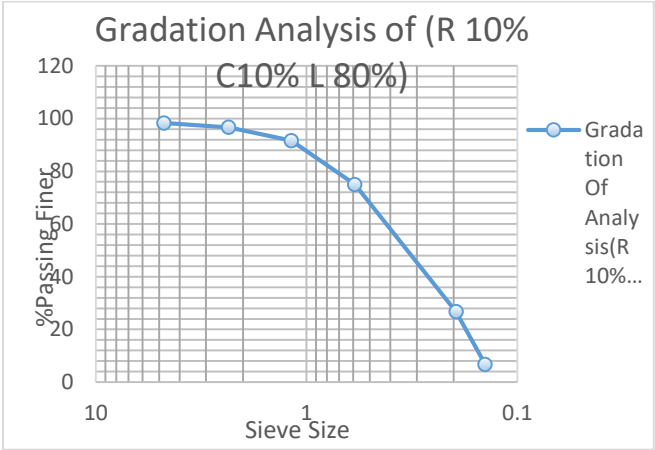

Fig. 3: Gradation Analysis Of 10% Ravi, 10% Chenab, 80% Lawrencepur Sand

Table 5 Gradation Analysis Of 20% Ravi, 20% Chenab, 60% Lawrencepur Sand

Gradation Analysis Of Ravi (20%), Chenab (20%) &Lawrencpur Sand (60%)						
Total Weight Of Sand = 300 g						
Sr. No.	Sieve No.	Sieve Size (mm)	Weight Of Sand Retain (gm)	% Weight Retain	Cumulative Retain %	% Passing (Finer)
1	4	4.75	5	1.67	1.67	98.33
2	8	2.34	10	3.33	5	95
3	16	1.18	10	3.33	8.33	91.67
4	30	0.59	40	13.33	21.66	78.34
5	50	0.195	150	50	71.66	28.34
6	100	0.142	80	26.67	98.33	1.67
7	Pan	Pan	5	1.67	100	0

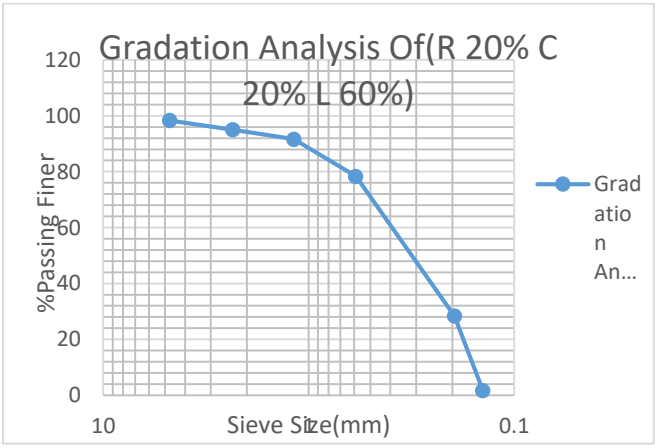

Fig. 4: Gradation Analysis Of 20% Ravi, 20% Chenab, 60% Lawrencepur Sand

Table 6 Gradation Analysis Of 30% Ravi, 30% Chenab, 40% Lawrencepur Sand

Gradation Analysis Of Ravi (30%), Chenab (30%) &Lawrencpur Sand (40%)						
Total Weight Of Sand = 300 g						
Sr. No.	Sieve No.	Sieve Size (mm)	Weight Of Sand Retain (gm)	% Weight Retain	Cumulative Retain %	% Passing (Finer)
2	8	2.34	5	1.67 No	1.67	98.33
3	16	1.18	10	3.33	5	95
4	30	0.59	25	8.33	13.33	86.67
5	50	0.195	150	50	63.33	36.67
6	100	0.142	105	35	98.33	1.67
7	Pan	Pan	5	1.67	100	0

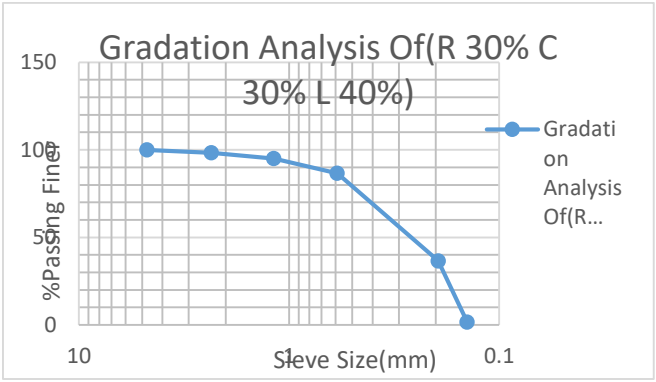

Fig. 5 :Gradation Analysis Of 30% Ravi, 30% Chenab, 40% Lawrencepur Sand

Table7 Gradation Analysis Of 40% Ravi, 40% Chenab, 20% Lawrencepur Sand

Gradation Analysis Of Ravi (40%), Chenab (40%) &Lawrencpur Sand (20%)						
Total Weight Of Sand = 300 g						
Sr. No.	Sieve No.	Sieve Size (mm)	Weight Of Sand Retain (gm)	% Weight Retain	Cumulative Retain %	% Passing (Finer)
1	4	4.75	0	0	0	100
2	8	2.34	5	1.67	1.67	98.33
3	16	1.18	5	1.67	3.34	96.66
4	30	0.59	15	5	8.34	91.66
5	50	0.195	110	36.67	45.01	54.9
6	100	0.142	150	50	95.01	4.99
7	Pan	Pan	15	5	100	0

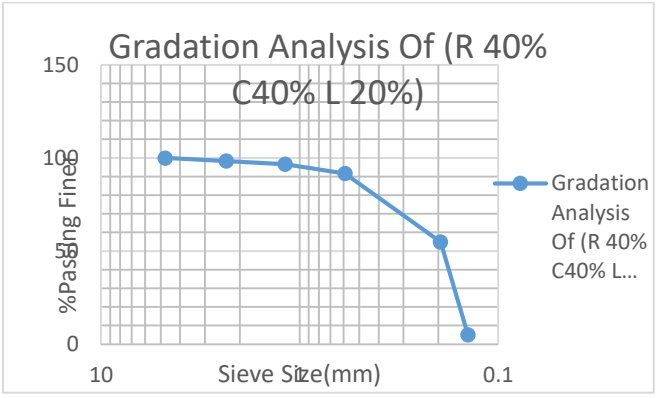

Fig. 6 : Gradation Analysis Of 40% Ravi, 40% Chenab, 20% Lawrencepur Sand

Table 8 Gradation Analysis Of 50% Ravi, 50% Chenab, 0% Lawrencepur Sand

Gradation Analysis Of Ravi (50%), Chenab (50%) &Lawrencpur Sand (0%)						
Total Weight Of Sand = 300 g						
Sr. No.	Sieve No.	Sieve Size (mm)	Weight Of Sand Retain (gm)	% Weight Retain	Cumulative Retain %	% Passing (Finer)
1	4	4.75	0	0	0	100
2	8	2.34	5	1.67	1.67	98.33
3	16	1.18	5	1.67	3.34	96.66
4	30	0.59	5	1.67	5.01	94.9
5	50	0.19	155	51.66	56.66	43.33
6	100	0.14	120	40	96.67	3.33
7	Pan	Pan	10	3.34	100	0

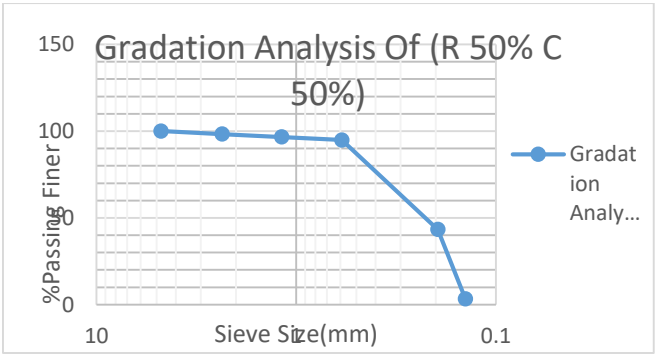

Fig. 7: Gradation Analysis Of 50% Ravi, 50% Chenab, 0% Lawrencepur Sand

Table 9 Gradation Analysis of Sands

Gradation Analysis Of Sands									
Sr. No.	Sieve Size (mm)	Ravi	Chenab	Lawrencepur Sand 100%	R: C: L 10:10:80	R: C: L 20:20:60	R: C: L 30:30:40	R: C: L 40:40:20	R: C: L 50:50:00
		100%	100%						

1	4.75	100	100	100	98.34	98.33	100	100	100
2	2	100	100	96.67	96.68	95	98.33	98.33	98.33
3	0.42	100	96.67	90	91.66	91.67	95	96.66	96.66
4	0.3	100	96.67	66.67	75.02	78.34	86.67	91.66	94.9
5	0.15	56.67	23.34	20	26.69	28.34	36.67	54.9	43.33
6	0.07	10	3.34	0.01	6.69	1.67	1.67	4.99	3.33

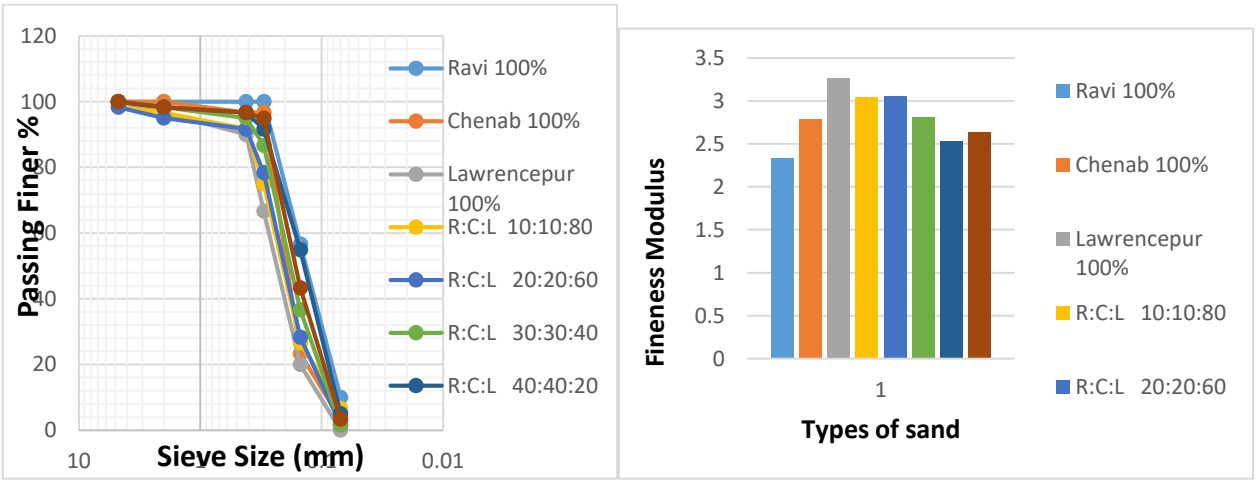

Figure 9 Fineness Modulus of Different Types of Sands & Their Mix Ratio

Table 10 Fineness Modulus of Different Types of Sands & Their Mix Ratio

Type of Sand	Ravi Sand (%)	Chenab Sand (%)	Lawrencepur Sand (%)	Fineness Modulus
Ravi	100	0	0	2.33
Chenab	0	100	0	2.79
Lawrencepur Sand	0	0	100	3.26
Ravi+ Chenab+ Lawrencepur	10	10	80	3.04
Ravi+ Chenab+ Lawrencepur	20	20	60	3.06
Ravi+ Chenab+ Lawrencepur	30	30	40	2.81
Ravi+ Chenab+ Lawrencepur	40	40	20	2.53
Ravi+ Chenab+ Lawrencepur	50	50	0	2.63

Table 10 Fineness Modulus Standard Range of Different Types of Sands & Their Mix Ratio
Comparison Between Lab Result and ASTM Standard

Sr. No.	Type of Material	Test Type	ASTM Code	Lab Result Range	ASTM Standard Range
1	Sand	Fineness Modulus	C-117-03	2.33- 3.26	2.3 to 3.1

Table 11 Bulk Density of Different Types of Sand & Their Mix Ratio

Bulk Density of Different typesof Sands & their Mix Ratios

Dimension of Mould

Dia (cm)	Height (cm)	Area (cm^2)	Volume (cm^3)	Weight (gm)	
10	13	81	1028	870	
Type of Sand	Ravi Sand %	Chenab Sand%	Lawrencepur %	Weight of Sand Excluding Mould Weight (gm)	Density.
	(%)	(%)	Sand (%)		(g/cc)
Ravi	100	0	0	1451	1.45
Chenab	0	100	0	1510	1.48
Lawrencepur Sand	0	0	100	1650	1.65
Ravi+ Chenab+ Lawrencepur	10	10	80	1535	1.53
Ravi+ Chenab+ Lawrencepur	20	20	60	1590	1.59
Ravi+ Chenab+ Lawrencepur	30	30	40	1500	1.5
Ravi+ Chenab+ Lawrencepur	40	40	20	1530	1.53
Ravi+ Chenab+ Lawrencepur	50	50	0	1430	1.43

Table 12 Gradation Analysis of Sargodha Crush

Gradation Analysis of Crush

Total Weight of Aggregate=3000g

Sr .No.	Sieve Size (Inch)	Sieve Size (mm)	Weight of Aggregate Retain (gm)	% Weight Retain	Cumulative Retain %	% Passing Finer
1	,3/4	20	0	0	0	100
2	,1/2	12.5	685	22.83	22.83	77.17
3	,3/8	10	1445	34.83	57.67	42.34
4	,3/16	4.75	1205	40.16	97.82	2.18
6	Pan	0.075	65	2.14	99.96	0

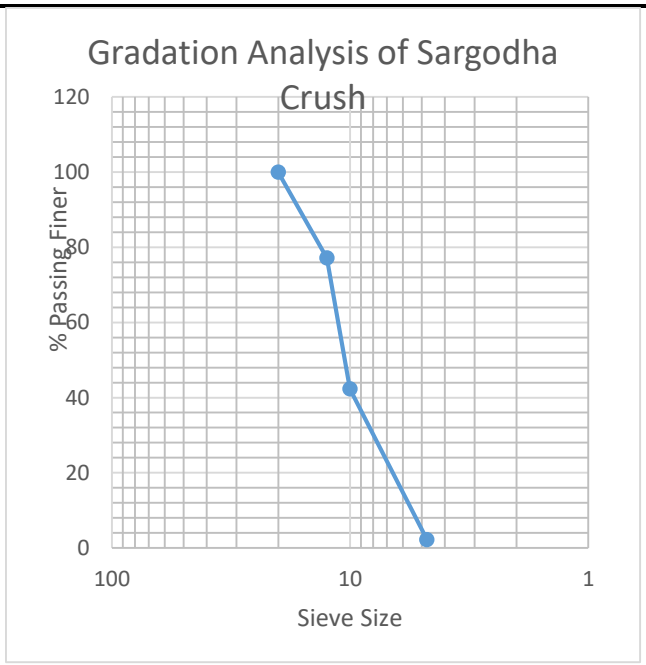

Fig. 10

Table 13 Coarse Aggregate Water Absorption Test Reading

Coarse Aggregate Water Absorption Test		
Weight Of SSD Sample (gm)	Weight Of Oven Dry Sample (gm)	Water Absorption (%)
1008	1000	1

Table 15 Fineness of Hydraulic Cement

Weight of OPC Cement Sample (gm)	Average Weight Of Retained (gm)	Fineness (%)
50	5	95

Table 1614 Fineness of Hydraulic Cement Standard Range

Comparison Between Lab Result and ASTM Standard					
Sr. No.	Type of Material	Test Type	ASTM Code	Lab Result Value	ASTM Standard Range
1	Best way Cement (OPC)	Fineness of Cement	C430-17	95%	>90%

Table 17 Normal Consistency Of Hydraulic Cement

Weight of Cement (gm)	Weight of Water Added (gm)	% Water by Weight
650	169	0.26

Table 18 Normal Consistency of Hydraulic Cement Standard Range

Comparison Between Lab Result and ASTM Standard					
Sr. No.	Type of Material	Test Type	ASTM Code	Lab Result Value	ASTM Standard Range
1	Best way Cement (OPC)	Normal Consistency	C187-11	0.26	.1 to .5%

Table 19Setting Time of Hydraulic Cement

Type Of Cement	Setting Time	In Minutes	In Hours
OPC Best way Cement (Pakcem)	Initial	139	2.2
OPC Best way Cement (Pakcem)	Final	257	4.28

Table 20 Time of Hydraulic Cement Standard Range

Comparison Between Lab Result and ASTM Standard					
Sr. No.	Type Of Material	Test Type	ASTM Code	Lab Result Value	ASTM Standard Range
1	Best way Cement (OPC)	Initial Setting Time	C191-13	139 minutes	49 -202 minutes
2	Best way Cement (OPC)	Initial Setting Time	C191-13	257 minutes	185 -312 minutes

Table 21 Slump of Hydraulic Cement Concrete

Slump of Hydraulic Cement Concrete				
Type of Sand	**Ravi Sand (%)**	**Chenab Sand (%)**	**Lawrencepur Sand (%)**	**Slump Value (mm)**
Ravi	100	0	0	29
Chenab	0	100	0	26
Lawrencepur Sand	0	0	100	5
Ravi+ Chenab+ Lawrencepur	10	10	80	19
Ravi+ Chenab+ Lawrencepur	20	20	60	21
Ravi+ Chenab+ Lawrencepur	30	30	40	21
Ravi+ Chenab+ Lawrencepur	40	40	20	25
Ravi+ Chenab+ Lawrencepur	50	50	0	45

Table 22 Slump of Hydraulic Cement Concrete Standard Range

Comparison Between Lab Result and ASTM Standard

Sr. No.	Type Of Material	Test Type	ASTM Code	Lab Result Range	ASTM Standard Range
1	OPC Cement Concrete (1: 2: 4)	Slump Test	C-143/C143M	5 - 45	25 to 160mm

Table 23 Compaction Factor of Hydraulic Cement Concrete

Compaction Factor of Hydraulic Cement Concrete				
Type of Sand	**Ravi Sand (%)**	**Chenab Sand (%)**	**Lawrencepur Sand (%)**	**Compaction Factor**
Ravi	100	0	0	0.69
Chenab	0	100	0	0.67
Lawrencepur Sand	0	0	100	0.53
Ravi+ Chenab+ Lawrencepur	10	10	80	0.61
Ravi+ Chenab+ Lawrencepur	20	20	60	0.62
Ravi+ Chenab+ Lawrencepur	30	30	40	0.62
Ravi+ Chenab+ Lawrencepur	40	40	20	0.66
Ravi+ Chenab+ Lawrencepur	50	50	0	0.91

24 Classification of Concrete with Different Mix Ratio w.r.t Slump & Compaction Factor

Type of Sand	Degree of Workability	Mix	Slump (mm)	Compacting Factor
Ravi	Very Low	M1	29	0.69
Chenab	Very Low	M2	26	0.67
Lawrencepur Sand	Very Low	M3	5	0.53
Ravi+ Chenab+ Lawrencepur	Very Low	M4	19	0.61
Ravi+ Chenab+ Lawrencepur	Very Low	M5	21	0.62
Ravi+ Chenab+ Lawrencepur	Very Low	M6	21	0.62
Ravi+ Chenab+ Lawrencepur	Very Low	M7 Table	25	0.66
Ravi+ Chenab+ Lawrencepur	High	M8	45	0.91

Table 25(a)15 Compressive Strength of Concrete with Different Types of Sand & Their Mix Ratio

Sr.No.	Proportion	Ravi (100%) (M1)	Chenab (100%) (M2)	Lawrencepur (100%) (M3)	R: C: L 10: 10: 80 (M4)	R: C: L 20: 20: 60 (M5)	R: C: L 30: 30: 40 (M6)	R: C: L 40: 40: 20 (M7)	R: C: L 50: 50:0 (M8)
1	7 Days	9.34238	9.61817	10.7282	10.611	10.1766	10.0112	9.48717	9.32859
2	14 Days	12.0796	12.8104	13.4792	13.3827	13.1345	12.9345	12.7415	12.5415
3	28 Days	20.29	15.9	21.15	20.54	21.43	21.18	19.57	16.68

Table 25(b)16 Compressive Strength of Concrete with Different Types of Sand & Their Mix Ratio

Sr.No.	Proportion	Ravi (100%) (M1)	Chenab (100%) (M2)	Lawrencepur (100%) (M3)	R: C: L 10: 10: 80 (M4)	R: C: L 20: 20: 60 (M5)	R: C: L 30: 30: 40 (M6)	R: C: L 40: 40: 20 (M7)	R: C: L 50: 50:0 (M8)
1	7 Days	1.47	1.22	1.67	1.59	1.53	1.51	1.55	1.15
2	14 Days	2.0263	1.83238	1.94135	1.89762	1.93526	1.67144	1.71983	1.57

3	28 Days	1.95075	1.94284	2.1497	2.14901	2.35095	2.07676	1.93854	1.85056

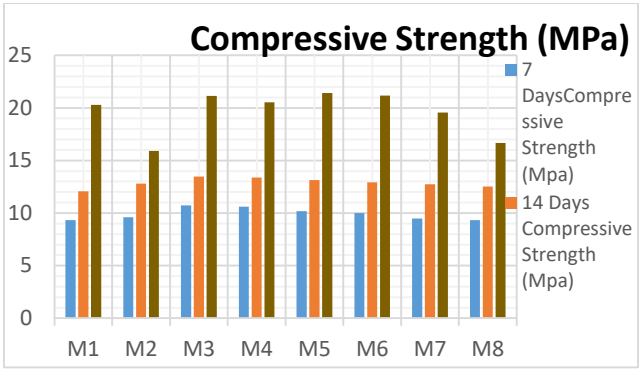

Fig.11: Compressive Strength of Concrete with Different Types of Sand & Their Mix Ratio

Table 26 Effect of Fineness Modulus of Sands & Their Mix Ratio on Compressive of Concrete

Sr.No.	Proportion	Ravi (100%)	Chenab (100%)	Lawrencepur (100%)	R: C: L 10: 10: 80	R: C: L 20: 20: 60	R: C: L 30: 30: 40	R: C: L 40: 40: 20	R: C: L 50: 50:0
	Fineness Modulus	2.33	2.79	3.26	3.04	3.06	2.81	2.53	2.63
1	7 days	1.47	1.22	1.67	1.59	1.53	1.51	1.55	1.15
2	14 days	2.0263	1.8323	1.94135	1.8976	1.93525	1.67144	1.71983	1.57
3	28 days	1.95057	1.9428	2.1497	2.1490	2.35095	2.07676	1.93854	1.8505

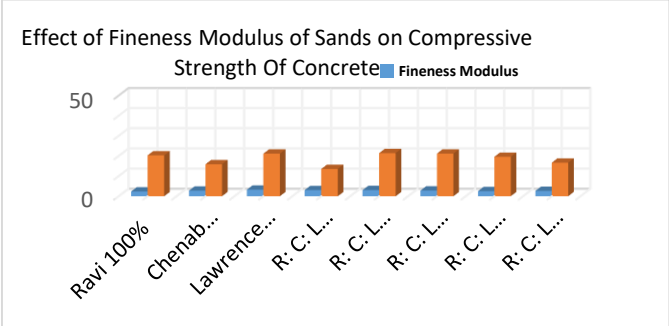

Fig.12: Effect of Fineness Modulus of Types of Sand and Their Mix Ratio on Compressive Strength

Table 2717Tensile Strength of Concrete with Different Types of Sand & Their Mix Ratio

Sr.No.	Proportion	Ravi (100%)	Chenab (100%)	Lawrencepur (100%)	R: C: L 10: 10: 80	R: C: L 20: 20: 60	R: C: L 30: 30: 40	R: C: L 40: 40: 20	R: C: L 50: 50:0
	Fineness Modulus	2.33	2.79	3.26	3.04	3.06	2.81	2.53	2.63
1	7 Days	9.34238	9.6181	10.7282	10.611	10.1766	10.0112	9.48717	9.3285
2	14 Days	12.0796	12.810	13.4792	13.382	13.1345	12.9345	12.7415	12.541
3	28 Days	20.29	15.9	21.43	20.54	21.15	21.18	19.57	16.68

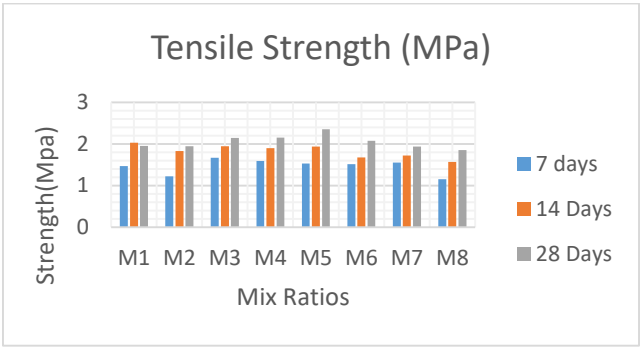

Fig. 13: 8Tensile Strength of Concrete with Different Types of Sand & Their Mix Ratio

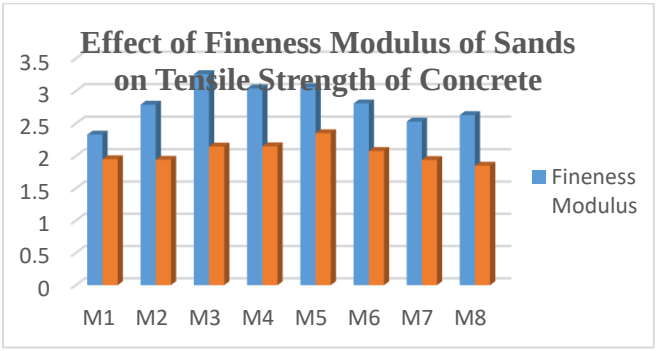

Fig. 15: Effect of Different Types of Sand & Their Mix Ratio Fineness

Modulus on Compressive Strength of Concrete

Fineness Modulus Vs Compaction Factor

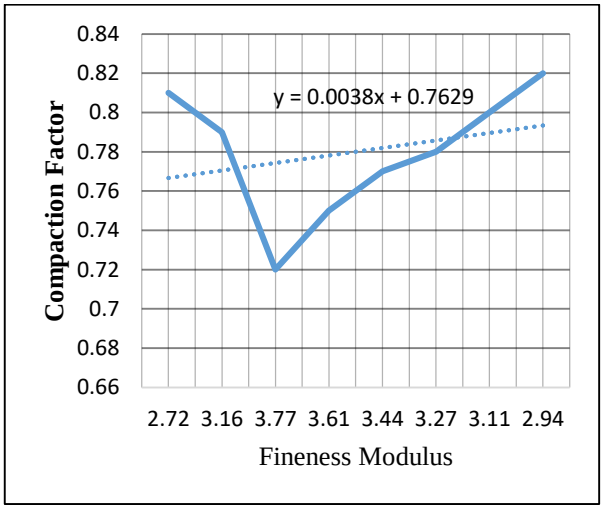

Fig. 16:9 Effect of Fineness Modulus on Compaction Factor

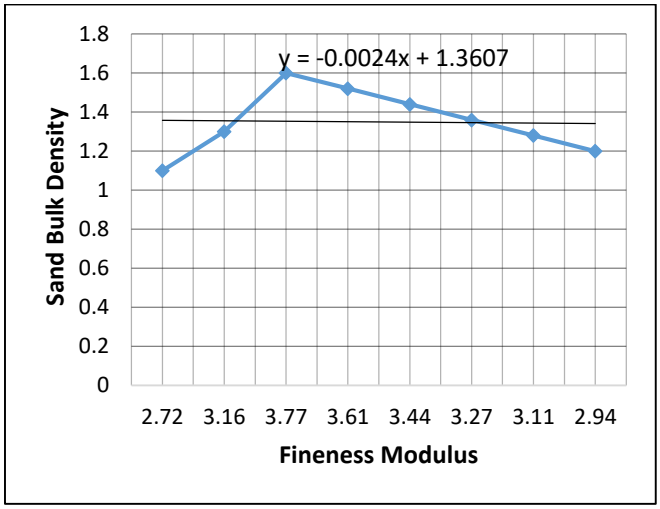

Fig.17: Effect of Fineness Modulus on Sand Bulk Density

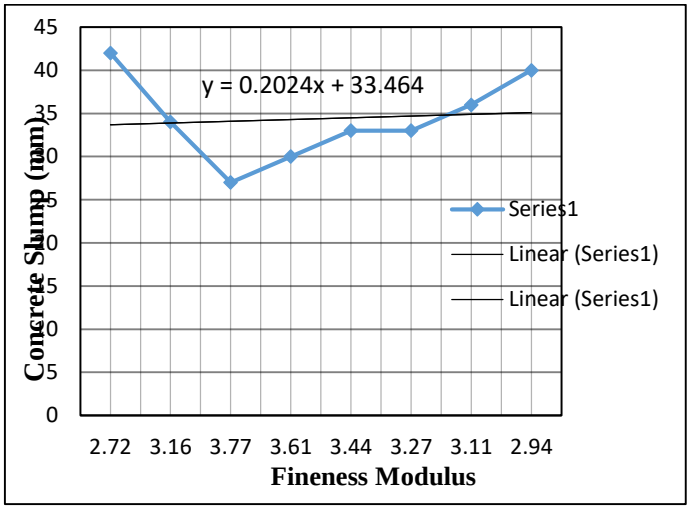

Fig.18:Effect of Fineness Modulus on Concrete Slump

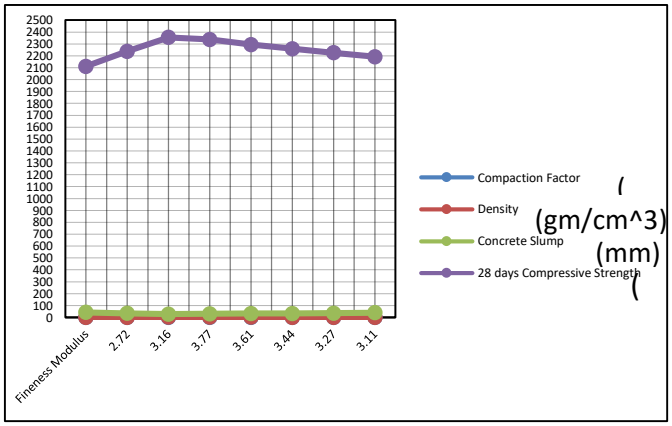

Fig.19: Effect Of Fineness Modulus on Density, Slump, Compaction Factor

VI. CONCLUSION

The above result shows the effect on Compressive and Tensile Strength of cement Concrete (1: 2: 4) by using different proportions of sand Component. Sand with different Fineness modulus is blended and its effect on compressive strength is monitored and Following are Conclusions.

- According to Lab results, Concrete Sample with high Fineness Modulus Sands achieved the high Compressive Strength.
- Lawrencepur Sand having max Fineness Modulus when used in concrete, depicts highest Compressive and Tensile Strength 21.43 and 2.1497 MPa respectively
- The 100% Chenab Sand Concrete which having Fineness Modulus lesser than Lawrencepur achieve less Compressive and Tensile Strength than lawrencepur as well as Ravi Sand Concrete.

- Using the different mix Proportion of these sands we have observed the effects on Concrete Compressive Strength and pattern of different results concludes our research.
- When we decrease the lawrencepur Sand Proportion and increase the other Sands proportion the compressive strength decreases accordingly

VII. RECOMENDATIONS

- In this research we use the different sands proportions of Lawrencepur, Chenab, and Ravi for the scope. However, the other sands proportion can be used in future research.
- In this Research we use three Sand Mix Ratio. You can use two sand mix Ratio in Future for Better Results.
- By changing water/cement ratio, can also check the effect on compressive strength of concrete.
- By changing the aggregates (coarse) type, can also check the effect on compressive strength of concrete.
- By changing cement types can also check the effect on compressive strength of concrete.

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