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EXPERIMENTAL STUDY ON CONVERSION OF SEA SAND INTO CONSTRUCTION SAND

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***Abstract*:** Concrete production needs a considerable amount of fine aggregate. The large-scale extraction of river sand from riverbeds has been prohibited. So, by partially substituting sea sand with river sand as fine aggregate, an experimental investigation on the strength characteristics of cement concrete is conducted. Normal sea sand, soaked sea sand, and soaked and boiling sea sand were employed in this investigation. In fine aggregate, sea sand is substituted in proportions of 25, 50, 75, and 100 percent. The major focus of this research is on a practical examination of the compressive strength and split tensile strength of concrete in which sea sand is partially or totally substituted as fine aggregate and measured at 28, 56, and 90 days to evaluate M25.

Keywords: Compressive strength, Concrete, Fine Aggregate, Sea sand, Split tensile strength.

1. INTRODUCTION

Sand is a unique uncooked material for the development enterprise at gift, however contractors should spend greater allocations for obtaining bulk loads of sand for his or her construction work. River sand are random due to the upward push in river water table. Also governments have banned using river sand. According to the industry as sets, the charge level of the river sand has grown to be sky rocketed.

2. OBJECTIVES

- To examine the practical utilization of sea sand.
- To determine the compressive and spilt tensile strength of concrete with distinct possibilities of sea sand.

3. MATERIALS PROPERTIES

3.1 Cement

Ordinary Portland cement of 53 grade is used.

Table 1. Physical properties of Ordinary Portland cement-53Grade

Properties	Values observed
Specific Gravity	3.12
Normal consistency	34%
Initial setting time	29min
Final setting time	600min

3.2 Fine Aggregate

The physical properties of fine aggregate are presentedintable2.

Table2.Physical properties of fine aggregate

Property	Result
Fineness Modulus	2.75
Specific Gravity	2.4

3.3 Coarse Aggregate

The maximum size of coarse aggregate is 20 mm which is obtained after passing 25mm and retained in 20 mm(Figure3).

Table3.Physical properties of coarse aggregate

Property	Result
Fineness Modulus	8.0
Specific Gravity	2.875

3.4 Sea sand

Sea sand present abundant in nature but contains alkaline salts. When used in the preparation of mortar then efflorescence appears in brick masonry where as used in reinforced concrete then corrosion is massive. Sea sand confirms to zone – III after performing sieve analysis asperIS383.

4. DETAILS OF PRESENT INVESTIGATION

4.1 Process of removing chloride content in sea sand

The sea sand contains a lot of chloride-containing material. When this is utilized extensively inside the reinforcement, it causes corrosion. There are two ways for removing chloride-containing materials:

1. Soaking and
2. Boiling process

4.2 Determination of chloride content in soaked and boiled sea sand

On this approach, soluble chloride ions inside the sand pattern were produced by employing AgNo3 and the resulting Agcl to determine the water soluble chloride in soil. The excess AgNo3 is calculated by titrating the precipitate with the $K_2Cr_2O_7$ indicator yellowish shade solution. Titrate into theAgNo3precipitate and shake nicely. Brownish yellow coloration is formed.

Chloride=normality×volume of burette solution/20

- The amount of chloride content in river sand is46gmsperlit.
- The amount of chloride content in soaked seasandis193.25gmsperlit.
- The amount of chloride content in soaked &boiledseasandis250gmsperlit.

5. TEST ON HARDENED CONCRETE

The tests are conducted on hardened concrete and the compressive and split tensile strength were determined and presented in table 4.

Table 4. Compressive and split tensile strength of concrete with normal river sand and sea sand

Cycle1(normal river sand and sea sand)

Sand used	Compressive strength, N/mm²			Split tensile strength, N/mm²		
	28days	56 days	28days	56 days	28days	90 days
100%R.S	31.90	34.49	37.07	3.09	3.20	3.59
75%R.S+25%S.S	32.69	35.32	38.05	3.16	3.44	3.67
50%R.S+50%S.S	33.08	35.81	38.50	3.24	3.53	3.76
25%R.S+75%S.S	29.69	32.26	34.73	2.67	2.90	3.10
100%S.S	28.22	30.61	32.93	2.56	2.77	2.98

Cycle2(normal river sand and soaked sea sand)

Sand used	Compressive strength, N/mm²			Split tensile strength, N/mm²		
	28days	56 days	28days	56 days	28days	90 days
100%R.S	31.90	34.49	37.07	3.09	3.20	3.59
75%R.S+25%S.S	33.01	35.73	38.3	3.19	3.47	3.71
50%R.S+50%S.S	33.41	36.29	39.03	3.36	3.64	3.91
25%R.S+75%S.S	30.67	33.24	35.66	3.01	3.27	3.51
100%S.S	29.48	32.12	34.45	2.89	3.12	3.36

Cycle3(normal river sand and soaked and boiled sea sand)

Sand used	Compressive strength, N/mm²			Split tensile strength, N/mm²		
	28days	56 days	28days	56 days	28days	90 days
100%R.S	31.90	34.49	37.07	3.09	3.20	3.59
75%R.S+25%S.S	33.99	36.93	39.73	3.33	3.59	3.87
50%R.S+50%S.S	34.88	37.87	40.77	3.40	3.68	3.96
25%R.S+75%S.S	28.91	31.38	33.70	3.12	3.38	3.64
100%S.S	30.81	33.76	35.75	3.00	3.26	3.50

6. CONCLUSION

River sand and sea sand were found that

1. The maximum compressive strength of concrete with 50% river sand and 50% sea sand for 28, 56 and 90 days are 33.08, 35.81 and 38.56 N/mm^2.
2. The maximum split tensile strength of concrete with 50% river sand and 50% sea sand for 28, 56 and 90 days are 3.24, 3.53 and 3.76 N/mm^2.
3. The maximum compressive strength of concrete with 50% river sand and 50% soaked sea sand for 28, 56 and 90 days are33.41, 36.29 and 39.03 N/mm^2.
4. The maximum split tensile strength of concrete with 50% river sand and 50% soaked sea sand for 28, 56 and 90 days are3.36, 3.64 and 3.91 N/mm^2.
5. The maximum compressive strength of concrete with 50% river sand and 50% soaked and boiled sea sand for 28, 56 and 90 days are 34.88, 37.87 and 40.77 N/mm^2.
6. The maximum split tensile strength of concrete with 50% river sand and 50% soaked sea sand and boiled for 28, 56 and 90 days are 3.40, 3.68 and 3.96 N/mm^2.

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