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The Study of Compressive Strength on Concrete by Using Surkhi

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Abstract: ***This research paper presents the result of an experimental investigation carried out to evaluate the compressive strength of high strength concrete. The investigation states that high strength concrete is made by partial replacement of sand by surkhi. In this study, surkhi is replaced 100% by balancingweigt of sand. The mix proportion of concrete had a constant water binder ratio of 0.60. The concrete specimens were cured on normal moist curing condition on the normal atmospheric temperature. The compressive strength was determined. The results indicate concrete made with this proportion generally exhibits excellent fresh and hardened properties. In conclusion, the addition of surkhi is the replacement to sand but the concrete was found to increase the compressive strength of concrete at all levels of experiment when compared to reference concrete made with sand.***

Keywords: Cement, Concrete, Fine aggregate, Coarse aggregate, Surkhi

I. INTRODUCTION TO CONCRETE

Concrete is a very strong and versatile mouldable construction material. It consists of cement, sand and aggregate mixed with water. The cement and water form a paste which coats the sand and aggregate. When the cement has chemically reacted with the water, it hardens and binds the whole mix together. The initial hardening reaction usually occurs within a few hours. It takes some weeks for concrete to reach full hardness and strength. Concrete can continue to harden and gain strength over many years.

A. Cement

Cement refers to the material which acts as a binding substance. In construction and civil engineering, cement is used to bind structural members for construction of buildings, pavements, bridges, tunnels, roads and highways etc. The common kind of cement available in the market with its strength is as follows:

GRADE OF CEMENT	STRENGHT
33	33MPA
43	43MPA
53	53MPA

B. Aggregate

Those particles passing the 9.5 mm (3/8 in.) sieve, almost entirely passing the 4.75 mm sieve, and predominantly retained on the 75 µm sieve are called fine aggregate.

Fig 1. Fine aggregate

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*1) Coarse Aggregate:*particles that are predominantly retained on the 4.75 mm sieve, are called coarse aggregate

Fig2. Coarse aggregate

C. Surkhi

Surkhi is used as a substitute for sand for concrete and mortar, and has almost the same function as of sand but it also imparts some strength and hydraulicity. Surkhi is made by grinding burnt bricks to make a powder out of it. It must be noted that brick-bats or burnt clay; under-burnt or over-burnt bricks should not be used, nor bricks containing high proportion of sand. When clay is especially burnt for making into surkhi, an addition of 10 to 20 per cent of quick lime will improve its quality. After this attempt, small clay balls are made for burning.

Fig 3.surkhi

Cubes of (15cm X 15cm X 15cm), electronic weighing balance, G.I sheet, sieve, tray, iron rod, vibrating machine, compression testing machine, trowel.

*1) Mixing of Concrete for Cube Test:*Mixing the concrete by hand.

a) Cement Taken: -Jaypee Cement

Pozzolana Portland Cement

43 GRADES

b) Surkhi: -sand is fully replace by surkhi

c) nominal mix: -m20: 1:1.5:3 (cement, sand, aggregate)

d) Water ratio: -0.60 / bag (50 kgs)

e) No. Of qubes: -total no.of qube is taken = 3

f) Date and time: - 07-september- 2017, 11:02a.m

Fig 4.Compression testing machine

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2) Procedure for Cube Test

a) Remove the specimen from water after specified curing time and wipe out excess water from the surface
b) Take the dimension of the specimen to the nearest 0.2
c) Clean the bearing surface of the testing machine
d) Place the specimen in the machine in such a manner that the load shall be applied to the opposite sides of the cube cast
e) Align the specimen centrally on the base plate of the machine.
f) Rotate the movable portion gently by hand so that it touches the top surface of the specime
g) Apply the load gradually without shock and continuously at the rate of 140 kg/cm^2/minute till the specimen fails
h) Record the maximum load and note any unusual features in the type of failure.

3) Curing of Cubes

The test specimens are stored in moist air for 24 hours and after this period the specimens are marked and removed from the moulds and kept submerged in clear fresh water until taken out prior to test.

4) Calculations of Mix Proportion

Mix proportion of concrete	For one batch of mixing
Coarse aggregate (kg)	7.08
Fine aggregate (kg)	7.08
Cement (kg)	4.72
Water (kg)	2.36
w/c	0.60
S/A	1.5:3
Admixture	7.09 “SURKHI”

Table 1; - Mix tabulation

Sr. No.	Age of Cube	Weight of Cement Cube (gms)	Cross-Sectional area (mm^2)	Load (N)	Compressive strength (N/mm^2)	Average Compressive strength (N/mm^2)
1.		7750	225000	413000	18.35	
2.	28 *DAYS*	7900	225000	408000	18.13	18.32
3.		7750	225000	412000	18.31	

Table 2:- experimental outputs

D. Result

The average 28 Days Compressive Strength of concrete surkhi sample is found to be 18.26(N/mm^2).

Precautions for Tests

The water for curing should be tested every 7 days and the temperature of water must be at 27+-2oC.

II. CONCLUSION

Surkhi can beused as asphaltpavement and as Aggregate in cement. Surkhi have high strength as compared to sand. We can replace sand by surkhi, which will be of lesser cost as compared to sand.

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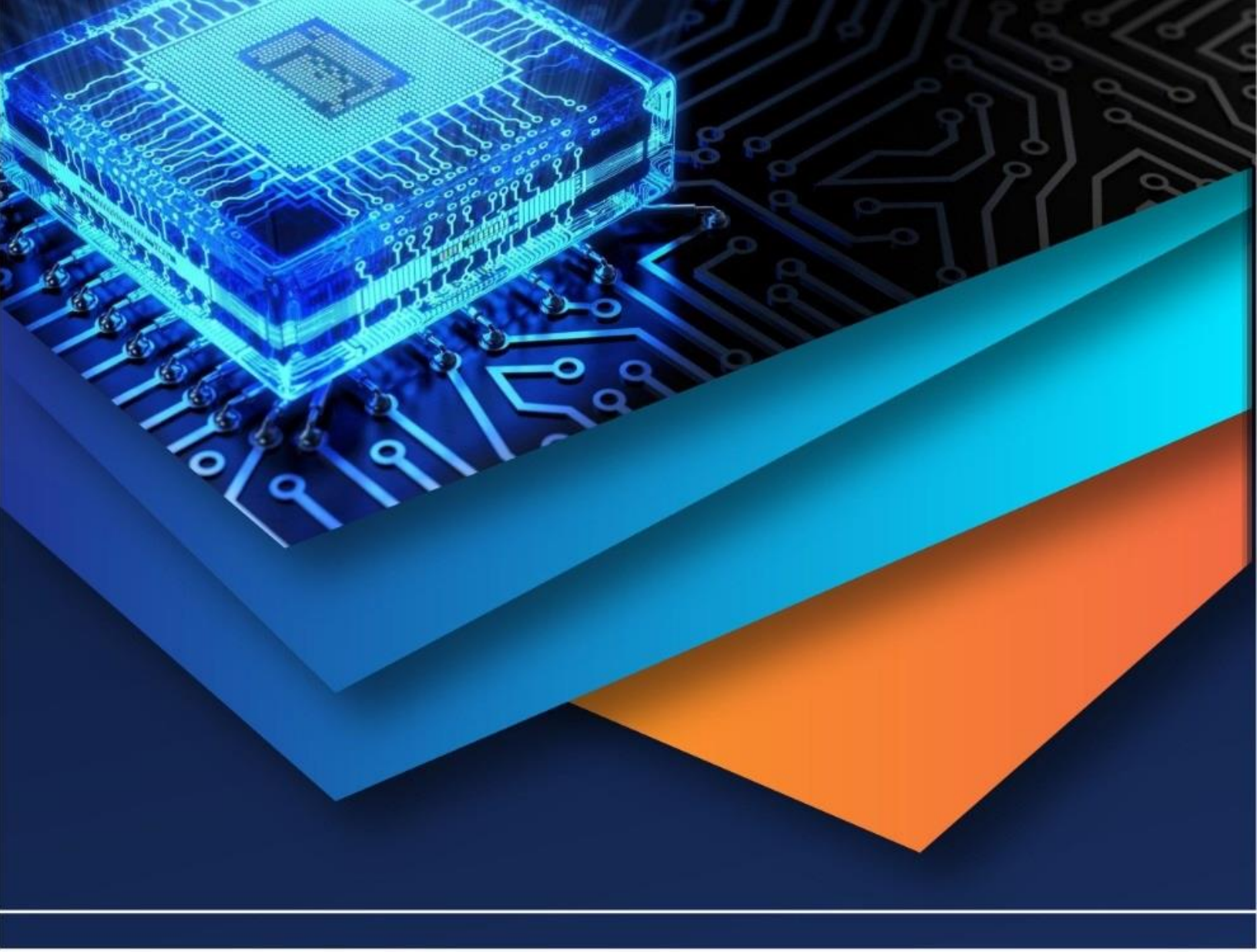

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