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The Effect on Strength Properties of Concrete using Fluorescent Lamp Powder, Quarry Dust and Iron Slag

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Abstract: *To overcome the problem of the Reduction in natural Aggregate and cement require introducing new composition. To replace the Natural aggregate and Cement used in concrete many replacements has been made. In this Research, concrete made of Iron slag and Quarry dust Replacing Fine aggregate to 20% of each are used to study the strength parameters of M25 grade concrete and Cement can be partially replace by Fluorescent Lamp powder in Various proportion of 0%,2%, and 4% to check the durability and workability of concrete by using This new composition. The Aim of the study to investigate the early age strength of concrete by partial replacement of cement with FLP and sand with Quarry dust and Iron slag.*

Keywords: FLP (Fluorescent Lamp Powder), Quarry Dust, Iron Slag, Strength Parameters

I. INTRODUCTION

Concrete is the most popular building material in the world. However, the production of cement has diminished the limestone reserves in the world and requires a great consumption of energy. River sand has been the most popular choice for the fine aggregate component of concrete in the past, but overuse of the material has led to environmental concerns, the depleting of securable river sand deposits and a concomitant price increase in the material. Therefore, it is desirable to obtain cheap, environmentally friendly substitutes for cement and river sand that are preferably by products. It is difficult to point out another material of construction which is as versatile as concrete.

1.1 Fluorescent Lamp Powder

A fluorescent lamp or fluorescent tube is a gas-discharge lamp that uses electricity to excite mercury vapour. A typical fluorescent lamp is composed of a sealed glass tube filled with argon gas at a low pressure, as well as a low partial pressure of mercury vapour, thus the tube is a partial vacuum.1,2 The inside of the tube is coated with a powder composed of various phosphor compounds.

Quarry dust is the by-product which is formed in the processing of the granite stones which broken downs into the coarse aggregates of different sizes to form fine particles less than 4. 75mm.Properties of Quarry Dust varies from quarry to quarry as it depends on type of the granite stones. For example, the Specific gravity depends on the nature of the rock from which it is processed, and the variation is less.

Iron slag is a by-product obtained in the manufacture of pig iron in the blast furnace and is produced by the blend of down-to-earth constituents of iron ore with limestone flux. Iron and steel slag can be differentiating by the cooling processing when removed from the furnace in the industry. Mostly, the slag consists of, magnesium, aluminum silicates calcium and manganese in various arrangements. Even though the chemical composition of slag same but the physical properties of the slag vary with the varying method of cooling. The slags can be used as fine aggregate major constituents as they have greater sand properties.

II. OBJECTIVE

- To Study the utilization of Fluorescent Lamp powder, Quarry dust and Iron slag as partial Replacement of Cement And sand.
- To Study the properties FLP, Quarry dust and Iron slag.

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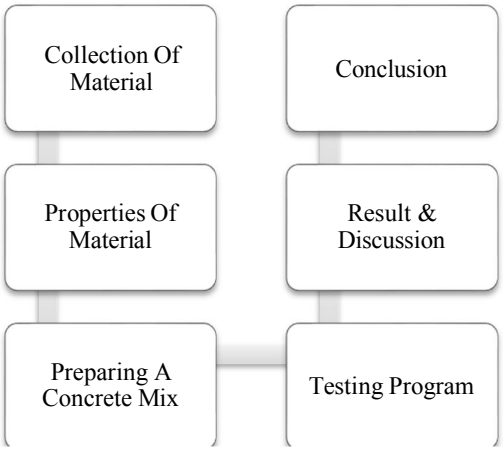
- To Check the Early age strength parameter of Concrete.
- To comparing the Results of Conventional Concrete to Modified Concrete In early age strength aspect an element casted and tested.

III. METHODOLOGY

In this chapter briefly explain the methodology adopted for this research



IV. MATERIAL PROPERTIES

4.1 Cement

Cement is a binder, a substance used for construction that sets, hardens and adheres to other materials to bind them together. Locally available 53 grade ordinary Portland cement is used in the present investigation for all concrete mixes.

Table 1: Properties of Cement

Sr.no.	Property	Result
1	Fineness modulus	6.5%
2	Initial setting time	70 min
3	Final setting time	295 min
4	Consistency	32%

4.2 Fine Aggregate

Aggregates for the concrete were obtained from approved suppliers conforming the specifications of IS 383:1970 and were chemically inactive (inert), spotless and robust. The fine aggregate was tested as per the limits which is specified in IS: 2386 (Part-3):1963.

Table 2: Properties of Fine Aggregate

Sr.no.	Property	Result
1	Fineness Modulus	2.84
2	Specific Gravity	2.659
3	Silt content	2%

4.3 Coarse Aggregate

Coarse aggregates will be machine-crushed done of black trap or equivalent black tough stone and shall be stiff, robust, dense, durable, spotless or procured from quarries approved by the consultant. Coarse aggregate can be defined as inert granular materials obtained after crushing a stone. Coarse aggregate is use of size 20mm. coarse aggregates passing through 20mm sieve and retained 12.5mm sieve are used in this experiment.

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Table 3: Properties of Coarse aggregate

Sr. no.	Property	Result
1	Fineness Modulus	2.028
2	Specific Gravity	2.8
3	Crushing value	38.83%
4	Impact value	5.54

4.4 Water

A good Tap water available in the Project is used for the construction purpose which conforming to the requirements of water for concreting and curing as per IS: 456-2009.Ph value of water is 8.56.

4.5 Fluorescent Lamp Powder

In This Experiment, the fluorescent lamp tube collected from MGIMS, Sewagram. The lamp powder is obtained by crushing the lamp tube by conventional method. The 90 micron passing fraction is used for the experiment

4.6 Quarry Dust

The Quarry dust is collected from local contractor for this experiment

Table 4: Properties of Quarry dust

Sr.no.	Property	Result
1	Fineness Modulus	2.558
2	Specific Gravity	2.7

4.7 Iron Slag

The Iron slag is collected from Uttam Galva Steels Limited, Wardha.

Table 5: Properties of Iron Slag

Sr.no.	Property	Result
1	Fineness Modulus	2.1
2	Specific Gravity	2.55

V. PERCENTAGE OF MIXING

Sr. no.	Cement + FLP(%)	Sand+ Quarry Dust +Iron slag (%)	Coarse Aggregate(%)
1	100+0	100+0+0	100
2	98+2	60+20+20	
3	96+4		

VI. MIX DESIGN for M25 Grade of Concrete

Sr. no.	Cement	Fine Aggregate	Coarse Aggregate	Water
1	404 kg/m3	669.36kg/m3	1157.31kg/m3	214.57 lit.
2	1	1.65	2.86	0.5

VII. COMPRESSIVE STRENGTH TEST

The compressive strength of concrete is the most common performance measure used in designing buildings and other structures. The compressive strength is generally measured by breaking cubical concrete specimens in a compression-testing machine. The compressive strength is calculated from the failure load divided by the cross-sectional area resisting the load Compressive strength test results are primarily used to determine that the concrete mixture as delivered meets the requirements of the specified strength, f`ckin the jobs specification

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VIII. Result And Discussion

The test was conducted on the cube specimen of size 150×150×150mm.

% of FLP	Compressive strength in N/mm2		Avg. Compressive strength in N/mm2	
	After 7 days	After 14days	After 7 days	After 14 days
0 %	16.22	22.22	15.99	22.66
	16	23.11		
	15.77	22.66		
2%	16.22	23.55	16.14	23.33
	15.77	23.11		
	16.44	23.33		
4%	16.66	24.00	16.44	23.70
	16.44	23.77		
	16.22	23.33		

IX. Conclusion

1. Based on research it is found that FLP can be as substitute material to the cement and Quarry dust and Iron Slag can be used as Substitute material to the Sand.
2. The physical and chemical properties Of FLP satisfy the requirement of Cement
3. As the size of FLP particle decrease strength of Concrete Increase From result concludes that 90-micron size particle gives high strength.
4. With the increase in percentage of FLP in Concrete Mix the early age strength is also Increase.

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