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AN INVESTIGATION ON STRENGTH OF CONRETE BY PARTIAL REPLACEMENT OF CEMENT WITH FLUORESCENT LAMP POWDER AND SAND WITH QUARRY DUST AND IRON SLAG

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ABSTRACT

In Research Of New Composition Of Material To Made Sustainable Concrete To Overcome The Problem Of Natural Aggregate That Depleting Day By Day And Cement Manufacturing Which Generate The Co_2 and Great Consumption Of Energy. At an equivalent time the environmental problems are very common in India due to generation of industrial by-products. This project deals with the study of concrete by partial adding of cement with the fluorescent lamp powder& Replacement of Sand with quarry dust and iron slag in concrete. Trial mixes are performed to achieve a concrete of M25 grade where Cement is substituted by weight with crushed fluorescent lamp powder at the rates varying from 2,4,6,8 and 10percentages& Sand replace by of quarry dust and iron slag. The aim of the study to investigate the 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, Research, Depleting.

I. INTRODUCTION

The great structure that are existing more than century that survived longer than civilization that built it and standing after nearly thousands of years. That's because of this of super material here is concrete. It's simple, it‘s strong it's cheap and it Last long. Across the world, concrete has become the foundation of modern cities and high living standards, But it's also a climate Killer. The cement and concrete Industry is responsible for about 8% of the world's carbon pollution.

Not just cement & concrete is problem there is another conflict arises because of sand. It's all around us it is the humblest of all minerals yet after air and water sand is most consumed Natural Resource on earth melted and transformed into different shape sand interconnects with our daily lives in ways we are not commonly aware of every construction site, paved road and computer screen is made from sand. What is happening in India is a manifestations of a slowly building crisis that demonstrates the coming of sand conflicts there is strong Scientific evidence to suggest that sand is becoming increasingly scare in many a strategic resource become finite it becomes a strategic catalyst for geopolitical strife much like crude oil and natural gas conflict after all is oftentimes rooted in competition for natural resources unless something‘s changes the sand crises will steadily promote maritime disputes endanger communities cause shortages while damaging the environment finite resources create near infinite conflict.

The solid waste, i.e. Iron slag coming out from different industries is abundantly available. A replacement of natural sand (fine aggregates) by Iron slag improves certain characteristics of concrete pavements including its durability and also may lead to energy conservation and treated as a source of good construction material. On the other hand, the advantages of utilization of by products or aggregates obtained as waste materials are pronounced in the aspects of reduction in Environmental load & waste management cost, reduction of production cost as well as augmenting the quality of concrete Environmental load & waste management cost, reduction of production cost as well as augmenting the of concrete.

As we ring in the New Year in India large amount of e-waste like Fluorescent lamp disposing in landfills is thought of as an easy way to get rid of electronic equipment. It's not viable option for environmental & legal

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Reasons. When disposed of improperly, landfills of Non- recyclable fluorescent lamp glass do not provide an environment- friendly solution for these wastes. In this Research fluorescent lamp crushing were ground and powder used as partial substitution of cement.

The utilization of Quarry rock dust which can be called as manufactured sand has been accepted as a building material in the industrially advanced countries of the west for the past three decades. As a result of sustained research and developmental works undertaken with respect to increasing application of this industrial waste, the level of utilization of Quarry Rock Dust in the industrialized nations like Australia, France, Germany and UK has been reached more than 60% of its total production. The use of manufactured sand in India has not been much, when compared to some advanced countries. Tests were conducted on cubes to study the physical, mechanical and workability and sieve analysis of concrete made of fly ash, Quarry Rock Dust and blast furnace slag for different proportions.

II. AIM & OBJECTIVE

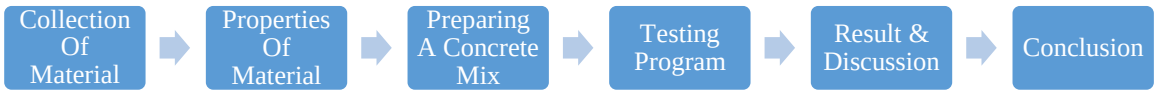
Aim:- To Investigation on Strength of Concrete with Partial Replacement of Cement by fluorescent lamp powder and Sand with quarry dust and iron slag in concrete.

OBJECTIVES:-

- To prepare the mix design of fluorescent lamp powder, quarry dust and iron slag in concrete.
- To check compressive strength of concrete cube element and analyze the results.
- To find out the potential use of fluorescent lamp powder, quarry dust and iron slag in concrete.
- To introduce the fluorescent lamp powder as partial replacement of cement as one of the new materials into the concrete.

III. METHODOLOGY

In this chapter briefly explain the methodology adopted for this research



IV. MATERIAL PROPERTIES

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%

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%

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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.

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. 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.

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.

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

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. 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

VI. RESULTS AND DISCUSSION

Discussion

This graph interpret that the compressive strength for M-25 grade of concrete for partial replacement of cement with FLP at rates of varying from different percentages 0,2,4,6,8,10% And sand with 20% Quarry Dust+20%Iron slag at 7 days,14 days & 28 days are 10% FLP show maximum compressive strength than others.

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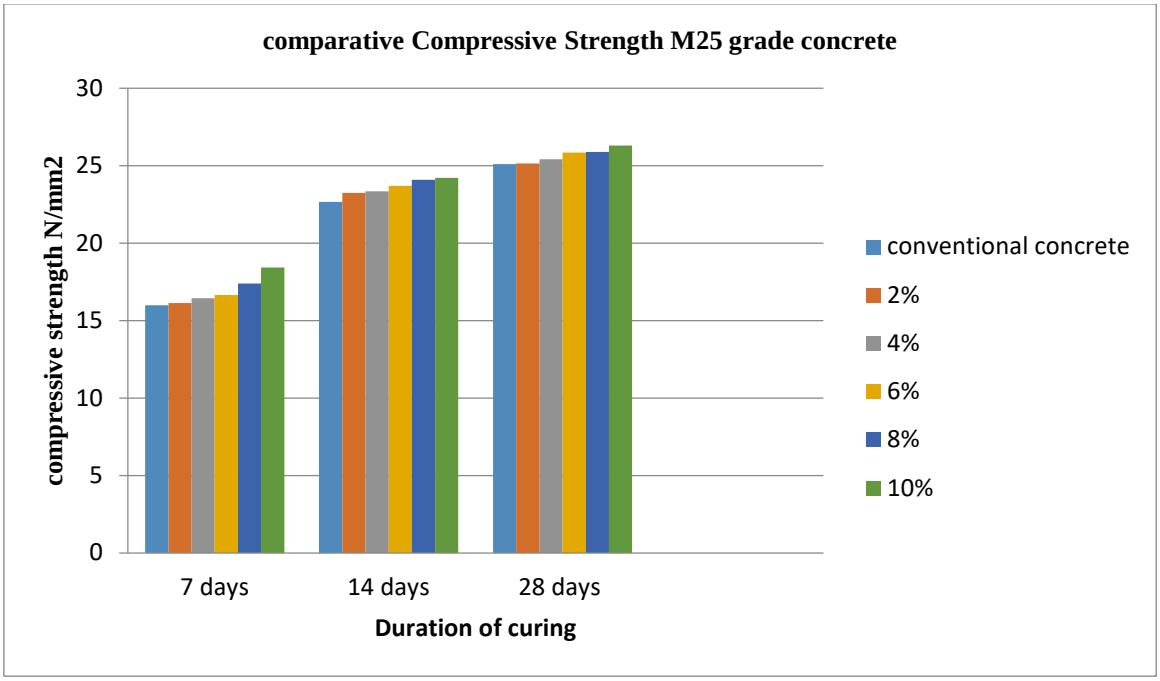

VII. CONCLUSION

After completion of the research work it can be concluded that

- Based on research it is found that fluorescent Lamp Powder can be used as alternative Material of Cement.
- Quarry dust and Iron slag also be good Replacing material to the sand.
- Fluorescent Lamp powder fulfills all the physical and chemical properties requirement of OPC 53 grade.
- The physical properties of Quarry dust and Iron slag satisfy the requirement of sand
- The finer the FLP shows the pozzolanic activity
- The finer the FLP increases the workability of concrete.
- The compressive strength of cube were increased with addition of FLP and quarry dust & iron slag up to combination of percentage 10% & 20%+20% respectively by the weight of cement and sand
- The particle size of FLP is less than 90 micron show the higher strength. It is found that the size of particle decrease it increase the strength of concrete.
- Usage of FLP, Quarry dust & iron slag in concrete will not only be economical but also satisfies all the Requirement of a good concrete.

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