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EXPERIMENTAL ANALYSIS OF E-WASTE USED IN CONCRETE

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Abstract - The construction sector has developed significantly due to the world population's rapid rise and increasing urbanisation, which has resulted in a significant increase in demand for sand and gravel. An alternate source is required to replenish the materials used in concrete because environmental issues arise when the pace of extraction of sand, gravel, and other materials exceeds the rate of creation of natural resources. Electronic items are becoming a necessary component of daily life since they increase comfort, security, and information exchange efficiency.The handling and disposal of these E-Wastes, which frequently contain extremely dangerous substances including lead, cadmium, mercury, beryllium, brominates flame retardants (BFRs), polyvinyl chloride (PVC), and phosphorus compounds, also poses significant problems. Therefore, e-waste may be used to create concrete that is sustainable. Additionally, this study offers a thorough literature assessment on the behaviour of concrete when E-Wastes are added. In this study, E-Waste is utilised, and the research is conducted using M30 grade concrete with replacement levels of 2.5%, 5%, 7.5%, and 10%. In order to identify the ideal replacement level at which maximum C S and F S is attained, the material's attributes are analysed

***KeyWords*:** Coarse aggregate, Fine aggregate, E-waste, Compressive strength, Split tensile strength and flexural strength.

1.INTRODUCTION

E-waste creation is the sector with the quickest rate of growth, and in the surrounding region, disposal is a significant issue. Utilising recycled plastic in the production of new plastic uses a significant amount of energy, raw materials, and wear and strain on equipment. Due to the high quality demand, lax quality criteria, and pervasive nature of building, using recycled materials in construction applications is among the most appealing options. This study has concentrated on the use of E-waste plastic cement concrete aggregate as a workable remedy to the issue of high recycling costs and disposal expenses. The several ways that plastics may be recycled, include the coke oven method, thermal recycling, mechanical recycling, etc.. Lack of affordable recycling methods and the requirement for a consistent and constant supply of materials to be recycled pose the biggest challenges to the recycling of plastic trash. There have been several studies done to look at the potential for recycling waste glass for use in concrete and building applications as a substitute for the expanding amount of waste glass. Fig. 1's depiction of broken electrical and electronic gadgets, circuit boards, transistors, TVs, and other abandoned items are examples of e-waste. Rapid technological advancement and cheap starting cost have led to a rapidly expanding surplus of electronic trash globally.. One of the fastest-growing waste sources in the world is e-waste. It used to make up around 1% of the total solid waste produced in wealthy nations, but that percentage is expected to increase to 3% by 2015. It makes up between 0.01% and 3% of the entire amount of municipal solid garbage produced in developing nations.

2. METHODOLOGY

Replace the coarse aggregate with a weight ratio of 2.5%, 5%, 7.5%, and 10% of E-waste + Plastic Waste now, using the replacement mixing technique, and do additional tests on the mix's strength..

2.1 Test to be performed

2.1.1 Compressive Strength

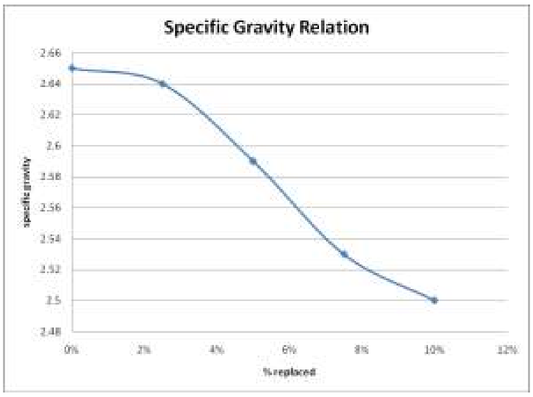
The assessments of compressive strength were performed while using an IS: 516-1959 compression testing machine.The 150mm cubes were tested over a period of 7 days, 28 days, 56 days, or weeks, as well as 90 days. Three specimens for each concrete composition have been examined. The compressive strength of 3 samples was determined to be of typical importance

2.1.2. Flexural Strength

A flexural assessment machine has tested concrete examples with dimensions of 100 mm x 100 mm x 500 mm using less than the conventional four factors bending.

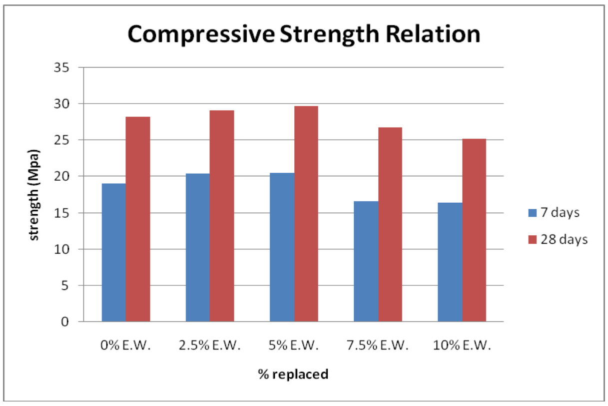
Table -1: SPECIFIC GRAVITY OF COARSE AGGREGATE AND E WASTE

% Replaced	Specific Gravity
0% E.W.	2.65
2.5% E.W	2.64
5% E.W	2.69
7.5% E.W.	2.53
10% E.W.	2.50



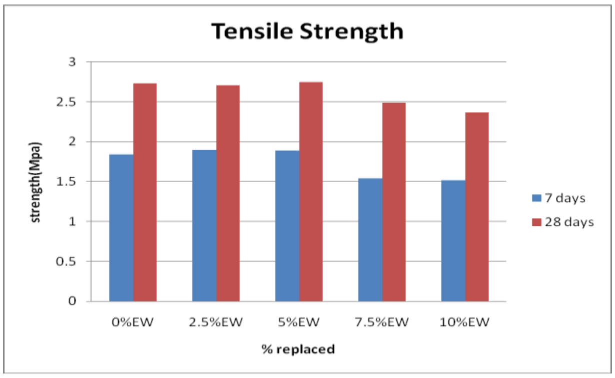
COMPRESSIVE STRENGTH

% Replaced	7 days Compressive Strength. (MPA)	28 days Compressive strength. (MPA)
0% E. W.	19.03	28.30
2.5% E.W.	20.39	29.31
5% E.W	20.5	29.70
7.5% E.W	16.62	26.8
10% E.W.	16.38	25.22



TENSILE STRENGTH

% Replaced	7 days Tensile Strength (MPA)	28 days Tensile Strength (MPA)
0% E. W.	1.84	2.73
2.5% E.W.	1.9	2.71
5% E.W	1.89	2.75
7.5% E.W	1.54	2.49
10% E.W.	1.52	2.37



3. CONCLUSIONS

The research demonstrates how important e-waste in concrete is to the building industry. Below, some key points are listed: The use of electronic waste in concrete lowers environmental pollution and solves the disposal issue, protecting our groundwater and air resources and other natural resources indirectly. Depending on the quality and characteristics of the e-waste material, both coarse and fine aggregates can be substituted by e-waste up to a certain percentage. which results in a green building-waste can be used to create lightweight concrete. due to the fact that e-waste has a lower density than traditional aggregates. It was observed that incorporating e-waste made concrete more workable, which means that doing so lowers the cost of the additive..E waste can also be used to concrete as an additive. The toughened qualities exhibit an increasing trend when it is used as an admixture up to a specific amount-waste is a potentially useful resource for both structural and nonstructural uses in low-cost construction

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