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EXPERIMENTAL INVESTIGATION ON STRENGTH AND DURABILITY CHARACTERISTICS OF CONCRETE BY PARTIAL REPLACEMENT OF COARSE AGGREGATE BY E-WASTE

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Abstract - *At present the demand of coarse mixture is accumulated day by day within the world. eighty five to ninetieth of electronic waste is disposed on landfills might drop in setting and affects human health conditions. For the recovery of terribly serious issue within the world to beat this speedy rising drawback is being questioned. The management and employment of E plastic waste is chop-chop growing because it could be a valuable resource of IT industries and it's terribly unsafe substances and with low employment rate. the employment of e plastic waste materials could be a partial answer to environmental and ecological issues. because the use of E plastic waste can reduces the combination value and provides a decent strength for the structures and roads. it'll reduces the lowland value and it's energy saving.*

A close experimental study had been administered to investigate the strength properties of typical concrete by casting the cube specimen. The compressive strength test was conducted using casting cube of "150 x 150 x 150 mm" with various percentage of E-waste like 0%,10%,15%,20% and different strength characteristics are conducted in lab.

Key Words: E-waste, conventional concrete, Split tensile, Flextural, etc.,

1. INTRODUCTION

Electronic and Electrical waste, magnificently referred to as e-waste things, It do not disintegrate or spoil away. The blasting use of electronic and electrical gear has created another nevertheless extraordinarily venturesome stream of waste, known as "electronic-waste", or primarily referred to as e-waste. Used physical science that are sorted for apply, resale, salvage, utilization or disposal are thought-about as e-waste.

On one hand the event of natural philosophy product has created life simple for near on the opposite hand it's inspired use and throws mentality. these days individuals choose to get a replacement appliance instead of taking the pains to induce the older one repaired. Such a trend not solely ends up in increase in volume of electrical and electronic waste however additionally poses serious threat to public health and setting. E-waste is growing exponentially in recent years as a result of the markets for these product are growing chop-chop. E-waste is presently one in every of the fastest developing waste streams. Consistently, innumerable recent PCs, cellular telephones, TV sets and radio gear are tossed, an oversized portion of that. Informal process of electronic waste in developing countries might cause serious health and pollution issues, as these countries have restricted regulative oversight of e-waste process. the matter of disposing and managing solid waste materials all told countries has become one in every of the most important environmental, economical, and social problems. an entire waste management system as well as supply reduction, reuse, recycling, land-filling, and burning has to be enforced to manage the increasing waste disposal issues. generally a plastic isn't recycled into constant form of plastic product made up of recycled plastics ar usually not reclaimable. the employment of perishable plastics is increasing. If a number of these get mixed within the different plastics for exercise, the rescued plastic isn't reclaimable as a result of the variance in properties and soften temperatures.

1.2 COMPONENTS OF E-WASTE:

Components of e-waste consists of the following:

a) Cathode ray tubes (used in TVs, computer monitors, ATM, video cameras, and more)
b) Printed circuit board (image behind table - a thin plate on which chips and other electronic components are placed)
c) Chips and other gold plated components
d) Plastics from printers, keyboards, monitors, etc.
e) Computer wires

1.3 METHODS OF DISPOSAL OF E-WASTE

The E-waste that generated is usually disposed of in the following ways.

Land Fill - A land fill could be a disposal space wherever garbage is accrued and eventually coated with dirt and mud. Fractions of Ewaste is most frequently drop into landfills. Over time, the e-waste results in certain quantity of chemical and metal teaching. this may fairly often cause water contamination.

Incineration- E-waste is burnt in combustion method. people in unorganized sectors perform such operations

during which unharness of harmful harmful gases like dioxins, that escape to the atmosphere and contaminate it.

Reuse - About 3%-5% of the computers that are discarded by their users ar reused. reprocess created doable either direct used use or use once slight modification. Non-working recent computers ar repaired and resold for profit in developing countries. These older units clearly have a restricted life and find yourself as waste sooner or later in these developing countries.

Recycling - In order to combat the environmental impact of improper electronic waste disposal several organizations have adopted to recycle their previous technology. when the chances of recycle are exhausted, then ensuing preference lies on utilization method. utilization implies that the previous raw materials area unit rescued to be product of in creating new merchandise. However, the prices of utilization area unit high. it's necessary to make a price effective and environmental friendly utilization method, which can be thought-about because the real would like hour. One facet of the strategy ought to embrace utilization and recycle of electronic merchandise in construction field by exploitation e-waste as a partial replacement of coarse aggregates in concrete (E-waste concrete).

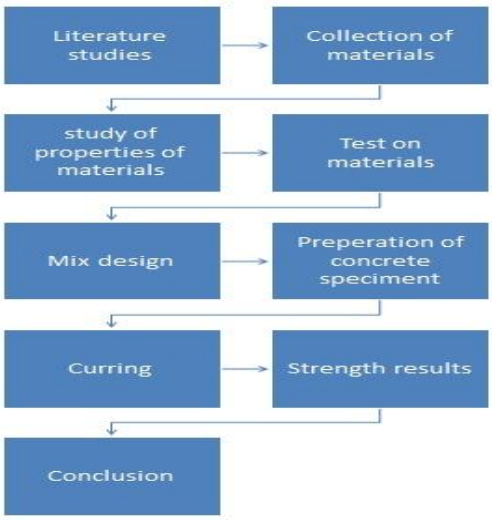
1.4 Advantages of using e-waste in concrete

- ✓ The growth within the use of plastic is thanks to its useful properties, that include: x Extreme skillfulness and talent to be tailored to satisfy specific technical desires.
- ✓ Lighter weight than competitory materials reducing fuel consumption throughout transportation. x sturdiness and longevity. Resistance to chemicals, water and impact.
- ✓ Excellent thermal and electrical insulation properties. relatively lesser cost.
- ✓ At temperature the bonding capability will increase because the temperature will increase.

1.5 Objectives:

- ✓ To identify that e-waste can be disposed by using them as construction material.
- ✓ Replacement of e-waste as coarse aggregate.
- ✓ To limit the amount of toxic substances in certain electronic product.
- ✓ To develop and improve the technology for e-waste management. to scale back the pollution thanks to utilisation of e-waste within the un-organized section.
- ✓ To confirm the compressive and flexural strength of concrete containing e-plastic combination.

2. METHODOLGY



3. EXPERIMENTAL INVESTIGATION

3.1 Compressive Strength

The compressive strength result of M25 grade of e-waste concrete trial mixes at the age of 7 and 28 days are. The development of compressive strengths of M25 grade of e-waste concrete trial mixes containing 10% and 20% cement replacement level by fly ash and super plasticizer is supplemental to the mixes.

TABLE 1: Compressive strength at 7days and 28 days

MIX	E-WASTE (%)	COMPRESSIVE STRENGTH (Mpa)	
		7 days	28 days
M0	0	19	27
M1	10	15	23
M2	15	18	25
M3	20	17	24

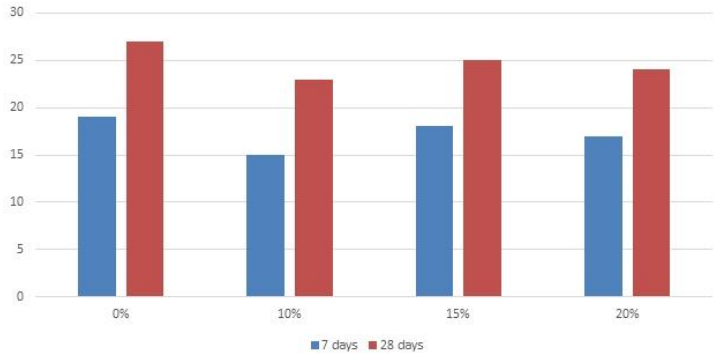


FIG 1: Comprssive strength of e-waste concrete at 7days and 28 days

all the mixes were tested at a period of 7 and 28 days. It is observed that the compressive strengths at the age of 28 days for M25 grade of e-waste concrete trial mixes containing 15% and 20% were 25 and 24 Mpa respectively; and at the age of 7 days were 18 and 17 Mpa respectively. Presents the Compressive strength of concrete mixes with and without E plastic aggregates, where 0% is M0 is Conventional Mix, M1 with E plastic of 10%,M2 with 15% of E plastic and M3 with 20% of E plastic and Graph 1 & 2 shows the graphical representations of compressive strength of all mixes M0, M1,M2 and M3 for 7 and 28 days. Hence, the maximum compressive strength was found to be 15 percent replacement of coarse aggregates by e-waste for M25 grades of concrete

3.2 Flexural strength test

The results of flexural test of e-waste concrete are given in the table. The influence of e-waste in concrete at different ratios are tabulated as below.

TABLE 2 : Flexural strength at 7days and 28 days

MIX	E-WASTE (%)	FLEXURAL STRENGTH (Mpa)	
		7 days	28 days
M0	0	2.65	4.15
M1	10	2.25	3.54
M2	15	2.59	3.81
M3	20	2.43	3.63

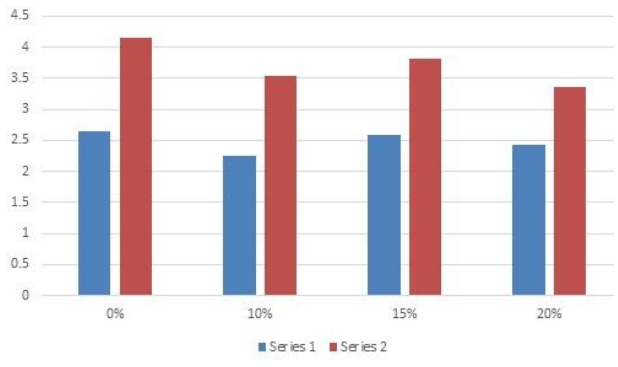


FIG 2: Flexural strength of e-waste concrete at 7days and 28 days

For all the mixes were tested at a period of 7 and 28 days. It is observed that the flexural strengths at the age of 7 days for M25 grade of e-waste concrete trial mixes M0, M1, M2, M3, M4 were 2.65, 2.25, 2.59 and 2.43 Mpa respectively; and at the age of 28 days were 4.15, 3.54, 3.81 and 3.63 respectively. The experimental result for flexural strength is given in the Table 2. From the Table 7, the flexural strength is maximum when replacing 15% of coarse aggregate by E–waste in concrete

3.3 Split tensile test

The enduringness results of M25 grade of e-waste concrete trial mixes at the age of seven and twenty eight days square measure. the event of tensile strengths of M25 grade of concrete trial mixes containing 100 percent,15% and two hundredth replacement of coarse aggregates by e-waste and square measure comparatively compared.

TABLE 3: Tensile strength at 7days and 28 days

MIX	E-WASTE (%)	SPLIT TENSILE STRENGTH (Mpa)	
		7 days	28 days
M0	0	2.4	3.45
M1	10	2.05	3.13
M2	15	2.31	3.34
M3	20	2.26	3.28

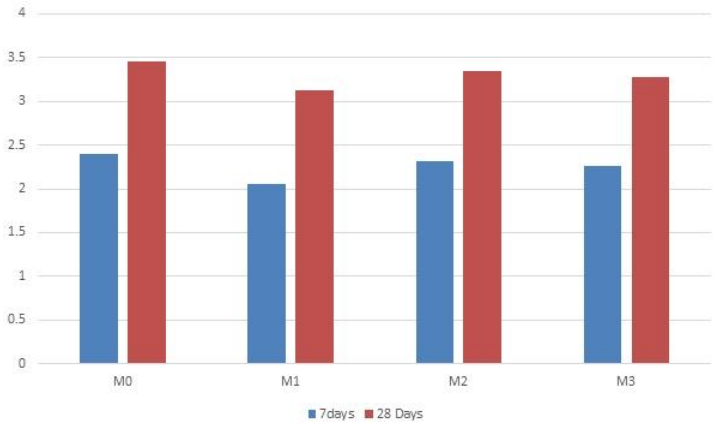


FIG 3: Tensile strength of e-waste concrete at 7days and 28 days

For all the mixes were tested at a period of 7 and 28 days. It is observed that the tensile strengths at the age of 7 days for M25 grade of e-waste concrete trial mixes M0, M1, M2, M3, M4 containing 10%,15% and 20% of e-waste were 2.4, 2.05, 2.31 and 2.26 Mpa respectively; and at the age of 28 days were 3.45,3.13, 3.34 and 3.28 respectively. The experimental result for tensile strength is given in the Table 6.3. From the Table 7, the tensile strength is maximum when replacing 15% of coarse aggregate by E–waste in concrete

4. CONCLUSIONS

Following are the conclusions can be made based upon the studies made by various researches:

1) E-waste plastics may be wont to replace a number of the aggregates in a very concrete mixture. This contributes to reducing the unit weight of the concrete. this can be helpful in applications requiring non-bearing light-weight concrete.

2) The result of water –cement magnitude relation of strength development isn't distinguished within the case of plastic concrete. it's owing to the very fact that the plastic aggregates scale back the bond strength of concrete. Therefore, the failure of concrete happens thanks to failure of bond between the cement paste and plastic aggregates.

3) For a given w/c, the utilization of E-waste plastics within the combine lowers the density, compressive strength and strength of concrete.

4) The inclusion of recycled aggregates within the concrete of the buildings below investigation has been shown to be benefits from Associate in Nursing energy purpose of read.

So,it may be conclude that the e-waste will partly replace the coarse aggregates in concrete and it offers a property resolution to the natural resources like aggregates and reduction within the accumulation of e-waste and additionally reduces the surplus lowland because of the e-waste.

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