ABSTRACT

The production of electrical and electronic devices is the fastest growing sector worldwide. Since 1980, with the development of consumer-oriented electrical and electronic technologies, countless units of electronic equipments have been sold. The rapid change in equipment features and capabilities reduces the life-time of consumer-oriented electronic devices. This waste stream of obsolete electronic equipments is the base for electronic waste. E-waste, e-scrap or Waste Electrical and Electronic Equipment (WEEE) depict loosely discarded, obsolete or broken electrical or electronic devices. It is estimated that the total number of obsolete personal computers emanating each year from business and individual households will be around 1.38 million in India.

According to a report by Confederation of Indian Industries (CII), the total waste generated by obsolete or broken electronic and electrical equipment in India has been estimated to be 1,46,000 tons per year. This e-waste stream is expected to exceed 8,00,000 tonnes by 2012. Composition of E-waste is diverse and differs across different categories. It consists of ferrous and nonferrous metals, plastics, glass, wood, ceramics and others. Iron and steel constitutes 50% of e-waste followed by 21% of plastics, 13% of non-ferrous metals and other constituents.

Non-ferrous metal consists of copper, aluminium and precious metals like silver, gold, palladium, platinum etc. E-waste recycling takes
place with the existing requirements in India for establishing and operating “Recycling, Treatment and Disposal of Hazardous Wastes”. The present activities operating in informal sector need to be upgraded to provide a support system for the integrated facility. This would enable to bring the standards of non-formal sector to ensure environmental compliances.

This study illustrates the efforts to utilize e-plastic as filler material in concrete. Recent studies have shown that reuse of finely grounded plastic waste in concrete has economical and technical advantages for solving the issues of disposal of waste. Several research works have been carried out to examine the possibility of reusing waste recycled glass in concrete as coarse aggregate, fine aggregate, fine filler in concrete depending on its source, reprocessing method and particle size.

This research aims to investigate the use of recycled plastic components of E-waste in construction applications. This is an alternative solution to administer the growing quantity of the E-waste. The properties of concretes containing various waste E-plastic particle contents were investigated in this study. Waste E plastic particles were derived from obsolete electrical and electronic equipments. The strength properties of specimens were observed with the use of waste E-plastic in various percentages (4%, 8%, 12%, 16%, 20% and 24%). The replacement of cement by fly ash (10% by weight) found to improve the properties of E plastic waste concrete. The compressive strength, split tensile strength and flexural strength of Grade M20 concrete mix were investigated by considering the use of waste
E-plastic particles. They are mixed as weight percent of coarse aggregate ranging from 4% to 24%.

Experiments were conducted to study the effect of E-plastic waste on the durability parameters such as acid attack, sulphate attack, permeability of Control mix and E-plastic concrete. The flexural rigidity of reinforced concrete beams with and without E-plastic aggregate and fly ash replacement was evaluated experimentally. The data presented in this paper showed that there is great potential for the utilization of waste E-plastic in concrete. The results indicated that the use of waste E-plastic upto 15% weight of the coarse aggregate and replacement of cement with fly ash (10% by weight) can be used effectively in concrete and thus results in waste reduction and conservation of resources in a cost effective and environmentally benign manner.