Table 4.3 Hazardous substances occurring in PCs and their effects.

**Chapter 5**

Table 5.1 Composition of a Personal Desktop Computer: 1996 Handy Harman Electronics Materials Co.Ltd Based
Table 5.2 Parts of EOL-PC and their average weight, number of units/ton
Table 5.3 Characterisation of Key Board.
Table 5.4 Characterisation of Mouse with cord
Table 5.5 Characterisation of Monitor
Table 5.6 Characterisation of Dot Matrix Printer
Table 5.7 Universal Resin Codes of different polymers.
Table 5.8 Polymer present in different parts of EOL-PC
Table 5.9 Composition of CRT panel and front glass
Table 5.10 Chemical analysis of various boards: Precious metals and polymers
Table 5.11 Chemical analysis of precious metals in EOL-PC
Table 5.12 Overall physical characterisation of CPU, Keyboard, Mouse, and Printer
Table 5.13 Comparison of Characterisation of EOL-PC of the present study with that of Handy-Harmann data

**Chapter 6**

Table 6.1 Resources recovered from EOL-PC by physical method
Table 6.2 Resources recovered from EOL-PC by chemical method

**Chapter 7**

Table 7.1 Conservation of natural resources by recovering Fe
Table 7.2 Conservation of natural resources by recovering Al
Table 7.3 Conservation of natural resources by recovering Au
Table 7.4 Quantity of the Resources that could be recovered from EOL-PC and economic value
Table 7.5 Resource conservation by recycling of CRT glass
Table 7.6 Resource conservation and other benefits of by recycling of plastics
Table 7.7 Estimation of Annual Resource recovery from EOL-PC in Bangalore city
Table 7.8 Economic viability of Recycling of EOL-PCs in Bangalore city

**List of Figures**

**Chapter 1**

Fig. 1.1. Life of the natural mineral resource.
Chapter 2.
Nil

Chapter 3
Fig.3.1 Babbage’s “Difference Engine”
Fig.3.2 World’s First Computer by Apple
Fig.3.3 First generation computers used vacuum tubes
Fig.3.4 Second generation computer: vacuum tubes replaced by transistors.
Fig.3.5 Third generation computer: ICs replacing transistors
Fig.3.6 Fourth generation computer
Fig.3.7 Charles Babbage: Inventor of modern digital computing machine
Fig.3.8 Obsolete Personal computers land filled
Fig.3.9 Obsolete computers discarded in U. S. A.
Fig.3.10 Forecasting generation of obsolete computers in developed and developing world.
Fig.3.11 EOL-PCs shipped to the developing countries
Fig.3.12 E-waste generation in India: Region wise
Fig.3.13 Monitors of EOL-PCs
Fig.3.14 Top ten Indian States generating E-waste and PC waste
Fig.3.15 Top ten cities generating E-waste and PC waste

Chapter 4
Fig.4.1 Part of Bangalore City map showing noted areas of backyard practices of EOL-PC
Fig.4.2 Map showing Goripalya and Jagajivanramnagar
Fig.4.3 Map showing Chamarajpet area
Fig.4.4 Unscientific methods to recover resources from EOL-PC
Fig.4.5 Circuit boards kept open after the recovery of valuables
Fig.4.6 CRT Monitor dismantled on the road by the backyard practitioners hazardous CRTs abanded
Fig.4.7 Children carrying broken CRTs and CRT discarded in open area
Fig.4.8 Unlabelled cans, broken buckets and barrels used to store acids and other chemicals
Fig.4.9 ‘Smelter’, containers and common salt used for the recovery of valuable metals.
Fig. 4.10 Methodology to recover valuables by Backyard Practitioners

Fig. 4.11 Amalgamation No safety measures taken

Fig. 4.12 Gold amalgam washed, heated, hazardous reddish brown gas released

Fig. 4.13 Metal nitrate solution reheated, solid impure gold collected

Fig. 4.14 Cu coated with Ag, Au components heated with Nitric acid

Fig. 4.15 Base metals dissolve, hazardous nitrogen oxides released

Fig. 4.16 Common salt added to precipitates AgCl

Fig. 4.17 Burning of Cables to retrieve copper: emission of dioxins

Fig. 4.18 Burning of Circuit boards to recover Copper: Serious health hazard

Fig. 4.19 Dioxin: 2,3,7,8-tetrachlorodiazodibenzo para Dioxin

Fig. 4.20 Dioxins used as Flame Retardants

Fig. 4.21 Bio accumulations of Dioxins: Development Retarded.

Fig. 4.22 Collection of Soil/dust samples of the ‘lab’

Fig. 4.23 Urine and hair samples collected for analysis

Fig. 4.24 Some of the elements and their impact on the health.

Chapter 5

Fig. 5.1 Personal Computer

Fig. 5.2 Central Processing Unit (CPU)

Fig. 5.3 Exploded view of Central Processing Unit

Fig. 5.4 Switched Mode Power Supply (SMPS)

Fig. 5.5. Exploded view of SMPS

Fig. 5.6 Hard Disk Drive (HDD)

Fig. 5.7 ‘Degaussing’ of HDD

Figs. 5.8a & b Exploded Views of HDD and HDD Reader (Actuator)

Fig. 5.9 Floppy Disk Drive (FDD)

Fig. 5.10 Exploded view of FDD

Fig. 5.11 Compact Disc Drive-(CDD)

Fig. 5.12 Exploded view of CDD

Fig. 5.13 Exploded view of CDD Motor

Fig. 5.14 Computer keyboard

Fig. 5.15 Exploded view of Keyboard

Fig. 5.16 Computer Mouse
Fig. 5.17 Exploded view of Mouse

Fig. 5.18 Cathode Ray Tube (CRT) Monitor

Fig. 5.19 Exploded view of Cathode Ray Tube (CRT)

Fig. 5.20 Yoke of CRT Monitor

Fig. 5.21 CRT Board

Fig. 5.22 Detachment of Electron gun

Fig. 5.23 CRTs conveyed through a series of rubber roller

Fig. 5.24 Breaking of CRT in a closed chamber with partial negative pressure.

Fig. 5.25 Exploded view of CRT.

Fig. 5.26 Exploded view of Dotmatrix Printer

Fig. 5.28 Characterisation of SMPS

Fig. 5.29 Pie chart showing Characterisation of SMPS board

Fig. 5.30 Characterisation of HDD

Fig. 5.31 Pie Chart of characterization of HDD Reader

Fig. 5.32 Characterisation of FDD

Fig. 5.33 Characterisation of CDD

Fig. 5.34 Characterisation of Keyboard

Fig. 5.35 Characterisation of mouse with cord

Fig. 5.36 Pie chart showing characterisation of Monitor

Fig. 5.37 Pie Chart showing characterisation of CRT

Fig. 5.38 Pie Chart showing characterisation of Yoke.

Fig. 5.39 Characterisation of Dot Matrix Printer

Fig. 5.40. Pie chart showing recoverable resources from Dotmatrix printer

Fig. 5.41 Pie chart showing recoverable/recyclable resources from EOL-PC

Fig. 5.42 Computer monitor

Fig. 5.43 Fire Assay: ‘Cupellation’: Estimation of Au and Ag

Fig. 5.44 Bar chart showing comparison of Characterisation of EOL-PC generated in the present study with that of Handy-Harmann data of 1996

**Chapter 6**

Fig. 6.1 Flow sheet for the manual dismantling of EOL-PC

Fig. 6.2 Resource recovery from SMPS

Fig. 6.3 Removal gold coated pins/contactors
Chapter 7.

Fig. 6.4. Copper recovered from Yoke of CRT
Fig. 6.5 Sorting by visual inspection
Fig. 6.6 Cullets recovered from CRT
Fig. 6.7 Manual scientific dismantling of EOL-PCs
Fig. 6.8 Gold bearing components: RAM, circuit boards
Fig. 6.9 Processor with gold coated pins

Fig. 7.1 Copper mined from EOL-PC
Fig. 7.2 Iron ore ready for transport
Fig. 7.3 Coal/Coke source of energy and reducing agent.
Fig. 7.4 COREX Plant –at JSW, Bellary
Fig. 7.5 Working at the Blast furnace: risky operation
Fig. 7.6 A view of Steel Plant at JSW, Torangallu, Bellary, Dist. Karantaka State
Fig. 7.7 Schematic diagram explaining the production of Iron and Steel from primary and secondary source
Fig. 7.8 Bauxite ore unloaded at HINDALCO- Aluminium Factory, Belgaum
Fig. 7.9 Plant to produce Aluminum oxide (Bayer’s Process.)
Fig. 7.10 Calcined Aluminium Hydroxide- Alumina –Al₂O₃
Fig. 7.11 A view of HINDALCO Factory (Hall –Harolt Process)
Fig. 7.12 ‘Red Mud’- environmental damage
Fig. 7.13 Schematic explaining the production of Aluminium
Fig. 7.14 Schematic diagram for copper production
Fig. 7.15 Flow sheet diagram explaining extraction of Gold from Gold ore
Fig. 7.16 Carbon in Pulp (CIP) Plant at Hutti Gold Mines
Fig. 7.17 Gold Ore Tailing (GOT)