



Mahatma Gandhi Vidyamandir's

PANCHAVATI COLLEGE OF MANAGEMENT AND COMPUTER SCIENCE, NASHIK

Affiliated to Savitribai Phule Pune University, Pune.



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3.3.2 Number of books and chapters in edited volumes/books published and papers published in national/ international conference proceedings per teacher during last five years

DVV Clarification

3.3.2

Provide cover page,content page and first page of the selected publication.Provide weblink of book for the year2019-20,2020-21.

Response: As per suggestions by the NAAC, we are here with providing following documents,


- Yearwise list of books and chapters in edited volumns/books published
- publication cover page,content page and first page
- link of the book available in amazon website.

3.3.2 Number of books and chapters in edited volumes/books published and papers published in national/ international conference proceedings per teacher during last five years

Sr. No.	Year	Name of the teacher	Title of the book/chapters published	Page No	Web Link
1	2019-20	Mr. Deepak S. Dandwate	Object Oriented Software Engineering	5	https://www.tppl.org.in/2020/fifth-semester/5602-object-oriented-software-engineering.html
2	2020-21	Mr. Deepak S. Dandwate	E-Waste management and procurement of Environment	13	https://www.amazon.in/Waste-Management-Procurement-Environment/dp/B095PR6MVS
3	2020-21	Dr. Umesh J. Tupe	E-Waste management and procurement of Environment	13	https://www.amazon.in/Waste-Management-Procurement-Environment/dp/B095PR6MVS
4	2020-21	Mr. Deepak S. Dandwate	Project Management	26	https://www.tppl.org.in/2020/third-sem/4937-project-management-book-for-mba-3rd-semester-sppu.html
5	2020-21	Dr. Umesh J. Tupe	Physics for CSIR-NET/SET	35	https://www.researchgate.net/profile/Anil-Gite-2/publication/330839550_CSIR-NET_SET_Theory_and_MCQ's/links/5c66702c92851c48a9d4e75d/CSIR-NET-SET-Theory-and-MCQs.pdf


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1)Object-Oriented Software Engineering :

Cover Page

About the Book

This book **Object Oriented Software Engineering** is designed for students of **BBA(CA) Fifth Semester** of **Savitribai Phule Pune University, Pune**. We hope this book will be useful to students studying Software Engineering. It is designed to meet the needs of beginners.

Salient features

- Language is easy to understand.
- Contents of book are arranged systematically using headings, sub-headings and examples.
- Exercises are included for practice.

About the Author



Prof. Prachi S. Patekar has completed **BCS, M.Sc.** in Computer Science & qualified NET examination in the same area. She has been actively involved in department's and various inter-college computer science projects. She has **13 years** of teaching experience at Graduate and Post Graduate level and two years of corporate experience. She has taught various subjects for the following faculties.



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Savitribai Phule Pune University, BBA(CA)-5th Semester

Subjects	Authors
Cyber Security	Nutan Prakash Joshi, Ms. Manishaben Jaiswal, Prof. Dhananjay Murlidhar Wagle
Object Oriented Software Engineering	Prof. Prachi S. Patekar, Mr. Deepak Shivaji Dandwate
Core Java	Prof. Manoj Ashok Sathe, Prof. Khule Rahul Bhaskar, Prof. Ashvini Swagat
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Object Oriented Software Engineering



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Prof. Prachi S. Patekar
Deepak Shivaji Dandwate



OBJECT ORIENTED SOFTWARE ENGINEERING

BBA (CA), FIFTH SEMESTER

According to the New Syllabus of 'Savitribai Phule Pune University', Pune

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- Prof. Prachi S. Patekar
- Deepak Shivaji Dandwate

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I am greatly indebted to my **Parents** and **Family** for their endless support in completing the assignment.

- Prof. Prachi S. Patekar

First and foremost, I express my sincere gratitude to the '**Almighty**', for having given me an opportunity and strength to write this book.

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- Deepak Shivaji Dandwate



Content Page :

-8-

Contents

Unit 1: Introduction and Basics of Software Modelling

1.1.	Software Modelling	13
1.2.	Software Life Cycle Models	13
1.2.1.	Waterfall Model	13
1.2.2.	Incremental Process Models	16
1.2.3.	Prototyping Model	17
1.2.4.	Spiral Model	18
1.3.	System	19
1.3.1.	Concepts	19
1.3.2.	Characteristics of System	20
1.3.3.	Elements of System	21
1.3.4.	Types of System	22
1.3.4.1.	Classification by Existence	22
1.3.4.2.	Classification by Form and Appearance	24
1.3.4.3.	Classification by Boundary	24
1.3.5.	Subsystems	25
1.4.	Project Organisation	26
1.4.1.	Introduction	26
1.4.2.	Conditions Requiring a Project Organisation	27
1.4.3.	Project Organisation Structure	27
1.4.4.	Activities Covered by Project Organisation	27
1.4.5.	Management Spectrum (Four P's Concept)	28
1.4.6.	Advantages of Project Organisation	30
1.4.7.	Disadvantages of Project Organisation	31
1.5.	Communication in Project Management	31
1.5.1.	Introduction	31
1.5.2.	Reasons of Failure of Project Management Communication	32
1.5.3.	Types of Communication in Project Management	32
1.5.4.	Key Factors in Project Management Communication	34
1.5.5.	Creating Project Management Communication Plan	34
1.5.6.	Management of Project Communication	34
1.6.	Risk Management in Project Management	35
1.6.1.	Introduction	35
1.6.2.	Objectives of Risk Management	35
1.6.3.	Principles of Risk Management	36
1.6.4.	Risks	36
1.6.4.1.	Types of Risks	37
1.6.4.2.	Nature of Risk	37
1.6.5.	Risk Strategies	38
1.6.6.	Managing Risks	38
1.6.6.1.	Risk Assessment	38
1.6.6.2.	Risk Control	41
1.7.	Exercise	44

Unit 2: SRS Documentation

2.1.	SRS Documentation	46
2.1.1.	Software Requirement Specification(SRS)	46
2.1.2.	Components of SRS Document	46
2.1.3.	Characteristics of Good SRS Document	47
2.1.4.	Uses of SRS Document	48
2.1.5.	Users of SRS	48
2.1.6.	IEEE Standards for SRS	49
2.2.	Requirements Elicitation	50
2.2.1.	Introduction	50

-9-

2.2.2.	Requirements Elicitation Problems	50
2.2.3.	Requirements Elicitation Process Activities	51
2.2.4.	Guidelines for Requirements Elicitation	51
2.2.5.	Requirements Elicitation Methods	51
2.2.5.1.	Documentation Analysis	52
2.2.5.2.	Onsite Observation	52
2.2.5.3.	Interviews	54
2.2.5.4.	Questionnaires	58
2.2.6.	Outcomes of Requirement Elicitation	60
2.3.	Business Engineering	60
2.3.1.	Introduction	60
2.3.2.	Business Engineering Process	61
2.3.3.	Continuous Improvement	61
2.3.4.	Forward and Backward Business Engineering	62
2.3.5.	Business Use Case Model	63
2.3.6.	Business Object Model	64
2.4.	Exercise	64

Unit 3: Unified Modeling Language

3.1.	Unified Modeling Language (UML)	66
3.1.1.	Introduction	66
3.1.2.	Concepts Related to UML	66
3.1.3.	Features of UML	67
3.1.4.	Goals of UML	68
3.1.5.	Architecture of UML	68
3.1.6.	UML's Basic Building Blocks	69
3.1.7.	Common Mechanisms of UML	72
3.1.8.	UML Diagram	72
3.1.9.	Advantages of UML	74
3.1.10.	Disadvantages of UML	74
3.2.	Exercise	75

Unit 4: Object Oriented Concepts and Principles

4.1.	Object Orientation	77
4.1.1.	What is Object Orientation?	77
4.1.2.	Object Oriented Concepts/Features of Object Orientation	78
4.1.2.1.	Objects	78
4.1.2.2.	Classes	79
4.1.2.3.	Instance	80
4.1.2.4.	Encapsulation	80
4.1.2.5.	Polymorphism	81
4.1.2.6.	Inheritance	81
4.1.2.7.	Message Passing	83
4.1.3.	OO Benefits	83
4.2.	Object Oriented System Development	84
4.2.1.	Introduction	84
4.2.2.	Function/Data Methods	86
4.2.3.	Object Oriented Analysis	87
4.2.3.1.	Activities in Object-Oriented Analysis	88
4.2.3.2.	Generic Steps for OOA	88
4.2.3.3.	Different Object Oriented Analysis Methods	89
4.2.4.	Object-Oriented Construction/Design	90
4.2.4.1.	Designing Concepts	91
4.2.4.2.	Design Principles and Strategies	91
4.2.4.3.	Input (Sources) for Object-Oriented Design	91
4.2.4.4.	Output (Deliverables) of Object-Oriented Design	92



4.2.5.	Advantages/Benefits of OOAD	92
4.2.6.	Difference between OOA and OOD	92
4.3.	Identifying the Elements of an Object Model	93
4.3.1.	Introduction	93
4.3.2.	Identifying Classes and Objects	94
4.3.3.	Specifying Attributes	95
4.3.4.	Defining Operations	96
4.3.5.	Finalizing the Object Definition	97
4.4.	Exercise	97

Unit 5: Structural Modeling

5.1.	Basic Structural Modeling	99
5.1.1.	Introduction	99
5.1.2.	Classes	99
5.1.2.1.	Names	100
5.1.2.2.	Attributes	100
5.1.2.3.	Operations and Methods	101
5.1.2.4.	Common Modeling Techniques for Classes	102
5.1.3.	Relationships	102
5.1.3.1.	Dependency	102
5.1.3.2.	Generalization	103
5.1.3.3.	Associations	105
5.1.3.4.	Aggregation	106
5.1.3.5.	Composition	107
5.1.3.6.	Multiplicity	107
5.1.3.7.	Common Modeling Techniques for Relationships	108
5.1.4.	Common Mechanisms in the UML	109
5.1.4.1.	Specification	109
5.1.4.2.	Adornments	110
5.1.4.3.	Common Divisions	111
5.1.4.4.	Extensibility Mechanisms	112
5.2.	Diagrams	112
5.2.1.	Introduction	112
5.2.2.	Classification of Diagram	113
5.2.3.	Class Diagrams	113
5.2.3.1.	Class Notation	114
5.2.3.2.	Class Interface Notation	114
5.2.3.3.	Visibility	115
5.2.3.4.	Reification	117
5.2.3.5.	Class Diagram Examples	118
5.3.	Advanced Structured Modeling	119
5.3.1.	Advanced Classes	120
5.3.1.1.	Classifiers	120
5.3.1.2.	Visibility	121
5.3.1.3.	Scope	122
5.3.1.4.	Abstract, Root, Leaf, and Polymorphic Elements	122
5.3.1.5.	Common Modeling Techniques for Advanced Classes	123
5.3.2.	Advanced Relationships	124
5.3.2.1.	Dependencies	127
5.3.2.2.	Generalizations	127
5.3.2.3.	Associations	128
5.3.2.4.	Realization	128
5.3.2.5.	Common Modeling Techniques for Advanced Relationships	129
5.4.	Interfaces, Types, and Roles	128
5.4.1.	Interface	128
5.4.1.1.	Names	128
5.4.1.2.	Operations	129

5.4.1.3.	Relationships	129
5.4.2.	Types	130
5.4.3.	Roles	131
5.5.	Packages	132
5.6.	Object Diagram	133
5.6.1.	Introduction	133
5.6.2.	Object Diagram Notations	133
5.6.3.	Object Diagram Examples	134
5.7.	Exercise	136

Unit 6: Basic Behavioural Modeling

6.1.	Basic Behavioral Modeling	138
6.1.1.	Introduction	138
6.1.2.	Use Cases	139
6.1.3.	Use Case Diagram with Stereo Types	140
6.1.4.	Interaction Diagrams	145
6.1.4.1.	Sequence Diagram	147
6.1.4.2.	Collaboration Diagram	153
6.1.5.	State Chart Diagram	156
6.1.6.	Activity Diagram	159
6.1.6.1.	Elements of Activity Diagram	160
6.1.6.2.	Contents of Activity Diagram	161
6.1.6.3.	Building Activity Diagram	162
6.2.	Exercise	169

Unit 7: Architectural Modelling

7.1.	Architectural Modeling	171
7.1.1.	Introduction	171
7.1.2.	Component	172
7.1.3.	Component Diagram	175
7.1.4.	Deployment Diagram	178
7.2.	Exercise	182

Unit 8: Object Oriented Analysis

8.1.	Object Oriented Analysis	184
8.1.1.	Introduction	184
8.1.2.	Domain Analysis	185
8.1.2.1.	Domain Class Model	186
8.1.2.2.	Domain State Model	188
8.1.2.3.	Domain Interaction Model	189
8.1.2.4.	Iterating the Analysis	190
8.1.3.	Application Analysis	190
8.1.3.1.	Application Interaction Model	190
8.1.3.2.	Application Class Model	194
8.1.3.3.	Application State Model	194
8.2.	Development Life Cycle	195
8.3.	Iterative Development	196
8.4.	Understanding Requirements	198
8.4.1.	Introduction	198
8.4.2.	Types of Requirements	199
8.4.2.1.	System Requirements	201
8.4.2.2.	User Requirements	202
8.4.3.	Requirement Analysis	202
8.4.4.	Determination of Requirements	202
8.5.	Rational Unified Process (RUP)	204
8.5.1.	Introduction	204



8.5.2.	Phases of the Unified Process	205
8.5.2.1.	Inception	205
8.5.2.2.	Elaboration	206
8.5.2.3.	Construction	206
8.5.2.4.	Transition	207
8.5.3.	Disciplines of RUP	207
8.5.4.	Best Practices of RUP	207
8.5.5.	Advantages of RUP	209
8.5.6.	Disadvantages of RUP	209
8.6.	Use Case Model	210
8.6.1.	Introduction	210
8.6.2.	Inception Phase	210
8.6.3.	Elaboration Phase	211
8.7.	Exercise	215

Unit 9: Object Oriented Design

9.1.	Object Oriented Design	218
9.1.1.	Introduction	218
9.1.2.	Design for Object Oriented Systems	218
9.1.3.	Conventional vs. OO Approaches	219
9.1.4.	Design Issues	219
9.2.	Object-Oriented Design (OOD) Methodologies	220
9.2.1.	Introduction	220
9.2.2.	Booch's Object-Oriented Design	220
9.2.2.1.	Booch's Static Diagrams	221
9.2.2.2.	Steps: Object-Oriented Design (OOD) Process	221
9.2.2.3.	Tools Used in Booch's OOD	221
9.2.3.	Yourdon and Coad Object-Oriented Design	222
9.2.3.1.	Steps: Yourdon and Coad Object-Oriented Design	222
9.2.3.2.	Tools Used in Coad and Yourdon OOA	222
9.2.4.	Jacobson Method	222
9.2.5.	Rumbaugh Method	224
9.3.	A Unified Approach to OOD	226
9.4.	Generic Components of OO Design Model	227
9.5.	The System Design Process	227
9.5.1.	Partitioning the Analysis Model	228
9.5.2.	Concurrency and Subsystem Allocation	228
9.5.3.	Task Management Component	228
9.5.4.	User Interface Component	229
9.5.5.	Data Management Component	229
9.5.6.	Resource Management Component	229
9.5.7.	Inter subsystem Communication	229
9.6.	Exercise	230
Question Papers (2018, 2019)		232
Model Paper		235

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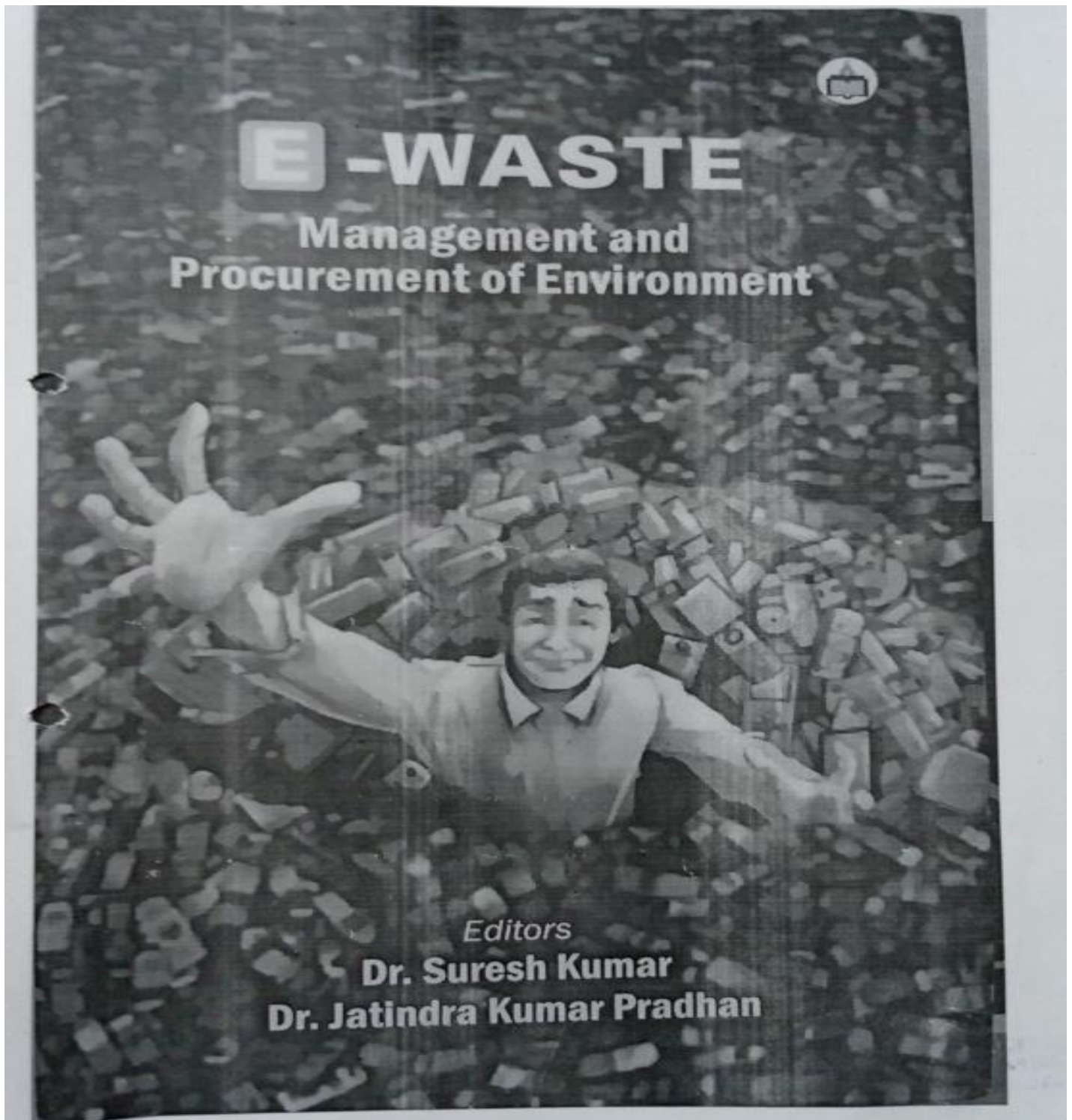
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2020-2021

E-Waste management and procurement of Environment:

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Contemporary world can't ignore waste though it is far from being a glamorous subject. Current life style and consumption pattern of every individual generates tons of waste over one's lifetime in which waste electrical and electronic equipment, i.e., electronic waste (e-waste) is the fastest growing solid waste because of its high obsolescence rate. Presence of hazardous elements and precious metals in e-waste becomes a prominent source of environmental problems as well as opportunities. Globally, the current quantity of e-waste generated grew up to approximately 56.3 million tons which is equivalent to 7.3 kg per capita. Annually the rate of increase of e-waste generation is 3% - 5% globally. The rate of e-waste production gives a direct threat resulting in huge loss of rare earth metals/natural resources. An interesting fact is that around 320 tons of gold (Au) and 7,500 tons of silver (Ag) are used annually for making personal computers, mobiles, tablets and other electronic goods and a worth of \$21 billion of precious metals is eventually available through e-waste. It provides material for remanufacture, refurbishment as well as recycling. The environmental toxicants commonly found in e-waste include toxic metals and metalloids such as arsenic, barium, beryllium, cadmium, cobalt, chromium, lead, mercury, etc., and persistent organic pollutants such as dioxin, BFRs, PAHs, PCBs, PBDD/Fs, PCDD/Fs, PVC, and AHFRs. Such a variety of toxicants could cause environmental problems and harm human health unless appropriate management procedure is applied. The hazards of e-waste contamination to the surrounding environment including soil, sediment, water, and air has become a serious issue in many developing countries. In case of humans, exposure to toxic substances through inhalation, ingestion and dermal contact can harm the human health in both chronic and acute conditions. The resources in e-waste are normally recycled by both formal and informal procedures. Manual e-waste recycling inescapably leads to the release of toxins and persistent organic pollutants into the environment in addition to harming the health of the recycling person due to the primitive techniques used. Many countries have framed rules and guidelines to manage e-waste for producers, consumers and recyclers. This book will provide an overview of globally e-waste management and current trends in research to mitigate the environmental problems as well as the potential of circular economy.

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The editorial team is pleased to inform you that your chapter:

“Impact of E-waste on Environment: Today and Future”

is accepted for the publication in an edited book titled

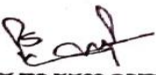
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We thank you very much for your contribution.

Thanks and Regards,

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**Acquisition Editor
(Authorspress)**



Impact of E-waste on Environment: Today and Future

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Abstract

Today, everywhere different types of technologies are used. The rapid advancement of technologies especially the inventions of vast electronic goods made life sophisticated. From morning to night millions of people are using various electronics and electrical devices. Hence, the demand for these products increases day by day so their manufacturing becomes fast. The increasing production of electronic and electrical devices or appliances and their limited lifespan alternatively plays a crucial role in the growth of electronic waster (E-waste). The disposal of such types of goods, devices, instruments, or appliances after their use and the change of technology become key players in the creating gigantic heap of E-waste. Electronics and electrical goods contain heavy metals, glass, plastics, etc., which are the major source of environmental hazards. When such types of harmful E-waste are improperly disposed-of then it is very harmful to our environment not only today but also future. It affects sustainable development; hence the E-waste management is very important. Here, in this chapter, authors made an attempt to present the influence of E-waste on the environment in a modern era.

Keywords: Electronic waste, environment, LEDs, harmful chemical elements

Introduction

One of the emerging challenges in the developed and developing countries around the world is electronic waste or E-waste. The electronic waste consists of a multitude of important material parts, some containing harmful chemicals, which can have a

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detrimental effect on the health of humans and the environment. The aim of this chapter is to give information on the sources of E-waste and its influence on the environment and living things today and in upcoming days.

Growth that is a long-term process is a very important now-a-days because various types of technologies are used by humans in various fields. This use of technologies by-default produces pollutions, due to various by-products after use, which is very harmful to the environment. In the twenty-first century, computer is the basic need of human beings, the computer is used in different applications. After damaging computer, if it is not applicable then it produced E-waste. E-waste not only produced by damage computers but also other electrical and electronic goods, appliances like CD-DVD, LEDs, microwaves, mobiles, digital watches, calculators and other discarded electronic and electric components.

Discarded electronic and electrical products and equipment's used in information technology, home appliances, audio and video products, communication, etc., are known as electronic waste or simply E-waste. E-waste is not problematic if it has safe storage or recycled from time to time but it can become hazardous if recycled by the primitive methods. Most of the E-waste in India is recycled by the unorganised sector. Proper education, awareness, cost-effective technology, and a need for a holistic approach are necessary. Prevention and control measures are necessary for E-waste pollution otherwise it will become hazardous to humans and other organisms and impact environment badly (Needhidasan et al., 2014, Li & Achal, 2020, Dasgupta, et al., 2017).

Increased use of electrical and electronic goods by a large portion of the populations and their changing habits of use are creating E-waste in India at an alarming pace. This is attributable to the side effect of rapid growth of technology. In modern times, these spectacular advances of technology have undeniably enhanced the quality of our lives. At the same time, these advancements contribute to the various problematic issues including the issue related to the hazardous waste like Pb, Cd, Be, Hg, and As, poisonous retardants flames, waste produced by computer and printer's spare parts, other waste produced from electrical goods, which has a negative impact on the sustainable development of the environment (Grant et al., 2013).

Environmental pollution can be defined as an "introduction of contaminants into the environment that makes the environment unhealthy for habitation and on the extreme can harm the ecosystem".

Pollutants are mainly two types (a) persistent pollutants and (b) non-persistent pollutants. Pollution can be described as the presence of the incorrect material in the incorrect amounts at the incorrect time. This means that if a substance is present at too low levels, it causes damage to the environment, and a pollutant is any substance that causes adverse effects or uneasiness in organisms. Persistent contaminants are pollutants that remain constant in the atmosphere for an extended period without changing their original type. Pesticides, E-waste, radioactive waste, plastics, and other chronic contaminants are the examples of persistent pollutants. Non-persistent pollutants are the polar opposite of persistent pollutants, and they degrade to their



simplest form. The chemicals are referred to as degradable pollutants if they are broken down by living organisms (Cayumil et al., 2016, Gupta, 2014 and Song et al., 2019).

E-waste is not harmful if it is properly processed or recycled from time to time, but if it cannot recycle properly, it can be risky not only present but also future. Awareness of the causes and prevalence of pollutants in the ecosystem is important for reducing the release of waste and reducing the burden on the environment and the risk to human health. E-waste is a colloquial term for electronic devices that have reached the end of their useful life. It is possible to reuse, refurbish, or recycle several of these items.

Environmental and Human Health Effects of E-waste

The severe impact of E-waste on environment and human health can be realised in the following points of discussion

1. During the summer months, E-waste becomes extremely harmful because the toxic chemicals are released into the open air when E-waste is heated by the sun rays, further destroying the already volatile atmosphere. This is one of the main environmental impacts of E-waste.
2. Heavy metals from E-waste, such as arsenic, lithium, lead, mercury, barium etc., after getting soil contaminated, then leak into the earth's crust and even further to enter the groundwater. Specifically, with lead and mercury because it has toxic effects on various organs of the human body such as the central nervous systems, reproductive systems, hemopoietic system (anemia) and genitourinary system. They inevitably find their way through wetlands, streams, rivers and reservoirs until these heavy metals enter into the groundwater. Acidification and toxification are produced in the water through these pathways, which is unhealthy for the animals, plants and communities even if they are miles away from a recycling site (Kohli & Gupta, 2015).
3. Air contamination occurs when E-waste is disposed-of informally by splitting, shredding or melting materials, exposing into the atmosphere, dust-particles etc., that cause air pollution which is severally harmful to the respiratory health of the human. E-waste of low value is often burned, but burning is also a way to obtain valuable metal from the E-waste, such as copper, aluminium and other metals. When burning of E-waste occur, the chronic diseases and cancers are at greater point of occurring. Because, burning process often releases the fine particles that can fly thousands of miles and creating various adverse health hazards for the humans and animals. The air pollution because of E-waste impacts on some animal species and the biodiversity of some regions that are chronically polluted. It can harm the quality of water, soil and plant species over time causing irreversible damage to the whole ecosystems.
4. When E-waste is improperly disposed-of in normal landfills or in the areas where it is illegally discarded, both heavy metals and flame retardants may



enter into the soil directly from the E-waste, causing contamination of the underlying groundwater or contamination of crops that may be planted, near or in the future, in those fields. The crops become susceptible to consuming these contaminants, when the soil is polluted by heavy metals, which can cause many adverse effects and resist the farmland to be as productive (Parajuly et al., 2019).

5. During the burning of E-waste more pollutants particles produced, due to their size and weight, they easily re-deposit to the ground and contaminate the soil as well. The amount of soil polluted depends on a number of variables, including temperature, type of soil, pH and composition of the soil. These contaminants can persist for a longer period of time in the soil and can be toxic to soil and plant micro-organisms. Consequently, for the survival of animals and wildlife species that depend on nature, will end up with eating affected plants causing internal health issues (Sivaramanan, 2013).
6. It is difficult for women who are pregnant and live in E-waste recycling areas are forming a barricade. Heavy metals and organic contaminants from E-waste, increasing possibility of premature births, decreased birth weights and lengths of babies, spontaneous abortions, stillbirths and Apgar scores (Song et al., 2019, Li & Achal, 2020).
7. During informal E-waste recycling or disposal procedures, such as uncontrolled disposal and burning of substantial quantities of persistent organic substances pollutants such as polyaromatic hydrocarbons, diphenyl alcohol, polybrominated and polychlorinated biphenyls which will be released into the atmosphere with dioxin in the natural surroundings, organic contaminants are relatively stable within living organisms and can be quickly accumulated and can migrate via food-soil or food-water chains (Li & Achal, 2020).
8. Chlorofluorocarbon gases are used in refrigerators and air-conditioners, and they contribute to ozone depletion and global warming. Increased UV radiation hitting the Earth's atmosphere, as well as increased skin cancers, would result from ozone depletion.
9. E-waste includes harmful elements such as Pb, Cd, Be, Hg, As, etc., that are hazardous to human health. In humans, the harmful health effects of these toxins include damage to the brain, heart, liver, kidney and skeletal system. It can also greatly affect the human body's nervous and reproductive systems, contributing to sickness and birth defects. Improper E-waste disposal is extremely dangerous for the global environment, which is why it is so important to raise awareness of this rising issue and the threatening implications. Printed circuit board used in different electronic appliances contains toxic substance such as mercury, polyvinylchloride (PVC), polychlorinated-biphenyls, lead, cadmium etc. These toxic substances are very harmful to human health. Because of this substance brain damage, damage of nerve system, cancer such types of health problem occur (Jhariya et al., 2014, Kiddee et al, 2013, Sitaramaiah & Kumari, 2014).



10. The lead in the soil depletes its natural nutrients and renders it sterile. Since the landfill releases particulate matter, which causes air pollution, the flora and fauna of the area around the landfill are harmed. E-waste that ends up in landfills contains chemicals that can leach into groundwater and have an effect on the local resources. Due to abnormal pH, turbidity, total dissolved solids, conductivity, and chloride levels, the water that was made to react with lead is unfit for human consumption. E-waste leaches into the groundwater table and affects. As a result, it has an effect on water used for domestic and drinking purposes, as even a small amount of lead in drinking water can pose a health risk to children and adults. E-waste that has been improperly disposed-of has resulted in water contamination, air pollution, soil pollution, and a hazard to humans and animals. The natural environment is being damaged as a result of the unprecedented rates at which E-waste is being improperly treated (Dharini et al., 2017).
11. Electronic and electrical equipment's are manufactured in vast amounts and will ultimately be discarded as E-waste. Because of the toxic substances they contain, the highly technical recycling criteria, the high overhead, and costs of environmentally sustainable management, as well as their negative effects on human health, these items pose a major global challenge. Low-income countries bear the brunt of negative health consequences including asthmatic bronchitis, DNA damage, endocrine and hormone disorders, lung cancer, fertility issues, genetic mutations, and so on (Hossain et al., 2015).
12. Persistent organic pollutants have a detrimental impact on human health and habitats by way of the ecological food chain. Bioaccumulation in the food chain has an impact on human health, especially in pregnant and breastfeeding women.
13. Toxic materials and heavy metals are both harmful to the atmosphere, but their release can be minimized with filtration. Additionally, supplying health services to the community to minimize the community's effect in the event that any metals escape. Toxicity levels should be tracked on a regular basis to prevent any future liabilities. Biological techniques for extracting precious metals may be used to reduce the number of harmful chemicals and metals released into the atmosphere (Awasthi et al., 2019).
14. Recycling of the components containing hazardous compounds such as halogenated chlorides and bromides, used as flame retardants in plastics which produce persistent dioxins and furans, when combusted at low temperatures is another dangerous method. When flame-retardants are incinerated, copper, this is used in printed circuit boards and cables, acts as a catalyst causing dioxin to form. As wires are sheathed in PVC, they become extremely corrosive and contain dioxin (Jhariya et al., 2014).
15. Polycyclic aromatic hydrocarbons (PAHs), a compound formed during the processing of E-waste, affects people living near waste processing sites being exposed to hazardous substances through their food. Higher PAHs levels near the waste processing areas are extremely harmful to human health (Wang et al., 2012). Tables 1 shows the sources of E-waste toxins and its influence on parts of human body.

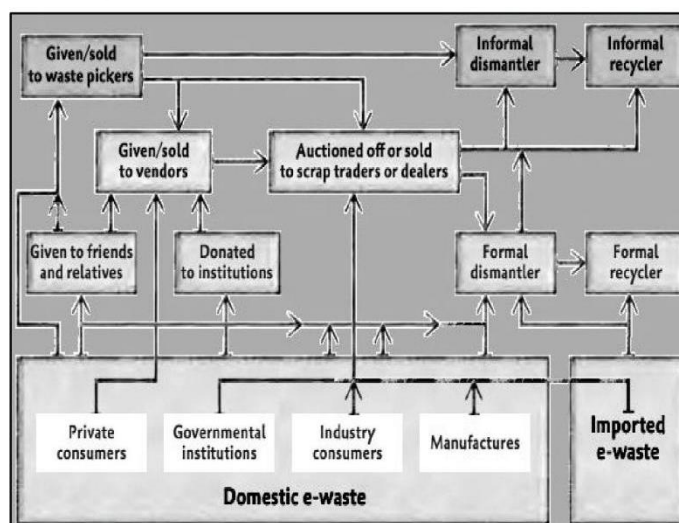


Table 1 Influence of E-waste on Human Health

Sr. No.	E-components/ devices	Constituents	Influence organ
1	Printed circuit boards	Cadmium and Lead	Urine gladder
2	Computer	Cadmium	Kidney, liver
3	Cable insulating	Polyvinylchloride (PVC)	Immune system

Flow of Domestic E-waste in India

E-waste produced from different sources and various stakeholders are also inter-connected and subsequently, it does not follow any fixed path (Kumar & Karishma 2016, Dwivedy & Mittal, 2012). The green color flows indicate the formal recycling sector, the red indicates the informal one, and the blue stakeholders and flows are semi-formal. The status of semi-formal stakeholders depends very much on their interaction with the other stakeholders. They represent the link between the formal sectors. Direct relations between the informal and formal sector occur as well, but are less common (Skinner et al., 2010). Most of the E-waste ends up with scrap traders and dealers who, for economic reasons, commonly transfer it on to the informal sector. Figure 1 represents the flow of E-waste in India (Skinner et al., 2010, Kumar & Karishma 2016).

**Figure 1 The Domestic E-waste Flow Chart**

Steps to Minimizing E-waste

The main issue we face in so many counties is that there are no such policies or specific regulations in place to monitor E-waste recycling. Backyard practitioners recycle the majority of E-waste. Our lives and living standards are all going to be



digitalised in modern times, which on the one hand make our lives much easier but then it creates different types of other problems too. The control and recycling of E-waste must also be done with the utmost sincerity. The need for E-waste disposal stems from the fact that there is no biodegradability of old and useless electronic products. Such E-waste materials are obtained in most developed countries by scrap dealers. From them, they end up in unorganised recycling places. Owing to the lack of suitable technology, recycling and disposal is not done properly (Jhariya et al., 2014, Needhidasan et al., 2014). Minimizing E-waste conserves resources and reduces the amount of energy we use from the planet. The manufacture of these instruments, as well as the use of uncommon materials in their construction, is a significant source of embodied energy.

If we look closely before ten years, we can see that E-waste is one of the fastest – growing pollution issues in the world, growing at a pace nearly three times faster than municipal waste. The production of E-waste is increasing in tandem with the increased consumption of electronic products and their use patterns. There are no credible statistics available to measure E-waste generation in India since there is no separate collection of E-waste (Gupta, 2014).

E-waste amounts are rapidly growing, both domestically and internationally. Imports are sometimes disguised as reconditioned computer donations aimed at closing the digital divide or as scrap metal. There are no specific estimates of how much E-waste is produced and recycled. The risks of excessive E-waste disposal are not well known by producers and customers. E-waste recycling is widely practiced in the informal sector, with primitive methods like acid being used. E-waste staff is exposed to significant health risks because they have little or no awareness of the chemicals in E-waste. Material value is lost due to inefficient recycling methods. The biggest concern we have is that we don't know what to do with it (Gupta, 2014, Moletsane & Venter, 2018).

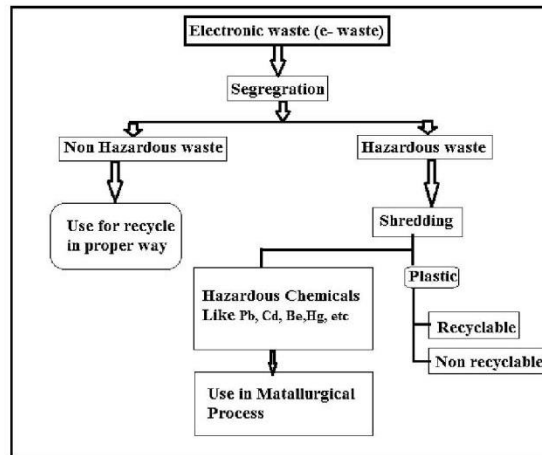


Figure 2 The Process of Recycling of E-waste



By incorporating societal, economic, environmental, technological, cultural, and gender perspectives, the global community has come together to prioritize sustainability for all developmental activities. As a result, this global integration has helped to protect the world from the degradation that occurs as living standards grow. In this vein, multilateral agreements and collaborations are crucial for achieving long-term growth. The most ambitious efforts to achieve long-term sustainability are the continuing focus on E-waste management, as well as other critical environmental concerns such as climate change and resource scarcity and degradation (Hossain et al., 2015, Needhidasan et al., 2014, Dwivedy & Mittal, 2012).

Proposed Solutions to Minimize the Problem of E-waste in Present and Future

We can follow following steps to minimize the E-waste

- Domestic legal framework for resolving these differences in E-waste imports
- Secure disposal of domestic waste needs to be tackled
- Recycle and return goods together
- Imports of used and recycled E-waste should be addressed by the system
- Attracting investment in this area
- Connecting informal sector practices to the formal sector
- Providing a fitting structure for processes
- Integrating precautionary principles and paying polluters
- Insist on manufacturing domestically
- Awareness program on E-waste recycling
- Then check to see if the company you chose can handle either E-scrap type

Limitations to Minimizing E-waste

In low-income countries, establishing safe and environmentally friendly E-waste production, such as storage, recycling, recovery, dumping, or overall management practises, is extremely difficult.

Conclusion

E-waste is a major problem on both a local and global scale. E-waste problems began in developing countries and have since spread to other parts of the globe. The amount of E-waste is increasingly increasing as consumer technology evolves at a rapid pace, resulting in rapid obsolescence and the development of significant amounts of E-waste. E-waste is made up of a variety of materials, some of which contain toxic substances that, if not properly managed at the end of their lives, can pollute the atmosphere and endanger human health. The rising global trend of E-waste generation has emerged as one of the most serious environmental concerns



and challenges to achieving long-term development. Given the potential for negative eco-toxicological effects and a wide range of health effects, a global multilateral agreement on E-waste handling, storage, transportation, recycling, and final disposal of any residual waste, whether by land filling or incineration, is urgently required. Since pollution production and transportation are global issues, international negotiations and cooperation are the only practical ways to achieve sustainable development goals. By designing eco-designed goods, properly collecting E-waste, recovering and recycling material using safe methods, disposing of E-waste using suitable techniques, preventing the transfer of used electronic devices to developing countries, and raising awareness of the impact of E-waste pollution on both customers and manufacturers, the interaction of tools will lead to E-waste management performance.

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4)Project Management

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Contents

Unit-1: Overview of Project Management		
1.1. Overview of Project	13	
1.1.1. Concept of Project	13	
1.1.2. Objectives of Project	13	
1.1.3. Attributes/Characteristics of Project	14	
1.1.4. Functions of Project	15	
1.1.5. Types of Project	15	
1.1.6. Factors Affecting Project	17	
1.2. Overview of Project Management	18	
1.2.1. Meaning & Definition of Project Management	18	
1.2.2. Scope of Project Management	19	
1.2.3. Objectives of Project Management	20	
1.2.4. Functions of Project Management	20	
1.2.5. Project Management Process	22	
1.2.6. Tools and Techniques of Project Management	23	
1.2.7. Importance of Project Management	24	
1.2.8. Limitations of Project Management	25	
1.2.9. Project Life Cycle	26	
1.2.10. Project Stakeholders	28	
1.2.10.1. Types of Project Stakeholders	28	
1.2.10.2. Importance of Identification of Project Stakeholders	30	
1.3. Project Management Structure	30	
1.3.1. Introduction	30	
1.3.2. Factors Considered While Deciding the Forms of Organisation	30	
1.3.3. Forms of Project Organization	31	
1.3.4. Line and Staff Organization Structure	31	
1.3.4.1. Advantages of Line and Staff Organisation	33	
1.3.4.2. Disadvantages of Line and Staff Organisation	33	
1.3.5. Divisional Organisation Structure	33	
1.3.5.1. Advantages of Divisional Organisation Structure	34	
1.3.5.2. Disadvantages of Divisional Organisation Structure	34	
1.3.6. Functional Organizational Structure	34	
1.3.6.1. Advantages of the Functional Organization Structure	35	
1.3.6.2. Disadvantages of the Functional Organization Structure	35	
1.3.7. Project Organizational Structure	35	
1.3.7.1. Advantages of Project Organizational Structure	36	
1.3.7.2. Disadvantages of Project Organizational Structure	36	
1.3.8. Matrix Organizational Structure	37	
1.3.8.1. Advantages of Matrix Organizational Structure	38	
1.3.8.2. Disadvantages of Matrix Organizational Structures	38	
1.3.9. Choosing Appropriate Project Management Structure	38	
1.3.10. Organisational Culture	39	
1.3.11. Implications of Organisational Culture	39	
1.3.12. Main Causes of Project Failure	40	
1.4. Project Definition	42	
1.4.1. Introduction	42	
1.4.2. Important Things to be Consider For Project Definition	42	
1.4.3. Steps for Defining the Project	43	
1.5. Project Scope Management	43	
1.5.1. Meaning of Project Scope Management	43	
1.5.2. Process of Project Scope Management	44	
1.5.2.1. Initiation	44	
1.5.2.2. Scope Planning	45	
1.5.2.3. Scope Definition	47	
1.5.2.4. Scope Verification	48	
1.5.2.5. Scope Control	49	
1.5.3. Benefits of Project Scope Management	51	
1.5.4. Limitations of Project Scope Management	51	
1.6. Establishing Project Priorities	51	
1.6.1. Introduction	51	
1.6.2. Priorities for Effective Project Management	52	
1.6.3. Benefits of Establishing Project Priorities	53	
1.7. Work Breakdown Structure (WBS)	54	
1.7.1. Meaning of Work Breakdown Structure	54	
1.7.2. Factors Considered in Developing Work Breakdown Structure	54	
1.7.3. Importance of Work Breakdown Structure	55	
1.7.4. Limitations of Work Breakdown Structure	55	



1.7.5.	Creating/Process of Work Breakdown Structure	55	2.2.8.	Developing Budgets	82
1.7.5.1.	Inputs to Work Breakdown Structure	56	2.2.9.	Types of Costs	83
1.7.5.2.	Tools and Techniques of Work Breakdown Structure	56	2.2.9.1.	Direct Costs	83
1.7.5.3.	Outputs from Work Breakdown Structure	57	2.2.9.2.	Direct Labour	83
1.7.6.	Integrating the WBS with the Organization	58	2.2.9.3.	Direct Non-Labour Expense	83
1.7.7.	Coding the WBS for Information System	59	2.2.9.4.	Overhead, General, and Administrative Expenses	84
1.7.8.	Project Roll Up	62	2.2.10.	Refining Estimates and Contingency Funds	84
1.7.9.	Process Breakdown Structure	62	2.2.10.1.	Refining Estimates	84
1.7.10.	Responsibility Matrix	64	2.2.10.2.	Contingency Funds/Reserves	85
1.8.	Exercise	66	2.3.	Developing a Project Network Plan	86
Unit-2: Project Planning			2.3.1.	Meaning of Network Analysis	86
2.1.	Project Planning	69	2.3.2.	Developing the Project Network	86
2.1.1.	Introduction	69	2.3.3.	Objectives of Network Analysis	86
2.1.2.	Meaning of Project Planning	69	2.3.4.	From Work Package to Network	87
2.1.3.	Objectives of Project Planning	70	2.3.5.	Constructing a Project Network	87
2.1.4.	Importance of Project Planning	70	2.3.6.	Identifying the Nodes and Activities	88
2.1.5.	Functions of Project Planning	70	2.3.6.1.	Activity-on-Arrow (AOA) Fundamentals	89
2.1.6.	Project Master Plan	70	2.3.6.2.	Activity-on-Node (AON) Fundamentals	89
2.1.7.	Process of Project Planning	72	2.3.7.	Steps in Network Design	90
2.1.8.	Tools and Techniques of Project Planning	72	2.3.7.1.	Rules for Drawing Network Design	90
2.2.	Estimating Project Times and Costs	75	2.3.7.2.	Common Errors & Dummies in Network Design	90
2.2.1.	Introduction	75	2.3.8.	Advantages of Network Analysis	92
2.2.2.	Importance of Estimation of Project Time and Cost	76	2.3.9.	Disadvantages of Network Analysis	92
2.2.3.	Factors Influencing Quality of Estimates	76	2.3.10.	Techniques for Network Analysis	92
2.2.4.	Estimation Guidelines for Time, Costs and Resources	77	2.4.	Critical Path Method (CPM)	93
2.2.5.	Approaches of Estimating Project Times and Cost	77	2.4.1.	Introduction	93
2.2.5.1.	Macro Estimating/Top-Down Approach	78	2.4.2.	Assumptions of CPM	93
2.2.5.2.	Micro Estimating/Bottom-Up Approach	78	2.4.3.	Principles of CPM Analysis	93
2.2.5.3.	Macro versus Micro Estimating	79	2.4.4.	Advantages of CPM	93
2.2.6.	Methods for Estimating Project Times and Costs	80	2.4.5.	Disadvantages of CPM	93
2.2.6.1.	Macro (Top-Down) Approaches	80	2.4.6.	Identifying Critical Path	93
2.2.6.2.	Micro (Bottom-Up) Approaches	81	2.4.7.	Time Estimation in Network Analysis	94
2.2.6.3.	Hybrid - Phase Estimating	81	2.4.8.	Network Computation Process	94
2.2.7.	Level of Detail	81	2.4.8.1.	Using Forward Pass Computations (Calculating EST and EFT)	94
			2.4.8.2.	Using Backward Pass Computations (Calculating LST and LFT)	95
			2.4.9.	Level of Detail for Activities	95
			2.4.10.	Floats and Slacks	98
			2.4.10.1.	Float	98
			2.4.10.2.	Slack	100
			2.4.11.	Extended Network Techniques	103



2.4.11.1.	Laddering	103	3.2.7.2.	Options for Accelerating Project Completion/Techniques for Reducing Project Duration	127
2.4.11.2.	Use of Lags	104			
2.5.	Program Evaluation and Review Technique (PERT)	105	3.3.	Classification of Scheduling Problem	128
2.5.1.	Introduction	105	3.3.1.	Sequencing Problem or Job-Shop Scheduling Problem	128
2.5.2.	Features of PERT	105	3.3.1.1.	Sequencing n Jobs on One Machine	129
2.5.3.	Assumptions of PERT	106	3.3.1.2.	Sequencing n Jobs on 2 Machines	130
2.5.4.	Steps involved in PERT	106	3.3.1.3.	Sequencing n Jobs on 3 Machines	133
2.5.5.	Advantages of PERT	106	3.3.1.4.	Sequencing n Jobs on m Machines	136
2.5.6.	Disadvantages of PERT	106	3.3.2.	Project Scheduling Problem	138
2.5.7.	Probability Consideration in PERT	106	3.3.3.	Assembly Line Balancing Problem	139
2.5.8.	Probability of Project Completion/Estimation of Project Completion Time	107	3.3.3.1.	Need of Line Balancing	139
2.5.9.	Applications of CPM and PERT Techniques in Project Planning and Control	111	3.3.3.2.	Procedure of Line Balancing	139
2.5.10.	Difference between CPM and PERT	112	3.3.3.3.	Methods of Line Balancing	139
2.6.	Exercise	112	3.4.	Resource Allocation	140
Unit-3: Project Scheduling & Risk Management					
3.1.	Project Scheduling	117	3.4.1.	Meaning of Resource Allocation	140
3.1.1.	Meaning of Project Scheduling	117	3.4.2.	Resource Allocation Methods	140
3.1.2.	Features of Project Scheduling	117	3.4.3.	Time-Constrained Project/Resource Levelling	141
3.1.3.	Types of Project Scheduling	118	3.4.4.	Resource-Constrained Project/Resource Smoothing	141
3.1.4.	Steps in Project Scheduling	118	3.4.5.	Heuristic Methods for Allocating Resources	142
3.1.5.	Tools and Techniques for Project Scheduling	119	3.5.	Assigning Project Work	142
3.1.6.	Splitting/Multitasking	119	3.5.1.	Introduction	142
3.1.7.	Advantages of Project Scheduling	120	3.5.2.	Considerations in Assigning Project Work to Team Members	143
3.1.8.	Disadvantages of Project Scheduling	120	3.5.3.	Importance of Assigning Project Work/Responsibilities to Project Team Members	143
3.2.	Scheduling Resources	120	3.6.	Multi/Multiple Project Resource Schedules/Scheduling	144
3.2.1.	Concept of Scheduling Resources	120	3.6.1.	Concept of Multi-Project Resource Scheduling	144
3.2.2.	Project Constraints in Scheduling	121	3.6.2.	Procedure of Resource Constrained Scheduling	144
3.2.2.1.	Types of Project Constraints	121	3.6.3.	Problems in Multi-Project Scheduling	145
3.2.2.2.	Technical or Logic Constraints	121	3.7.	Project Costing	146
3.2.2.3.	Physical Constraints	121	3.7.1.	Concept of Project Cost	146
3.2.2.4.	Resource Constraints	121	3.7.2.	Fundamental Components of Project Cost	147
3.2.3.	Resource Scheduling for Multiple Projects	122	3.7.3.	Types of Project Costs	148
3.2.4.	Role of Network Analysis in Resource Scheduling	123	3.7.4.	Construction of a Project Cost-Duration Graph	149
3.2.5.	Factors Affecting Resource Scheduling	123	3.7.4.1.	Project Time-Cost Relationship	149
3.2.6.	Benefits of Scheduling Resources	124	3.7.4.2.	Activity Time-Cost Relationship	150
3.2.7.	Reducing Project Duration	125	3.7.5.	Practical Considerations	151
3.2.7.1.	Rationale for Reducing Project Duration	125	3.8.	Managing Risk of Project	153



3.8.1.	Introduction	153
3.8.2.	Types/Sources of Risk	154
3.8.3.	Meaning of Project Risk Management	155
3.8.4.	Risk Management Process	155
3.8.5.	Risk Identification	156
3.8.5.1.	Process of Risk Identification	157
3.8.5.2.	Inputs to Risk Identification	157
3.8.5.3.	Measuring of Risk/Tools and Techniques for Risk Identification	157
3.8.5.4.	Outputs from Risk Identification	159
3.8.6.	Risk Assessment/Quantification	159
3.8.6.1.	Process of Risk Assessment/Quantification	160
3.8.6.2.	Inputs to Risk Assessment/Quantification	160
3.8.6.3.	Tools and Techniques for Risk Assessment/Quantification	161
3.8.6.4.	Outputs from Risk Quantification	167
3.8.7.	Risk Priority	168
3.8.8.	Risk Response Development/Planning	168
3.8.8.1.	Process of Risk Response Planning	168
3.8.8.2.	Inputs to Risk Response Planning	169
3.8.8.3.	Tools and Techniques of Risk Response Planning	169
3.8.8.4.	Strategies for Negative Risks or Threats	169
3.8.8.5.	Strategies for Positive Risks or Opportunities	170
3.8.8.6.	Contingency Planning/Acceptance	170
3.8.8.7.	Outputs from Risk Response Planning	171
3.8.9.	Risk Response Control and Monitoring	173
3.8.9.1.	Process of Risk Response Control and Monitoring	173
3.8.9.2.	Inputs to Risk Response Control	174
3.8.9.3.	Tools and Techniques of Risk Response Control	174
3.8.9.4.	Outputs from Risk Response Control	175
3.9.	Change Control Management	175
3.9.1.	Introduction	175
3.9.2.	Concept of Change Control Management	176
3.9.3.	Objectives of Change Control Management	176
3.9.4.	Fundamentals for Managing Project Change	176
3.9.5.	Process of Change Control Management	177
3.9.6.	Project Change Control Management	178

Process	Participants	and
Responsibilities		
Project Change Control Management		179
Process Documentation		
Exercise		179

Unit-4: Project Organisation

4.1.	Project Organisation	182
4.2.	Project Manager	182
4.2.1.	Meaning of the Project Manager	182
4.2.2.	Role of the Project Manager	182
4.2.3.	Responsibilities of the Project Manager	183
4.2.3.1.	Planning	183
4.2.3.2.	Organising	184
4.2.3.3.	Controlling	184
4.2.4.	Skills of the Project Manager	184
4.2.4.1.	Leadership Abilities	184
4.2.4.2.	Coaching & Mentoring Abilities	184
4.2.4.3.	Communication Skills	185
4.2.4.4.	Interpersonal Skills	185
4.2.4.5.	Ability to Handle Stress	185
4.2.4.6.	Problem-Solving Skills	185
4.2.4.7.	Time Management Skills	186
4.2.5.	Delegation	186
4.2.5.1.	What to Delegate?	186
4.2.5.2.	When to Delegate?	186
4.2.5.3.	How to Delegate?	186
4.2.6.	Management of Change	187
4.2.6.1.	Change Management in Projects – The 8-Step Model	187
4.3.	Managing Project Teams	189
4.3.1.	Meaning of Project Team	189
4.3.2.	Characteristics of a Project Team	189
4.3.3.	The Five Stage Team Development Model	190
4.3.3.1.	Forming	190
4.3.3.2.	Storming	190
4.3.3.3.	Norming	191
4.3.3.4.	Performing	191
4.3.3.5.	Adjourning	191
4.3.4.	Situational Factors Affecting Team Development	192
4.3.5.	Team Effectiveness	192
4.3.5.1.	Characteristics of Effective Teamwork	193
4.3.5.2.	Importance of Teamwork	193
4.3.6.	Managing Virtual Project Teams	193



4.3.7.	Composition of a Project Team	194	5.2.3.	Purpose of PMIS	221
4.3.8.	Process of Project Team-Building	195	5.2.4.	Computer-Based Tools - PMIS	221
4.3.9.	Advantages of Project Team	196	5.2.5.	Advantages of PMIS	221
4.3.10.	Project Team Pitfalls/ Barriers in Project Team Development	197	5.2.6.	Disadvantages of PMIS	222
4.4.	Conflict in Projects	198	5.3.	Project Control	222
4.4.1.	Meaning of Conflict	198	5.3.1.	Introduction	222
4.4.2.	Sources of Conflict	198	5.3.2.	Meaning of Project Control	222
4.4.3.	Categories of Conflict in Projects	198	5.3.3.	Features of Project Control	223
4.4.4.	Strategies for Handling Conflict	199	5.3.4.	Objectives of Project Control	223
4.4.5.	Conflicts and the Project Life Cycle	201	5.3.5.	Types of Project Control	224
4.5.	Exercise	202	5.3.6.	Project Control Process	224
			5.3.7.	Reasons for Ineffective Control in Project	225
			5.3.8.	Other Control Issues	225
			5.3.9.	Analysis Approach to Project Control	227
5.1.	Progress and Performance Management and Evaluation	205	5.4.	Monitoring Time Performance	228
5.1.1.	Meaning of Performance Evaluation	205	5.4.1.	Gantt Chart	228
5.1.2.	Types of Performance Evaluation	205	5.4.2.	Tracking Gantt Chart	230
5.1.3.	Areas of Performance Evaluation	205	5.4.3.	Milestone Chart	230
5.1.4.	Techniques of Project Performance Evaluation	206	5.4.4.	Networking	231
5.1.5.	Earned Value Analysis	206	5.4.5.	Task Lists	231
5.1.5.1.	Earned Value Terminology	207	5.5.	Integrated Information System (IIS)	232
5.1.5.2.	Features of Earned Value	207	5.5.1.	Introduction	232
5.1.5.3.	Fundamentals of Earned Value	208	5.5.2.	Example of Integrated Information System	233
5.1.5.4.	Steps of Earned Value	208	5.5.3.	Need for an Integrated Information System	233
5.1.5.5.	Uses of Earned Value	208	5.5.4.	Structure of Integrated Information System	234
5.1.5.6.	Drawbacks of Earned Value Management	209	5.6.	Developing a Dashboard	236
5.1.6.	Variances Analysis under Earned Value	209	5.6.1.	Meaning of Dashboard	236
5.1.6.1.	Time Variance (TV)	209	5.6.2.	Features of Project Status Dashboard	236
5.1.6.2.	Cost Variances (CV)	209	5.6.3.	Considerations in Producing a Project Dashboard or Project Tracking Report	237
5.1.6.3.	Schedule Variance (SV)	210	5.6.4.	Advantages of Dashboards	237
5.1.7.	S' Curves	210	5.7.	Developing a Status Report	238
5.1.7.1.	Cut Off Date in S Curve	211	5.7.1.	Introduction	238
5.1.7.2.	Types of S Curves	211	5.7.2.	Meaning of Project Status Reporting	238
5.1.7.3.	Analysing Cost and Work in S-Curve Analysis	213	5.7.3.	Types of Status Reports	239
5.1.7.4.	Reports under S Curve	214	5.7.4.	Tips for an Effective Status Report	239
5.1.7.5.	S' Curves for Project Completion	214	5.7.5.	How to Deliver the Status Report?	239
5.1.7.6.	Uses of S Curve	218	5.7.6.	Project Status Reports Criteria	240
5.1.7.7.	Drawbacks of S Curve	219	5.7.7.	Factors Considered in Status Reports	240
5.2.	Structure of a Project Monitoring/ Management Information System (PMIS)	219	5.7.8.	Status Report (D6)	241
5.2.1.	Meaning of PMIS	219	5.8.	Developing a Index to Monitor Progress	242
5.2.2.	Features of PMIS	220	5.8.1.	Cost Performance Index (CPI)	242
			5.8.2.	Schedule Performance Index (SPI)	244

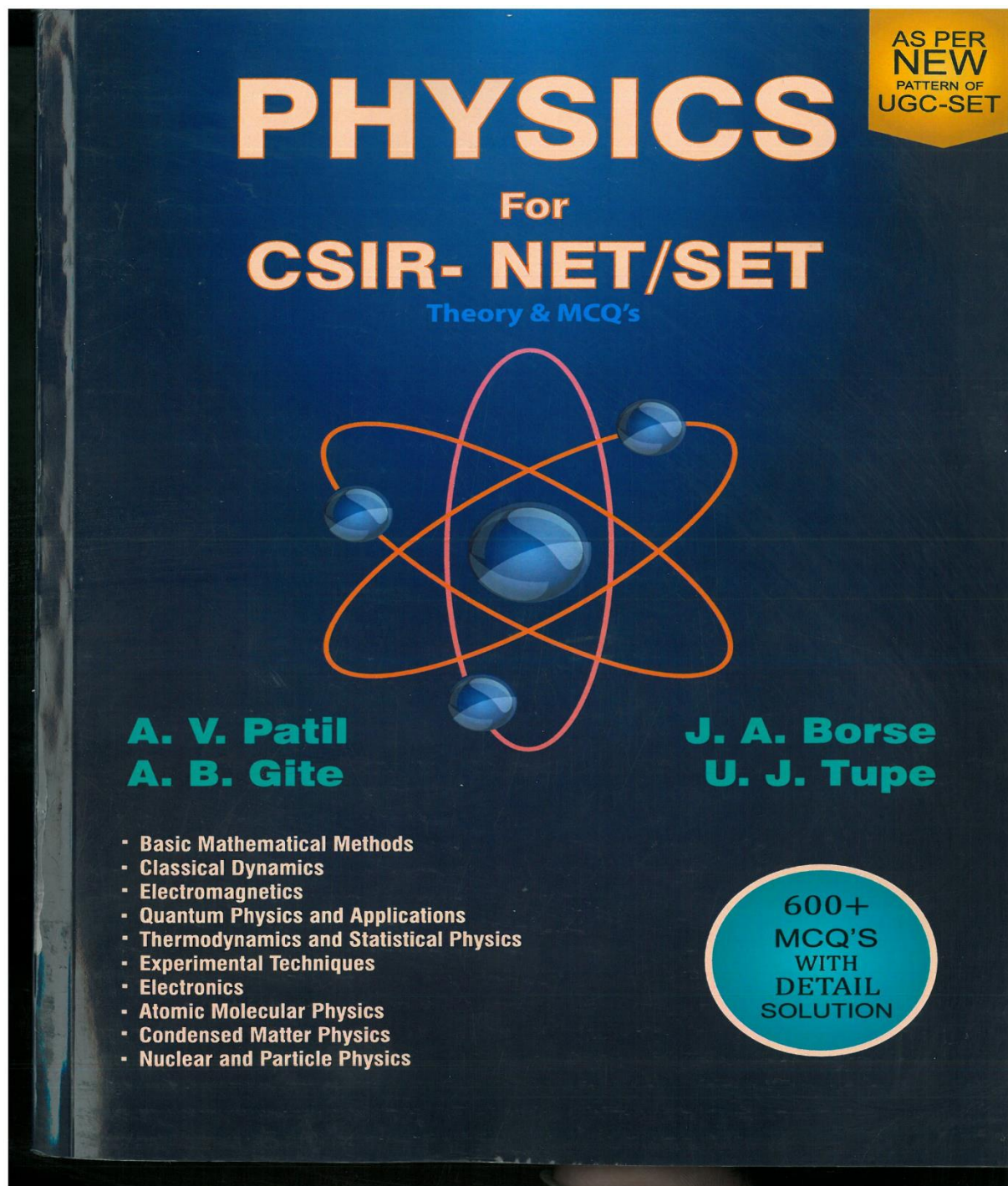


5.9.	Forecasting Final Project Cost	245			255
5.9.1.	Estimate at Completion (EAC)	246	5.11.5.2.	Bills Clearance	255
5.9.2.	Estimate to Complete (ETC)	247	5.11.5.3.	Site Clearance	255
5.9.3.	To Complete Performance Index (TCPI)	247	5.11.5.4.	Punch List Preparation	256
5.9.4.	Variance at Completion (VAC)	248	5.11.5.5.	Project Handing Over to Stakeholders (Internal or External)	258
5.10.	Project Audit	249	5.11.5.6.	Outputs of Project Closure	258
5.10.1.	Meaning of Project Audit	249	5.11.5.7.	Project Final Closure	259
5.10.2.	Objectives of Project Audit	249	5.12.	Team, Team Member and Project Manager Evaluations	259
5.10.3.	Levels of Project Audit	250	5.12.1.	Team Evaluation	261
5.10.4.	Project Audit Process	250	5.12.2.	Team-Member and Project Manager Evaluation	262
5.10.5.	Project Audit Report	251	5.12.2.1.	Components of a Project Manager's Performance Evaluation	262
5.11.	Project Closure	252	5.12.2.2.	Methods for Evaluating Team Member and Project Managers' Performance	263
5.11.1.	Meaning of Project Closure	252	5.13.	Exercise	267
5.11.2.	Need of Project Closure	252		Case Studies	283
5.11.3.	Approaches of Project Closure	252		Model Paper	
5.11.4.	Project Closure Acceptance Documentation (PCAD)	253			
5.11.5.	Steps for Project Closure/Financial Transaction Completion	254			
5.11.5.1.	Final Bills Submission	255			

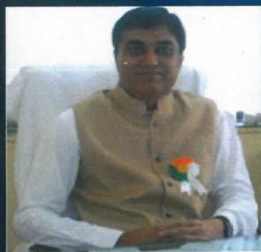


5) Physics for CSIR-NET/SET

Cover Page



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Vaishali Prakashan, Pune



First Page:

PHYSICS

For

CSIR-NET/ SET

Theory & MCQ's

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Content Page :

CONTENTS

<i>Preface</i>	<i>i</i>
<i>Scheme for examination</i>	<i>ii-iii</i>
<i>Procedure for examination</i>	<i>iv</i>
1. Basic mathematical methods	1-37
1.1. Theory	1-33
1.2. Multiple choice questions	34-35
1.3. Answerkey	36
1.4. Solution of MCQ's	36-37
2. Classical dynamics	38-89
2.1. Theory	38-80
2.2. Multiple choice questions	81-86
2.3. Answerkey	87
2.4. Solution of MCQ's	87-89
3. Electromagnetics	90-153
3.1. Theory	90-142
3.2. Multiple choice questions	143-150
3.3. Answerkey	151
3.4. Solution of MCQ's	151-153
4. Quantum physics	154-214
4.1. Theory	154-203
4.2. Multiple choice questions	204-210
4.3. Answerkey	211
4.4. Solution of MCQ's	211-214
5. Thermodynamics and statistical physics	215-279
5.1. Theory	215-268
5.2. Multiple choice questions	269-276
5.3. Answerkey	277
5.4. Solution of MCQ's	277-279
6. Experimental techniques	280-361
6.1. Theory	280-352
6.2. Multiple choice questions	353-359
6.3. Answerkey	360
6.4. Solution of MCQ's	360-361
7. Electronics	362-458
7.1. Theory	367-424
7.2. Multiple choice questions	424-448
7.3. Answerkey	449
7.4. Solution of MCQ's	450-458



8. Atomic molecular spectra	459-538
8.1. Theory	459-526
8.2. Multiple choice questions	527-534
8.3. Answerkey	535
8.4. Solution of MCQ's	535-538
9. Condensed matter physics	539-600
9.1. Theory	539-590
9.2. Multiple choice questions	591-596
9.3. Answerkey	597
9.4. Solution of MCQ's	597-600
10. Nuclear and molecular physics	601-653
10.1. Theory	601-640
10.2. Multiple choice questions	641-648
10.3. Answer key	649
10.4. Solution of MCQ's	649-653

