

**Govt. of Karnataka, Department of Technical Education**  
**Diploma in Information Science & Engineering**

**Sixth Semester**

**Subject: Software Testing**

**Contact Hrs / week: 4**

**Total hrs: 64**

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<b>SN</b>	<b>Chapter</b>	<b>Hours</b>	<b>Marks</b>
1	Introduction	2	5
2	Fundamentals of testing	10	25
3	Testing levels and types	10	25
4	Static testing techniques	10	25
5	Dynamic testing and test case design techniques	10	25
6	Managing the testing process	8	20
7	Software testing tools	4	10
8	Code of ethics for software professionals	2	5
	Seminars, Guest Lectures and other innovation interactions	5	
	Tests	3	
	Total	64	140+5 (Objective Type)

## Detailed Contents

1			<b>Introduction</b>
	1.1		Power of software
	1.2		Challenges in software projects
	1.3		Software Fiascos
		1.3.1	Ariane 5
		1.3.2	Patriot Missile
		1.3.3	Mars Pathfinder
		1.3.4	CT Scanner
		1.3.5	The great bank robbery
		1.3.6	FBI Virtual case file
	1.4		Reasons for software failure
	1.5		What is the solution?
		1.5.1	Software Quality Assurance
		1.5.2	Software Testing
		1.5.3	Code of Ethics
	1.6		Software Testing Professionals
		1.6.1	Skill sets for Testing Professionals
		1.6.2	Tasks handled by Testing Professionals
2			<b>Fundamentals of Testing</b>
	2.1		What is Testing?
		2.1.1	Testing versus Debugging
		2.1.2	Testing and Debugging
		2.1.3	Verification and Validation
		2.1.4	Root Cause Analysis
	2.2		Significance of Testing
		2.2.1	Cost of Quality
	2.3		Psychology of Testing
	2.4		Testing Choices
		2.4.1	In-house Testing
		2.4.2	Outsourcing
	2.5		Who does the testing?
		2.5.1	Developers as Testers
		2.5.2	Independent team Testing
		2.5.3	Buddy Testing
	2.6		Testing Phases
		2.6.1	V Model
		2.6.2	Testing and Life cycle models
	2.7		Testing the Systems
	2.8		Testing the Strategies
		2.8.1	Static Testing
		2.8.2	Dynamic Testing
		2.8.3	Why testing is difficult?
		2.8.4	Test Case
		2.8.5	Test Oracle

		2.8.6	Test Software
		2.8.7	Manual versus Automated Testing
		2.8.8	Testing Software of different Technologies
	2.9		Metrics in Testing Phase
	2.10		When Testing is Complete?
		2.10.1	Criteria for Completion of Testing
	2.11		Risk-based Testing
		2.11.1	Types of risks
	2.12		The Myths and Realities of Testing
3			<b>Testing Levels and Types</b>
	3.1		Testing Levels
		3.1.1	Unit/Component Testing
		3.1.2	Module Testing
		3.1.3	Integration Testing
		3.1.4	System Testing
		3.1.5	Acceptance Testing
	3.2		Testing Approaches
		3.2.1	Static Testing vs Dynamic Testing
		3.2.2	Positive Testing vs Negative Testing
		3.2.3	Top-down Testing vs Bottom-up Testing
		3.2.4	Functional Testing vs Structural Testing
		3.2.5	Mutation Testing
		3.2.6	Confirmation Testing
		3.2.7	Regression Testing
	3.3		Types of Testing
		3.3.1	Smoke Testing
		3.3.2	Black Box Testing
		3.3.3	White Box Testing
		3.3.4	Interface Testing
		3.3.5	Use Case Testing
		3.3.6	Gorilla Testing
		3.3.7	Alpha Testing
		3.3.8	Beta Testing
		3.3.9	Field Trail / Operational Testing
		3.3.10	Performance Testing / Load Testing
		3.3.11	Stress Testing
		3.3.12	Accessibility Testing
		3.3.13	Conformance Testing
		3.3.14	Internationalization Testing
		3.3.15	Security Testing
		3.3.16	Maintenance Testing
		3.3.17	Acceptance Testing
		3.3.18	Documentation Testing
4			<b>Static Testing Techniques</b>
	4.1		Static Testing
		4.1.1	Advantages of Static Testing

	4.2		Manual Reviews
		4.2.1	Formal Review Process
		4.2.2	Informal Reviews
		4.2.3	Walkthroughs
		4.2.4	Inspections
		4.2.5	Making Reviews Successful
		4.2.6	Checklists
	4.3		Formal Code Reviews
		4.3.1	Coding Guidelines
		4.3.2	Programming style
		4.3.3	C Coding Guidelines
		4.3.4	Code Optimization
		4.3.5	Java Coding Guidelines
	4.4		Static Analysis using Tools
		4.4.1	Tool for Readability Improvement / Indenting
		4.4.2	Portability Testing Tool
		4.4.3	Symbolic Execution
5			<b>Dynamic Testing and Test case design Techniques</b>
	5.1		Dynamic Testing
	5.2		Review work products
	5.3		Identify Test Objectives
	5.4		Test Specifications and Test Design
	5.5		Design Test Cases
		5.5.1	Black Box Test Case Design Techniques
		5.5.2	White Box Test Case Design Techniques
		5.5.3	Experience-based Test Case Design Techniques
		5.5.4	Case Study #1 : Test Cases for an IVR System
		5.5.5	Case Study #2 : Test Case for Finger Print Recognition System
	5.6		Document Test Cases
	5.7		Execute Test Cases
	5.8		Generate Incident Report / Anomaly Report
	5.9		Log the Defects
	5.10		Test Documentation Standards
	5.11		Formal Methods of Testing
6			<b>Managing the Testing Process</b>
	6.1		Management Commitment
		6.1.1	Organization Structure
	6.2		Testing Process management
		6.2.1	Options for Managers
		6.2.2	Testing Process Management Activities
	6.3		Planning, Budgeting and Scheduling the Testing Phase
		6.3.1	Test Plan
	6.4		Alignment of the Process to the Project

6.5		Team Formation
6.6		Infrastructure
	6.6.1	Testing Tools
6.7		Reviewing, Monitoring and Risk Management
	6.7.1	Risk Management
	6.7.2	Test Reports
6.8		Metrics
	6.8.1	Software Reliability
6.9		Defect tracking
	6.9.1	Classification of Defects
6.10		Configuration Management
6.11		Test Closure and Process Improvement
	6.11.1	Software testing Maturity Model (SW-TMM)
6.12		Information Security
<b>7</b>		<b>Software Testing Tools</b>
7.1		Need for Tools
7.2		Classification of Tools
	7.2.1	Functional / Regression Testing Tools
	7.2.2	Performance / Load Testing Tools
	7.2.3	Testing Process Management Tools
7.3		Benefits of Tools
7.4		Risks Associated with the Tools
7.5		Does your Organization Need Tools?
7.6		Selecting Tools
7.7		Introducing the tools in the Testing Process
<b>8</b>		<b>Code of Ethics for Software Professionals</b>
8.1		Human Ethics
8.2		Professional Ethics
8.3		Ethical Issues in Software Engineering
8.4		Code of Ethics and Professional Practice
	8.4.1	Software Engineering Code of Ethics and Professional Practice
8.5		Ethical issues: Right versus Wrong

**Text book:**

**ISTQB Certification Study Guide**, Dr. K.V.K.K. Prasad, Wiley-Dreamtech Press, ISBN: 9788177227116

**Reference Books:**

1. Software Testing Principles and Practices, Srinivasn desikan, Goplaswamy Ramesh, Pearson, ISBN: 9788177581218
2. Software Testing Tools, Dr. K.V.K.K. Prasad, Wiley- Dreamtech Press, ISBN 10: 8177225324

ISBN 13: 9788177225327

3. Software Testing Concepts and Tools, Nageshwara Rao Pusuluri, DreamTech, ISBN 10: 8177227122 ISBN 13: 9788177227123

## General Objectives:

After the completion of the study of this subject students should be able to

1. Importance of developing quality software and how software testing helps in achieving this goal.
2. Foundations of software testing, important concepts and the testing process
3. Understand Testing levels and testing methods
4. Study Static testing – how to carry out testing without executing the code
5. Learn about dynamic testing and Test case design techniques. How to do the testing after executing the program and how to design test cases with examples
6. Know the details of Managing the testing Process
7. Know the need for testing tools and how to select a tool.

## Specific Objectives

<b>1</b>	<b>Introduction</b>
	Importance of software
	The challenges in Software development
	The software fiascos
	Reasons for software failures
	How to avoid software failures?
	Testing professional's role
	Skills required for testing professionals
<b>2</b>	<b>Fundamentals of testing</b>
	What is testing?
	Psychology of testing
	When to test and where to test?
	How to test?
	Test case and test oracles
	Metrics in testing phases
	Criteria for completion of testing
	Myths and realities of testing
<b>3</b>	<b>Testing Levels and Types</b>
	Levels of Testing
	Testing approaches
	Types of testing

4	<b>Static Testing Techniques</b>
	What is static testing?
	Advantages of static testing
	Difference between static testing and dynamic testing
	Review mechanisms and formal review process
	Checklists
	Static code review and coding guidelines for C and Java
5	<b>Dynamic Testing and Test case design Techniques</b>
	Dynamic testing methodology
	Test specifications and test design
	Techniques for test case design
	Test case documentation
	Test case execution and incident reporting
	Defect logs
6	<b>Managing the Testing Process</b>
	Testing process management activities
	Project planning, budgeting and scheduling
	Testing team formation
	Reviews and monitoring of projects
	Risk management
	Metrics in testing phase
	Defect racking
	Configuration management
	Testing process improvement
	Testing standards and information security testing
7	<b>Software Testing Tools</b>
	Appreciate the need for automated testing tools
	Understand the requirements of testing tools
	Get to know the various categories of testing tools and their functionality
	Learn how to select a testing tool
	Learn the process of introducing the tools in an organization
8	<b>Code of Ethics for Software Professionals</b>
	What is Professional ethics?
	Ethical issues for software professionals
	Code of ethics and professional practices for software professionals

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Max. Marks: 100

Max. Time: 3 Hours

Model Question Paper

Note: 1. Section –I is compulsory.

2. Answer any TWO questions from each remaining Sections.

**Section - I**

- |      |   |       |
|------|---|-------|
| 1 a. | Fill in the blanks                                    | 5x1=5 |
| i.   |   |       |
| ii.  |   |       |
| iii. |   |       |
| iv.  |   |       |
| v.   |   |       |
| b.   | Write a short note on challenges in software projects | 5     |

**Section – II**

- |    |   |    |
|----|---|----|
| 2. | a).. What is the significance of testing? Explain                               | 5  |
|    | b).Explain the strategy of developers as a Tester                               | 5  |
|    | c).Write a note on V model  | 5  |
| 3  | a).Differentiate static v/s Dynamic Testing                                     | 5  |
|    | b). What is a Test case? Explain the concept of Testing Process using test case | 5  |
|    | c). What is the significance of Mutation Testing ?                              | 5  |
| 4  | a). Describe the different levels of Testing                                    | 10 |
|    | b). Compare Top down v/s Bottom up Testing                                      | 5  |

**Section-III**

- |   |  |    |
|---|--|----|
| 5 | a). Write a note on Beta Testing                       | 5  |
|   | b). Explain The different Check list in Static Testing | 10 |
| 6 | a). Write a note on formal review process              | 5  |
|   | b). Explain the concept of Code optimization           | 5  |



- c). What are the Guidelines for Programming style? 5
- 7. a). Write a note on Boundary value Analysis 5
- b). Compare Structural Testing at Module level v/s System level 5

**Section -IV**

- 8. a).Write a note on Cost effect Analysis 5
- b). Explain Equivalence Partitioning 5
- c) Write a note on Formal method of Testing 5
- 9. a). Classify the testing tools 5
- b). Writer a note on Software Reliability 5
- c). Explain Configuration management 5
- 10. a).Explain the different classes of Testing Tools 10
- b). Write a note on Ethical issues in Software engineering 5