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Facilitator Guide

Test Engineer

Sector
IT-ITeS

Sub-Sector
IT Services

Occupation
Testing and Quality Assurance

Reference ID: SSC/Q7001, Version 3.0
NSQF Level:4

Published by

IT – ITeS Sector Skills Council NASSCOM
Sector Skill Council Contact Details:
Address: Plot No. – 7, 8, 9 & 10 Sector – 126, Noida, Uttar Pradesh – 201303
New Delhi – 110049
Website: www.sscnasscom.com
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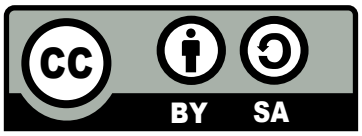
Second Edition, August, 2024



Disclamer

> Skilling is building a better India. If we have to move India towards development then Skill Development should be our mission.

Shri Narendra Modi
Prime Minister of India

Acknowledgement

This Facilitator handbook meant for Test Engineer is a sincere attempt to ensure the availability of all the relevant information to the existing and prospective job holders in this job role. We have compiled the content with inputs from the relevant Subject Matter Experts (SMEs) and industry members to ensure it is the latest and authentic. We express our sincere gratitude to all the SMEs and industry members who have made invaluable contributions to the completion of this Facilitator handbook. We would also like to thank all the experts and organizations who have helped us by reviewing the content and providing their feedback to improve its quality.

This handbook will help deliver skill-based training in the field of Test Engineer. We hope that it will benefit all the stakeholders, such as participants, trainers, and evaluators. We have made all efforts to ensure the publication meets the current quality standards for the successful delivery of QP/NOS-based training programs. We welcome and appreciate any suggestions for future improvements to this handbook.

About this Guide

This Facilitator Guide has been designed to serve as a guide for trainers who aim to provide the required knowledge and skills to the trainees of various activities in the role of a Test Engineer. Its content has been aligned with the latest Qualification Pack (QP) prepared for the job role. The participants will be equipped with the following for working efficiently in the job role:

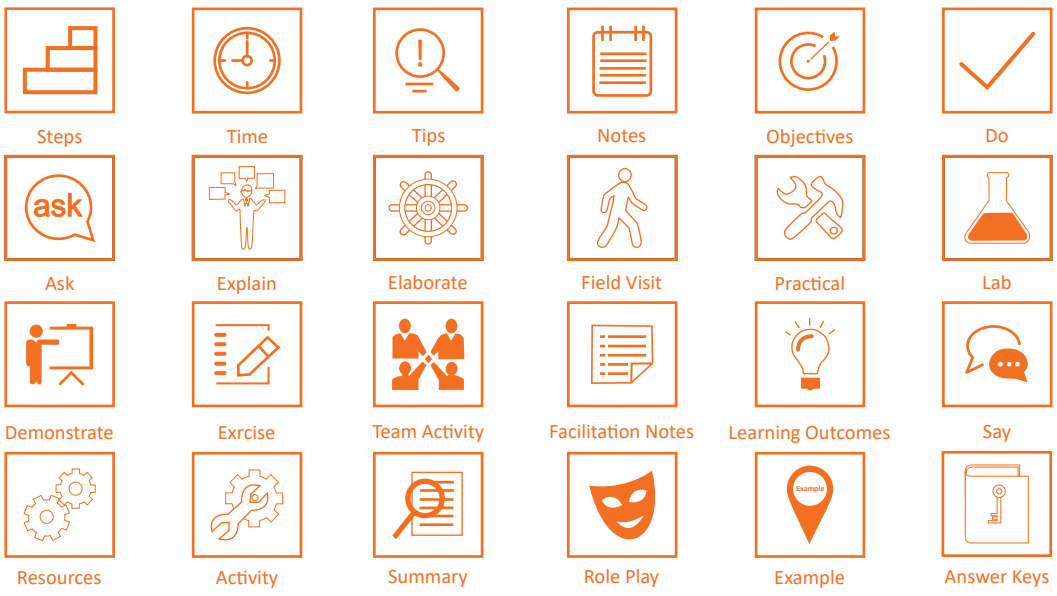
- Knowledge and Understanding: The relevant operational knowledge and understanding to perform the required tasks.
- Performance Criteria: The essential skills through hands-on training to perform the required operations to the applicable quality standards.
- Professional Skills: The Ability to make appropriate operational decisions about the field of work.

The Facilitator handbook details the relevant activities to be carried out by a Test Engineer. After studying this handbook, job holders will be adequately skilled in carrying out their duties according to the applicable quality standards. The Facilitator handbook is aligned with the following National Occupational Standards (NOS) detailed in the latest and approved version of Test Engineer QP:

- SSC/N1301: Design tests for software products/applications/modules
- SSC/N1302: Carry out automated tests on software products/applications/modules
- SSC/N1303: Carry out manual tests on software products/applications/modules
- SSC/N9014: Maintain an inclusive, environmentally sustainable workplace
- Employability Skill for 60 Hours

The Facilitator handbook has been divided into an appropriate number of units and sub-units based on the content of the relevant QP. We hope it will facilitate easy and structured learning for the participants, allowing them to obtain enhanced knowledge and skills.

About this Guide



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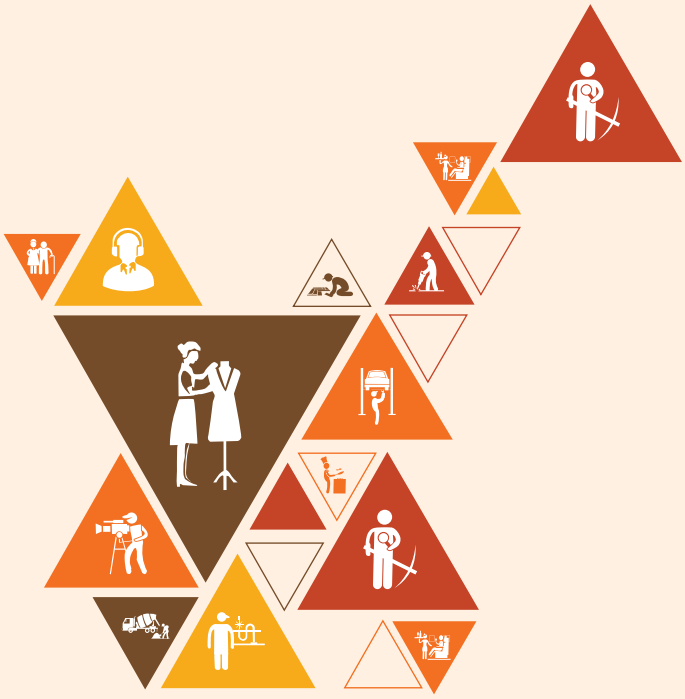
1.Introduction

Unit 1.1 -Overview of the Indian IT-ITeS Industry

Unit 1.2: Career Opportunities for Test Engineers and Job Responsibilities



Key Learning Outcome

By the end of this module, participants will be able to:

1. Comprehend various delivery models used in the IT-Services industry.

Unit 1.1 Overview of the Indian IT-ITeS Industry

Unit Objectives

By the end of this unit, participants will be able to:

1. Explain the relevance of the IT-ITeS sector.
2. Outline the future of the IT-ITeS industry.
2. Conduct an Internet search to collect data, evidence, and articles pertaining to IT-ITeS/support services.

Resources to be Used

Participant Handbook, Pen, Writing Pad, Whiteboard, Flipchart, Markers, Laptop, Overhead Projector, Laser Pointer, equipment and Tools (as recommended for the job role)

Note

This is the first session of the program, which will provide you an Introduction to the IT-ITES/BPM as an Industry, its composition and structure.

Say

Good day and a very warm welcome to this training program. Before we begin this session, let us have a round of interaction.

Ask

Ask the participants the following questions:

- Which industry in India has shown remarkable growth and has made it a leader on the world map?

Write down the participants' answers on whiteboard/flipchart. Take appropriate cues from the answers and start teaching the lesson.

Elaborate

In this session, we will discuss the following points:

- Information Technology, Information Technology Enabled Services and Business Process Management (BPM) and its contribution to the Indian economy.
- IT-BPM Industry and its structural component.

Ask

Let us now participate in an activity to understand the concept better.

Activity-1

- In this activity, you invite a Senior Associate from a renowned company IT firm to give an overlook on the IT Industry, its Size and how the IT-ITES/BPM services are growing exponentially.
- You will conduct a group discussion session.
- If the students have any queries or they have any confusions regarding this chapter, they will raise their hands
- On availing permission from you, the students can ask questions.
- In addition to this, the Senior IT associate will also share important pointers on areas like:
    - The importance of IT-ITES/BPM services in Indian economy.
    - India's position in providing related services globally.
    - Different components of this industry and its significance.
    - Information about India's IT & BPM industry diversification across verticals, such as Banking, Financial Services, and Insurance (BFSI) sector, telecom and retail.
- After the doubts are cleared, the senior associate or you may add a few points in relation to meeting the requirements.
- In addition to those, you can also include few extra points that you may find reliable to the topic and beneficial for the students.

Say

Did you enjoy this activity? Can you see how much information you had previously and the information you have now? Let us summarize the points discussed.

Do

- Jot down the crucial points on the whiteboard as the students speak.
- Share your inputs and insight, to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Notes for Facilitation

- Ask the participants if they have any questions.
- Encourage other participants to answer it and encourage peer learning in the class.
- Answer all the doubts in case any to the participants.
- Ask them to answer the questions given in the participant manual.
- Ensure that all the participants answer every question.

Unit 1.2 Career Opportunities for Test Engineers and Job Responsibilities

Unit Objectives

By the end of this unit, participants will be able to:

1. Discuss the role and responsibilities of a Test Engineer.
2. Describe the qualities a Test Engineer should possess.
3. Determine the career path for a Test Engineer.
4. Categorize key applications for Testing and Quality Assurance services.

Resources to be Used

Participant Handbook, Pen, Writing Pad, Whiteboard, Flipchart, Markers, Laptop, Overhead Projector, Laser Pointer, equipment and Tools (as recommended for the job role)

Note

This is the Second session of the program, which will provide you an understanding of the role and responsibilities of a Test Engineer its attributes & skills important to succeed in it as well as the career path.

Say

Good day and a very warm welcome to this training program. Before we begin this session, let us have a round of interaction.

Ask

Ask the participants the following questions

- What are the key skills and attributes required to succeed in the IT industry?
- What are the career options or the associated opportunities post completing Data Entry operator course?

Write down the participants' answers on whiteboard/flipchart. Take appropriate cues from the answers and start teaching the lesson.

Elaborate

In this session, we will discuss the following points:

- Introduction to software testing
- Roles and responsibilities of a Test Engineer
- Knowledge and Skills Required as a Test Engineer
- Career Map for a Test Engineer
- Applications for Testing and Quality Assurance services
- Distinctions between Software Quality Assurance and software testingSay

Say

Let us now participate in an activity to understand the concept better.

Activity

- In this activity, you invite a Test Engineer from a renowned company to give an overlook on the roles and responsibilities, desired attributes, and the career growth into this field.
- If the students have any queries or they have any confusions regarding this chapter, they will raise their hands
- On availing permission from you, the students can ask questions.
- In addition to this, the Test Engineer will also share important pointers on areas like:
    - Job responsibilities of a Test Engineer and its associated operations and day to day activities.
    - Attributes and skill required by a Test Engineer to succeed in this career.
    - Opportunities and career path for a Test Engineer.
    - Workplace challenges and benefits.
- After the doubts are cleared, the Test Engineer or you may add a few points in relation to meeting the requirements.
- In addition to those, you can also include few extra points that you may find reliable to the topic and beneficial for the students.

Say

Did you enjoy this activity? Can you see how the much information you had previously and the information you have now? Let us summarize the points discussed.

Do

- Jot down the crucial points on the whiteboard as the students speak.
- Share your inputs and insight, to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Notes for Facilitation

- Ask the participants if they have any questions.
- Encourage other participants to answer it and encourage peer learning in the class.
- Answer all the doubts in case any to the participants.
- Ask them to answer the questions given in the participant manual.
- Ensure that all the participants answer every question.

Answer Keys

A. Fill in the Blanks

1. The IT industry sees the past 3 – 5 years as its "_____".

   (b) Golden Period

2. The aggregated revenues from the IT sector in 2017 were estimated to be around

   (a) US$ 160 billion

3. Any unsolved problem needs to be escalated properly to the appropriate

   (a) Software developer

4. The employment growth in the IT industry is forecasted to increase by:

   (b) 7-8%

5. Software testing is a process to _____ and _____ a `` discrepancy, a flaw, or an error.

   Highlight, recognize

6. Indicate whether each of the following claims is true or false:

   (a) Software testing reveals the weak points in a program or product.

   True

   (b) Myers made the observation that testing is the process of running a program with the aim of identifying errors.

   True

7. The primary objective of testing is to confirm the dependability of software systems by utilising them repeatedly in tightly regulated conditions. Justify.

   Any software product's or application's quality has a significant impact on its success. Today, testing is thought to be the best way to guarantee the quality of any product. Quality testing can significantly lessen the cascading effects of project rework, which have the potential to increase budgets and push back the schedule. Businesses are under pressure to create complex applications in less time, which increases the need for testing. Testing is a type of investigation used to judge how well a software service or product works. Additionally, it is the process of determining whether a product is correct and how well it functions.

   A method of comparison is used in the testing process to identify product flaws. The behaviour and condition of a given product are compared against a set of standards, which may include specifications, contracts, and previous iterations of the product. Software testing is a gradual and iterative process to find inconsistencies, flaws, or errors. According to Myers, "Testing is the process of running a program with the intention of finding errors."

   Software testing, according to IEEE 83a, is the process of manually or automatically exercising or evaluating a system or system component to ensure that it complies with predetermined requirements.

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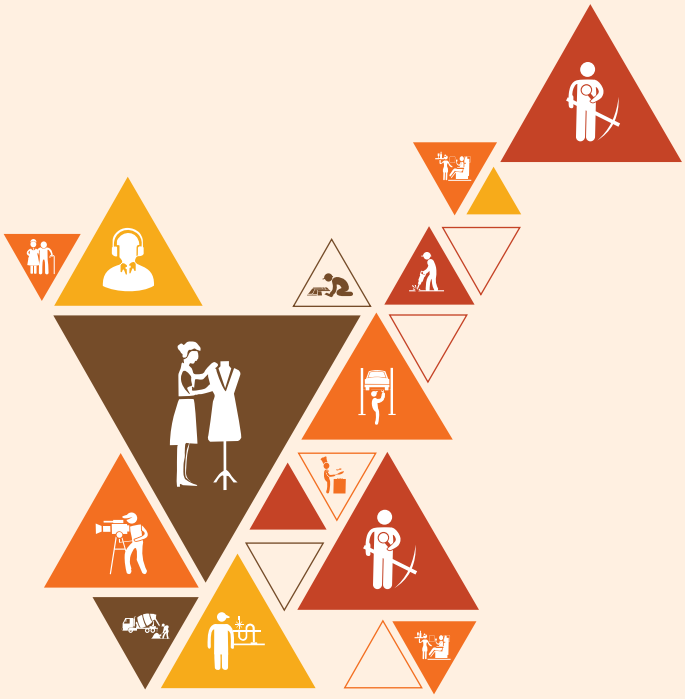
2. Concept and Principle of Quality Testing

Unit 2.1 - Concept and Principle of Quality Testing



(SSC/N1301)

Key Learning Outcome

By the end of this module, participants will be able to:

1. Discuss the objectives and scope of Quality Assurance work being undertaken.
2. Discuss the key differences of quality testing vs quality control based on types of data.

Unit 2.1 Concept and Principle of Quality Testing

Unit Objectives

By the end of this unit, participants will be able to:

1. Discuss various aspects of quality assurance pertaining to controls, job management, and adequate process, performance, and integrity criteria.
2. Discuss the key requirements for quality testing, including policies, standards, processes, procedures, and version control.
3. Discuss the principles of subjective and objective data gathered from various sources.
4. Demonstrate how to categorize subjective and objective data based on rejection principle.
5. Perform quality control through objective and subjective data analysis.
6. Analyse the impact of soft elements, such as personnel integrity, confidence, organizational culture, motivation, team spirit and quality relationships on quality process

Resources to be Used

Participant Handbook, Pen, Writing Pad, Whiteboard, Flipchart, Markers, Laptop, Overhead Projector, Laser Pointer, equipment, and Tools (as recommended for the job role)

Note

This is the third session of the program, which will provide you an understanding of Concept and Principle of Quality Testing.

Say

Good day and a very warm welcome to this training program. Before we begin this session, let us have a round of interaction.

Ask

Ask the participants the following questions:

- What is QA Testing?

Write down the participants' answers on whiteboard/flipchart. Take appropriate cues from the answers and start teaching the lesson.

Elaborate

In this session, we will discuss the following points:

- What is QA testing?
- History of Quality Assurance
- What is version control? How it is important in Quality Assurance?
- Benefits of Version Control
- Test Entry & Exit Criteria
- Data collection methods
- Understanding Objective and Subjective Analysis
- Stress Testing
- Software Testing Principles
- Various Aspects of Quality Assurance
- Principles of Quality Assurance
- Quality Assurance Approaches
- Quality Assurance in Practice Across Industries
- Software Tester Skill Set
- Coding Skill for a Test Engineer

Say

Let us now participate in an activity to understand the concept better.

Activity

- You will divide the class into 5 teams.
- Each team will have an even number of students.
- Ask students to present the one of the following version controls.

GitHub

GitLab

Perforce

Beanstalk

AWS CodeCommit

Say

Did you find the activity fruitful? I hope all of you are aware of the Concept and Principle of Quality Testing.

Do

- Jot down the crucial points on the whiteboard as the students speak.
- Share your inputs and insight, to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Notes for Facilitation

- Ask the participants if they have any questions.
- Encourage other participants to answer it and encourage peer learning in the class.
- Answer all the doubts in case any to the participants.
- Ask them to answer the questions given in the participant manual.
- Ensure that all the participants answer every question.

Answer Keys

1. **Multiple Choice Questions:**

   i. What is pesticide paradox?

   b. If the same tests are repeated over and over again , eventually the same set of test cases will no longer find any new bugs

   ii. Which of the following testing is also known called by white-box testing?

   b. Structural testing

   iii. In Which of the following Test Document is used to define the Exit Criteria of Testing?

   c. Test Plan

   iv. ---------- are those software errors that occurred during the coding phase?

   d. Bugs

2. **List out the seven essential principles of software testing.**

The seven principles are:

1. Testing shows the presence of defects
2. Exhaustive Testing is not possible
3. Early Testing
4. Defect clustering
5. Pesticide paradox
6. Testing is context-dependent
7. Absence of errors fallacy

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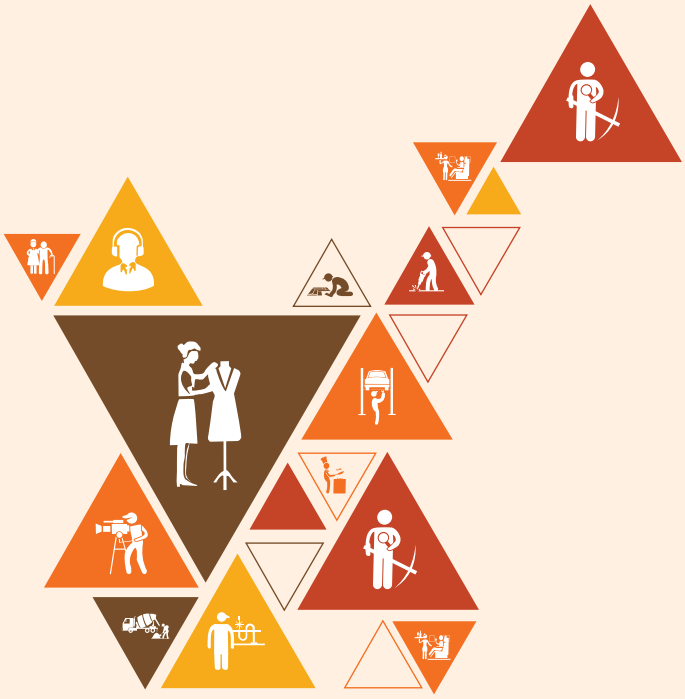
3. Design Tests for Software Products/Applications/ Modules

Unit 3.1: Design Tests for Software Products/Applications/Modules



(SSC/N1301)

Key Learning Outcome

By the end of this module, participants will be able to:

1. Demonstrate how to identify issues with the software requirements for testing using codes.
2. Examine the process to modify test cases relevant to the requirements.

Unit 3.1 Design Tests for Software Products/Applications/ Modules

Unit Objectives

By the end of this unit, participants will be able to:

1. Discuss the concept of source code and its use in application development.
2. Discuss the process of modification of the test plan, test cases and/or automated scripts.
3. Discuss the hierarchy of escalation in designing team for technical issues.
4. Discuss the process of Identifying issues with the requirements for testing in consultation with relevant stakeholders.
5. Demonstrate writing source code, reviewing code, etc. for software designing.
6. Modify test cases relevant to the requirements for automation.
7. Examine the steps to develop a test methodology to cover all the requirements.
8. Apply the design process for automated scripts relevant to the requirements.
9. Demonstrate how to develop source codes for various applications.

Resources to be Used

Participant Handbook, Pen, Writing Pad, Whiteboard, Flipchart, Markers, Laptop, Overhead Projector, Laser Pointer, equipment, and Tools (as recommended for the job role)

Note

This is the forth session of the program, which will provide you an understanding of designing Tests for Software Products/Applications/Modules.

Say

Good day and a very warm welcome to this training program. Before we begin this session, let us have a round of interaction.

Ask

Ask the participants the following questions:

Ÿ What do you understand by test cases, scripts and tools?

Write down the participants' answers on whiteboard/flipchart. Take appropriate cues from the answers and start teaching the lesson.

Elaborate

In this session, we will discuss the following points:

- Software Testing
- Test Scenario
- Designing Methods to test high level scenarios
- Test Scenario Template
- What is test Case?
- Why we write the test cases?
- Test Case Template
- Test Case Design Techniques
- A Test Script
- Modify a test script (Automted)
- Test Policy
- Test Strategy
- Testing Guideline
- Design Test Data
- Test Plan
- Test Planning
- Writing a Test Plan

Say

Let us now participate in an activity to understand the concept better.

Activity

- You will divide the class into groups of 4.
- The various Board Games will be played within them. Arrange the board games and make them play.
- Board games like Sequence, Chess, Ludo, Puzzles, Marbles, etc.
- This will help them in understanding the use of planning in programming through the board game.
- Alternatively, you can divide the class divided in 4 groups and make them compete for all board games you buy.

This exercise would help them in understanding planning concept.

Say

Did you find the activity fruitful? I hope all of you are aware of the test scenario, test case and test planning.

Do

- Jot down the crucial points on the whiteboard as the students speak.
- Share your inputs and insight, to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Notes for Facilitation

- Ask the participants if they have any questions.
- Encourage other participants to answer it and encourage peer learning in the class.
- Answer all the doubts in case any to the participants.
- Ask them to answer the questions given in the participant manual.
- Ensure that all the participants answer every question.

Answer Keys

1. Multiple Choice Questions:

1. Which of the following is also known as white-box testing?

   b. Structural testing

2. What are the different levels of Testing?

   d. All of the above

3. Which of the following is not included in the Test Plan?

   c. Schedule

4. Which of the following Test Document is used to define the Exit Criteria of Testing?

   c. Test Plan

5. The test cases are signed off by whom?

   c. Business Analyst

6. What are the inputs for Test Planning

   c. Both (a) and (b)

7. _____ testing is used to check the code?

   d. White-box testing

2. Answer the Following Question in Brief:

A. What is the purpose of exit criteria?

Exit criteria are requirements that must be satisfied before testing is complete. For instance, the test case should be completed once all goals have been achieved and all bugs have been fixed.

B. What is test Case?

A test case is a set of situations under which a tester decides whether or not a software programme meets the customer's specifications.

C. Define Test script.

Performing a set of instructions on a system under test to make sure it performs as expected is known as running a test script. For manual testing, they can be written in a human language, while automated testing requires them to be written in a scripting or programming language.

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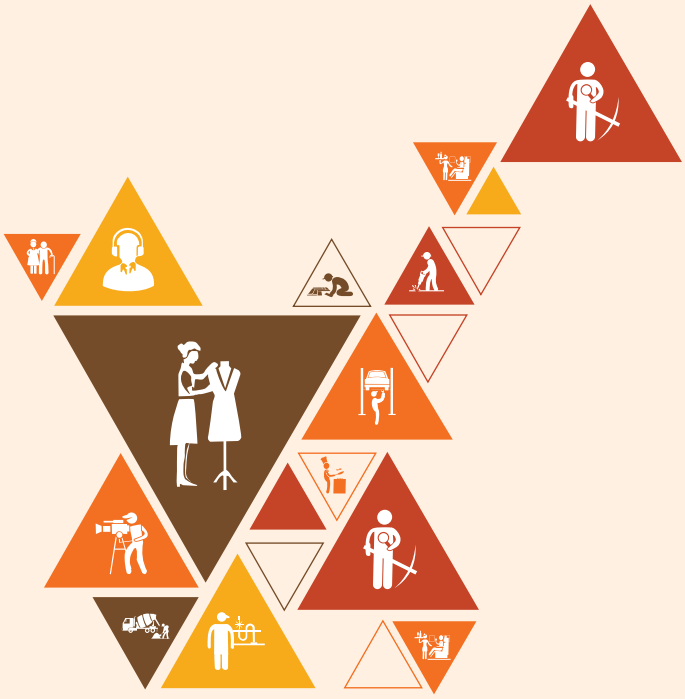
4.Carry out Automated Tests on Software Products / Applications/Modules

Unit 4.1 – Carry out Automated Tests on Software Products/ Applications/Modules



(SSC/N1302)

Key Learning Outcome

By the end of this module, participants will be able to:

1. Demonstrate the knowledge of identifying the nature of testing to be carried out and the test management tool to be used.
2. Examine the process of functional, usability, compatibility, performance, and regression testing on applications.

Unit 4.1 Carry out Automated Tests on Software Products/ Applications/Modules

Unit Objectives

By the end of this unit, participants will be able to:

- Ÿ Discuss the process for Identifying latest versions of the test cases and automated scripts.
- Ÿ Discuss how to identify the correct versions of application and data sources required for testing.
- Ÿ Describe key elements of functionality, usability, and regression method.
- Ÿ Discuss how programming languages like Java, SQL, etc. assists in development of software modules.
- Ÿ Interpret instructions to carry out automated test scripts.
- Ÿ Demonstrate the process of functional, usability, compatibility, performance, and regression testing.
- Ÿ Apply programming language, like C, C++, SQL, Java, etc. to develop software modules.

Resources to be Used

Participant Handbook, Pen, Writing Pad, Whiteboard, Flipchart, Markers, Laptop, Overhead Projector, Laser Pointer, equipment, and Tools (as recommended for the job role)

Note

This is the fifth session of the program, which will provide you an understanding of contribution to Quality Assurance of Projects.

Say

Good day and a very warm welcome to this training program. Before we begin this session, let us have a round of interaction.

Ask

Ask the participants the following questions:

- Explain what test management tool are.

Write down the participants' answers on whiteboard/flipchart. Take appropriate cues from the answers and start teaching the lesson.

Elaborate

In this session, we will discuss the following points:

- What are test management tools and why do you need them?
- Choosing the Right Test Management Tool
- Need For Test Management Tool
- Advantages of Test Management Tool
- Management tools that are widely used
- Testing life cycle
- Generic Software Testing Terms
- Types of testing
- Manual vs. Automated testing
- Latest versions of software testing tools for test cases and automated scripts
- Method of logging: Test progress, Results, Defects & Uses of Agreed test management tool.
- Defects Management
- Methods for conducting a root cause analysis of software flaws
- Programming Language and its Uses

Say

Let us now participate in an activity to understand the concept better.

Activity

In this activity, the trainer asks to pair up amongst themselves.

- Each pair will be given with a Topic on which they have to give presentation from the below listed topics from Management tools.
    - o SpiraTest by Inflectra/TestRail/XRay – Test Management For Jira/Zephyr Scale/Zephyr Squad/PractiTest/TestLink/QTest/QMetry Test Management/Kualitee
- Trainer ask to choose the issue from the list below or open to choose as per their wish:
- Encourage student for active participation. After completion the task they will submit it to the trainer.

Trainer will appreciate the best filled logging sample and accolade for the best efforts.

Say

Did you find the activity fruitful? I hope all of you are aware of the test management tools and their uses.

Do

- Jot down the crucial points on the whiteboard as the students speak.
- Share your inputs and insight, to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Notes for Facilitation

- Ask the participants if they have any questions.
- Encourage other participants to answer it and encourage peer learning in the class.
- Answer all the doubts in case any to the participants.
- Ask them to answer the questions given in the participant manual.
- Ensure that all the participants answer every question.

Answer Keys

A. Answer the following questions:

1. List out key programming language and its uses.

    1. The key programming language and its uses are:

- **Python**

Without a doubt, the traditional manual testing methods used by organizations are being replaced by automation testing in the modern era. All of this is taking place because automation testing, when compared to manual testing, is more labor-effective, efficient, and scalable while also providing better performance and incurring lower operational costs. Automation testing primarily focuses on the process of developing test cases using a variety of tools and software and then executing those test cases while taking into account pre-defined actions.

- **Java Script**

JavaScript excels at redefining customer expectations through front-end development and places a high emphasis on test automation. Numerous web applications, including Instagram, Accenture, Slack, and Airbnb, inexorably support libraries created with JavaScript automation, including instauto, ATOM (Accenture Test Automation Open source Modular Libraries), Botkit, and Mavericks. Unavoidably, many web applications, including Slack, Instagram, Accenture, and Airbnb, offer JavaScript automation libraries, including instauto, ATOM (Accenture Test Automation Open source Modular Libraries), Mavericks, and Botkit.

- **C#**

According to a Stack Over flow survey, more than 60% of users endorse the C# programming language for meeting the development and automation needs of a commercial enterprise.

C# is steadily booming thanks to its automation testing frameworks, which were developed by Microsoft's skilled developers. Microsoft's seasoned developers created C#, which is steadily booming thanks to its automation testing tools.

- **Ruby**

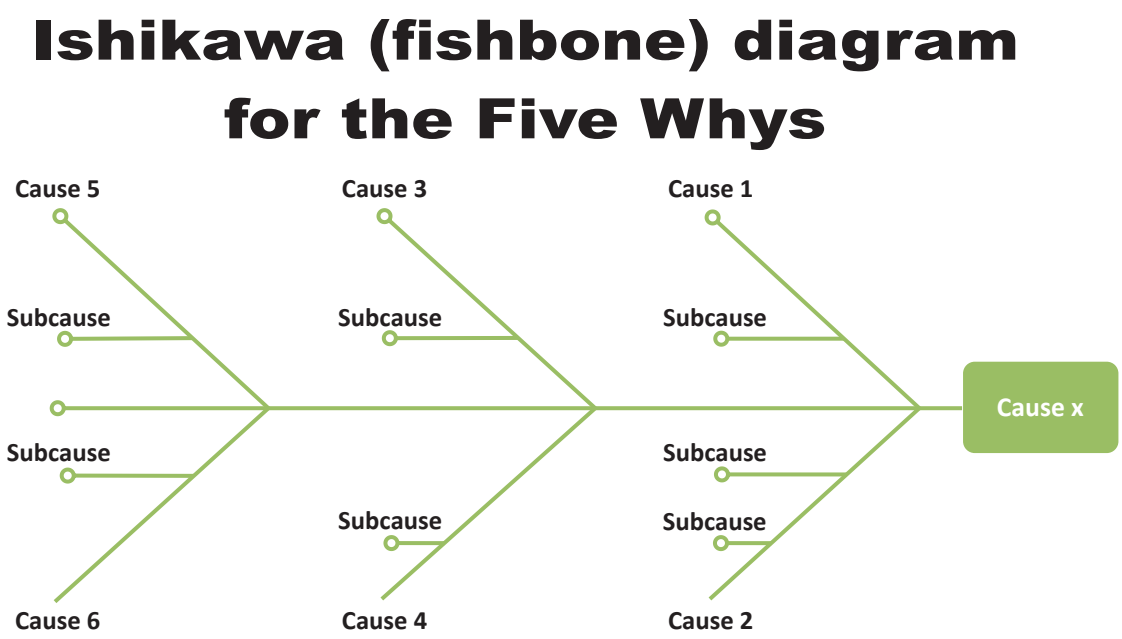
Another programming language supported by the MVC Architecture is Ruby, which is growing in popularity in business sectors that need automation. It's possible that those topics will have to do with risk management, compliance, logistics, or hiring. A further intriguing aspect of Ruby is its potential to facilitate Selenium Automation Testers' work environments, enabling them to implement cross-border testing and its related processes with fewer lines of code.

- **Java**

Larger firms are choosing Java as their second most essential technology in order to increase job prospects in the field of automation testing. Thanks to the general-purpose Java code(s) held by Oracle Corporation, more than 2 billion devices can synchronise a variety of automation benefits enabled by the “Write Once, Run Anywhere” premise of this multipurpose language.

2. Explain below tools to approach root cause analysis tasks

a) fishbone diagrams



b) Five Whys

5 Whys analysis. People might delve further into a problem by asking "why," which opens up new possibilities. The response to each why serves as the foundation for the following inquiry. The process is comparable to a toddler asking a series of why questions; each time an adult responds, the youngster builds on that response to ask a new question. The method makes use of brainstorming.

3. Latest versions of software testing tools for test cases and automated scripts

Tool	Description
Selenium	Selenium is a testing tool, used to automate tests which are performed on web browser. It can be executed in multiple browsers. It is compatible to multiple programming languages.
Cucumber	Cucumber is an open source tool which supports Behavior Driven Development (BDD). It can be defined as testing framework, which uses plain English (Gherkin Language). It is multiple platform compatible, for example- Ruby On Rails, Selenium, PicoContainer, etc.

Ranorex	Ranorex is an all in one tool for mobile, web and desktop testing. It provides an easy click and go interface for beginners and an powerful IDE for automation experts. It is an licensed software.
Testsigma	Testsigma is one of the best automation tools available in market. It is best suited for DevOps and Agile market. It is an AI-driven tool which automates complex tests using simple English. No programming. CI/CD support.
LamdaTest	LamdaTest is one of the best cross browser test automation tool. Run Selenium automation tests on a secure, scalable and reliable cloud based Selenium Grid.

4. Explain Need For Test Management Tool.

Test management tools are required for Managing and Tracking Test Activities, has test assigning feature, traceability and to eliminate complexity and duplication.

B. Choose the correct answer:

I- Which test tool is used for managing scheduling,tracking and analysis

a. test management tool

II- What are the signs that state that a software project is in trouble

d. all of the above

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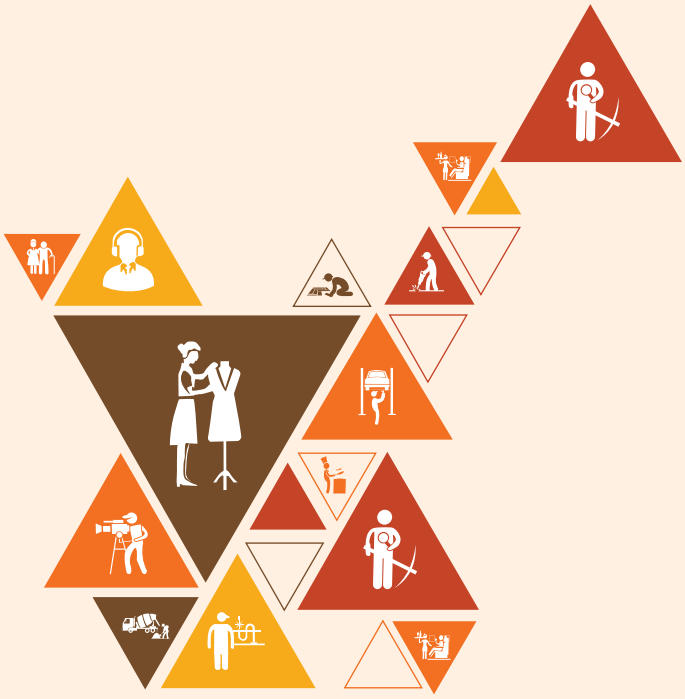
5. Contribute to Quality Assurance of Projects

Unit 5.1 Contribute to Quality Assurance of Projects



Key Learning Outcome

By the end of this module, participants will be able to:

1. Demonstrate the ability to identify the checkpoints that a project should comply with during each phase of the project.
2. Prepare reports on checks carried out, data and information collected, and risks identified.

Unit 5.1 Contribute to Quality Assurance of Projects

Unit Objectives

By the end of this unit, participants will be able to:

1. Discuss the principles of effective quality testing on data.
2. Collate required data/information against key indicators using standard templates and tools.
3. Discuss the hierarchy of approval process in quality team.
4. Discuss with experts, any issues related to project data, where necessary.
5. Demonstrate regressive/progressive analysis of data to accurately identify risks to projects.
6. Apply the review process of the test plan, test cases and/or automated scripts.
7. Examine the impact of failure test or stress test of data on quality.
8. Demonstrate the use of chart/bar diagrams to project milestones to management reviewers, internal auditors, and technical reviewers.

Resources to be Used

Participant Handbook, Pen, Writing Pad, Whiteboard, Flipchart, Markers, Laptop, Overhead Projector, Laser Pointer, equipment, and Tools (as recommended for the job role)

Note

This is the sixth session of the program, which will provide you an understanding of contribution to Quality Assurance of Projects.

Say

Good day and a very warm welcome to this training program. Before we begin this session, let us have a round of interaction.

Ask

Ask the participants the following questions:

- Discuss the scope of quality assurance for a test engineer.

Write down the participants' answers on whiteboard/flipchart. Take appropriate cues from the answers and start teaching the lesson.

Elaborate

In this session, we will discuss the following points:

- Scope of Quality Assurance in Software Testing
- Project Milestone Review Meeting
- Guidelines for Milestone Review Meeting
- QA Process and Development Steps
- Conducting Technical Expert Review
- RCA (Root Cause Analysis)
- Practicing Effective Documentation

Say

Let us now participate in an activity to understand the concept better.

Activity

- In this activity, the trainer will divide the class into 10 equal pairs
- .All the groups will need to brief the class on Quality Assurance Process. Each pair will be given with below topic in which they need to tell the benefits as well.

  Team 1: Review of requirements

  Team 2: Test planning/writing test cases

  Team 3: Unit testing

  Team 4: Integration testing

Team 5: System testing

Team 6: Performance testing

Team 7: Security testing

Team 8: Cross-browser testing / cross-platform testing

Team 9: Updating test cases

Team 10: Regression testing

- The group completing the given task in the best way will be declared as the winner and will be appreciated in the class with accolades.

Say

Did you find the activity fruitful? I hope all of you are aware of the scope of quality assurance for a test engineer.

Do

- Jot down the crucial points on the whiteboard as the students speak.
- Share your inputs and insight, to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Notes for Facilitation

- Ask the participants if they have any questions.
- Encourage other participants to answer it and encourage peer learning in the class.
- Answer all the doubts in case any to the participants.
- Ask them to answer the questions given in the participant manual.
- Ensure that all the participants answer every question.

Answer Keys

A. Tick the correction options agaist each statement.

1. Who identifies, documents, and verifies that corrections have been made to the software?
   d) All of the mentioned
2. Software quality assurance consists of the auditing and reporting functions of management.
   a) True
3. What does QA and QC stand for?
   c) Quality Assurance and Quality control
4. What is QA?
   b) Any systematic process used to ensure quality in the process
5. Arrange the steps of QA in ascending order?
   a) Report and measure , review requirements and documentation, verifying fixes, plan and prepare test cases, design test cases,

B. Answer the below questions:

a) What does FTR stands for?

Formal Technical Review (FTR)

b) Define RCA (Root Cause Analysis)?

RCA (Root Cause Analysis) is a technique for identifying the root cause of defects. We use brainstorming, reading, and digging to determine whether a defect was caused by "testing miss," "development miss," or "requirement or design miss."

c) List out the steps of Software Review Process.

The steps of software review process are:

- Entry Evaluation
- Management Preparation
- Review Planning
- Preparation
- Examination and Exit Evaluation

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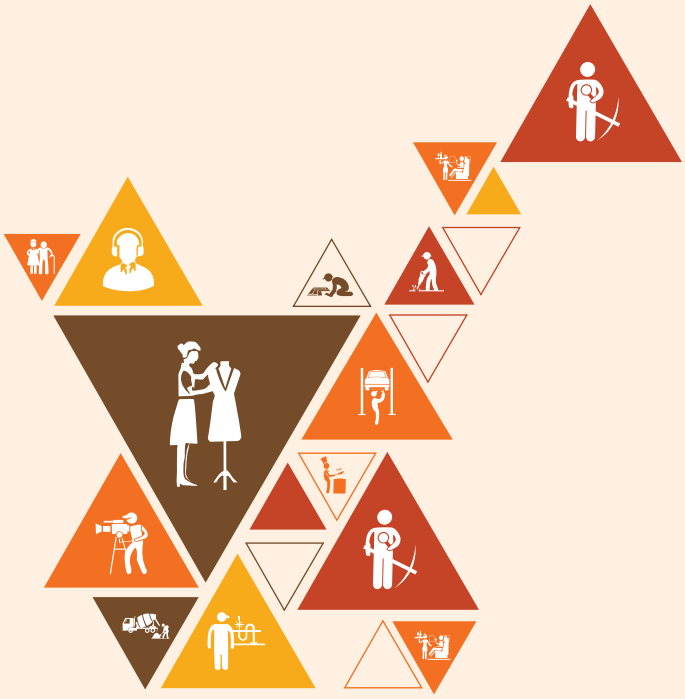
6: Key Indicators for Software Applications

Unit 6.1 – Key Indicators for Software Applications



(SSC/N1303)

Key Learning Outcome

By the end of this module, participants will be able to:

1. Identify the primary sources of key indicators for quality testing.
2. Examine the purpose of data or information provided to third party for quality check.

Unit 6.1 Key Indicators for Software Applications

Unit Objectives

By the end of this unit, participants will be able to:

1. Identify the key factors impacting the quality assurance of projects and why projects must comply with these.
2. Discuss the types of risks and their indicators like unproven technologies, user and functional requirements, application, and system architecture, etc.
3. Define the checkpoints for third party performance in quality assurance.
4. Explain the factors that impact quality of software such as inadequate third-party performance, litigation in protecting intellectual property, obsolete software, and wrong software functionality.
5. Analyse how management reviewers, internal auditors, technical reviewers impact the purpose of data/information shared for software applications.

Resources to be Used

Participant Handbook, Pen, Writing Pad, Whiteboard, Flipchart, Markers, Laptop, Overhead Projector, Laser Pointer, equipment, and Tools (as recommended for the job role)

Note

This is the seventh session of the program, which will provide you an understanding of Key Indicators for Software Applications.

Say

Good day and a very warm welcome to this training program. Before we begin this session, let us have a round of interaction.

Ask

Ask the participants the following questions:

- What are Key Indicators for Software Applications?

Write down the participants' answers on whiteboard/flipchart. Take appropriate cues from the answers and start teaching the lesson.

Elaborate

In this session, we will discuss the following points:

- Basics of impact analysis in software testing
- The Basis of Software Testing Metrics
- Software Testing Performance Indicators(KPIs) for Quality Assurance
- Risk In Software Project Management
- Risks in Software Project
- Performance testing difficulties and strategies for overcoming them

Say

Let us now participate in an activity to understand the concept better.

Activity

- The Trainer asks the Trainees the following question: “What are the key performance assurance inducators?”
- In this activity candidate need to raise their hands to volunteer and speak.
- The language spoken during the session should be known by the majority of Trainees in the class.
- While the session goes on, the Trainer should jot down the crucial points on the Whiteboard with the help of a marker.
- The best answer shall be appreciated by the Trainer in front of the whole class.

Say

Did you find the activity fruitful? I hope all of you are aware of the project risks and their potential/ actual impact on developing application.

Do

- Jot down the crucial points on the whiteboard as the students speak.
- Share your inputs and insight, to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Notes for Facilitation

- Ask the participants if they have any questions
- Encourage other participants to answer it and encourage peer learning in the class
- Answer all the doubts in case any to the participants
- Ask them to answer the questions given in the participant manual
- Ensure that all the participants answer every question

Answer Keys

1. **Choose the correct Answers:**

   A. What is QA?

   d. any methodical procedure applied to guarantee process quality

   B. To identify issues and address them in order to raise the inetee of a project is the goal of _____.

   c. Software testing

   C. Which is an example of an indicator?

   d. Defects per thousand lines of code

   D. Reducing ____ is software assurance's main objective.

   a. Risks

   E. FTR stands for ____.

   c. Formal Technical Review

   F. The factors influencing project management is/are ____.

   d. All of the above

2. **List the performance challenges in testing.**

   A type of performance measurement, Organizations and testers both utilise performance indicators, or KPIs, to collect data that may be measured. KPIs are the exact specs that the software testing team measures and examines to make sure the process complies with the company's goals. Additionally, they support the team in taking any necessary actions if the product's performance falls short of the predetermined goals.

   Performance testing difficulties and strategies for overcoming them

   I- Selection of wrong performance testing tools

   II- Third-party performance -3rd Party Application Dependency

   III- Outsourcing Challenges

   IV- Improper analysis of performance test outcomes:

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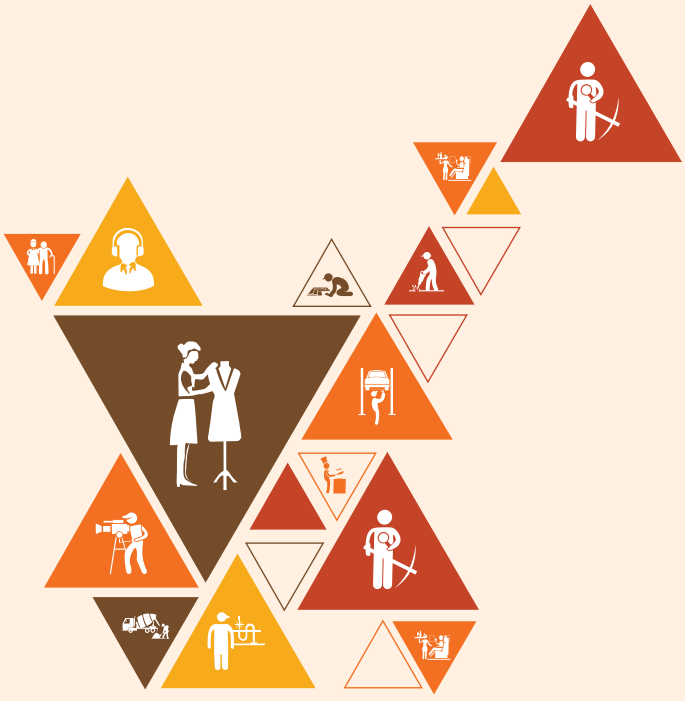
7. Technical Skills for Manual Tests

Unit 7.1 – Technical skills for handling incidents



Key Learning Outcome

By the end of this module, participants will be able to:

1. Design test suites or cases during the testing phase with 100% test coverage.
2. Examine the importance of source coding standards, and utilities/tools for handling quality assurance.

Unit 7.1 Technical Skills for Manual Tests

Unit Objectives

By the end of this unit, participants will be able to:

1. Discuss latest changes, procedures, and practices in the field of designing test suites.
2. Examine the purpose of software testing elements, like static testing, dynamic testing, white box testing, black box testing, etc.
3. Discuss the use of different value and data to determine the correct action in manual testing.
4. Apply correct usage of information technology to input and/or extract data accurately.
5. Demonstrate static testing, dynamic testing, white box testing, black box testing, etc.
6. Use applications like .Net, SQL, Java, Oracle, VB Script, etc. for comprehending code written in respective coding language
7. Monitor, access and validate automated alerts and test service requests

Resources to be Used

Participant Handbook, Pen, Writing Pad, Whiteboard, Flipchart, Markers, Laptop, Overhead Projector, Laser Pointer, equipment, and Tools (as recommended for the job role)

Note

This is the ninth session of the program, which will provide you an understanding of the purpose of analyzing results to identify defects and track the same in defect tracking system.

Say

Good day and a very warm welcome to this training program. Before we begin this session, let us have a round of interaction.

Ask

Ask the participants the following questions:

- Examine how applying different values and data impacts the manual test report.

Write down the participants' answers on whiteboard/flipchart. Take appropriate cues from the answers and start teaching the lesson.

Elaborate

In this session, we will discuss the following points:

- Information storage and retrieval
- Backup and restore
- Methods of Data Extraction
- Types of Data Structures used in Data Extraction
- Generating Data
- What is an Anomaly?
- Anomaly Detection Methods
- Use of common applications Like .Net, SQL, Java, Oracle, VB Script in testing
- Process of conducting static testing, dynamic testing, white box/black box/grey box testing.

Say

Let us now participate in an activity to understand the concept better.

Activity

- In this session, the trainer will play a videos.
- The video will be learning about data extraction and its uses.
- The YouTube link for the video is https://www.youtube.com/watch?v=O6GFM_uGVFY
- The trainees will observe the video with pin drop silence.
- They can note down pointers from the video that they may find relevant.
- Trainees will maintain decorum in the class and not talk, whisper or discuss in the class.

In case of any queries or confusions, trainees will write those down in their notebooks.

Say

Did you find the activity fruitful? I hope all of you are aware of the technical skills required for handling incidents.

Do

- Jot down the crucial points on the whiteboard as the students speak.
- Share your inputs and insight, to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Notes for Facilitation

- Ask the participants if they have any questions
- Encourage other participants to answer it and encourage peer learning in the class
- Answer all the doubts in case any to the participants
- Ask them to answer the questions given in the participant manual
- Ensure that all the participants answer every question

Answer Keys

A. Answer the following questions

a) Differentiate between Black Box Testing vs. White Box Testing vs. Grey Box Testing.

Index	Black Box Testing	White Box Testing	Grey Box Testing
1	Knowledge of internal working structure (Code) is not required for this type of testing.For test cases, only the GUI (Graphical User Interface) is necessary. Only GUI (Graphical User Interface) is required for test cases.	This type of testing necessitates an understanding of the internal workings of software (software coding).	It is necessary to have some knowledge of how things work internally.
2	The terms functional testing, data-driven testing, and closed box testing are all variations of black box testing.	The terms structural testing, clear box testing, code-based testing, and transparent testing are also used to describe white box testing.	The term “grey box testing” or “translucent testing” refers to testing where the tester has only rudimentary coding knowledge.
3	Due to the fact that testers are not required to understand the internal software coding, the testing methodology includes trial and error methods.	Since there is no internal coding knowledge gap, White Box Testing is followed by a verification of the system boundaries and data domains built into the software.	The software is then validated for its internal system boundaries and data domains if the tester has coding knowledge.
4	The largest of all testing spaces is the testing space for input tables, which contain the inputs needed to build test cases.	In comparison to Black Box testing, the testing space for tables of inputs (inputs to be used for creating test cases) is smaller.	Tables for inputs (inputs used to build test cases) have a smaller testing space than Black Box and White Box testing.

5	Because hidden software errors may be caused by internal functioning that is unknown to Black Box testing, finding them can be very challenging.	Due to the possibility that they may result from internal functioning, which is thoroughly examined in White Box testing, hidden errors are easily found.	Difficult to discover the hidden error. User level testing may reveal it. Might be found in user level testing.
6	It is not taken into account when testing algorithms.	It is a good fit and is advised for testing algorithms.	It is not taken into account when testing algorithms.
7	The amount of time needed for Black Box testing depends on whether the functional specifications are available.	Due to the extensive code, designing test cases for white box testing takes a lot of time.	Designing test cases can be completed quickly.
8	Testers, developers, and end users can all participate.	The only people who can participate in testing are testers and developers; end users are not allowed.	Testers, developers, and end users can all participate.
9	Of all the testing processes, it takes the least amount of time.	The testing process as a whole takes the longest of all the testing processes.	Taking less time than White Box testing.
10	Black Box testing covers resilience and security against viral attacks.	White Box testing does not cover resilience and security against viral attacks.	Grey Box testing does not cover resilience and security against viral attacks.
11	External expectations and unknown internal ineteent form the basis of this testing.	Coding, which is in charge of internal operation, serves as the foundation for this testing.	High-level database and dataflow diagrams are used for testing.
12	Compared to White Box and Grey Box testing approaches, it is less thorough.	In terms of testing techniques, Black Box testing is the most thorough.	Depends on whether the test cases are GUI-based or coding-based, but not entirely exhaustive.

a) Brief static testing & dynamic testing.

Static Testing: Static testing is a method of testing software that doesn't involve running the entire program or having the software executed. Static testing is done early on in the development process so that bugs and errors can be found and fixed before moving on to dynamic testing. Compared to dynamic testing, static testing might require less time and resources. The use of static testing may also uncover some errors that dynamic testing might not be able to detect as easily.

There are essentially two types of static testing:

- One is carried out manually, i.e., the analysis of the code is performed manually. A code review or a simple review are other names for this procedure.
- The automated analysis, in which we run the test using tools, is another.

Dynamic Testing: One type of software testing called dynamic testing completely examines the dynamic ineteent of the software's code. In a nutshell, verification and validation make up the entire test, with the latter—the validation process—being referred to as dynamic testing.

Dynamic testing's primary goal is to test every component of the software by manually entering values into its UI or APIs and determining whether the values are accepted and whether the desired output is produced in accordance with the input.

The system is tested with input from end users, and this is entirely their perspective.

B. Fill in the blanks:

a) Data Extraction

b) Static Testing

c) Anamoly

d) SQL (Structured Query Language)

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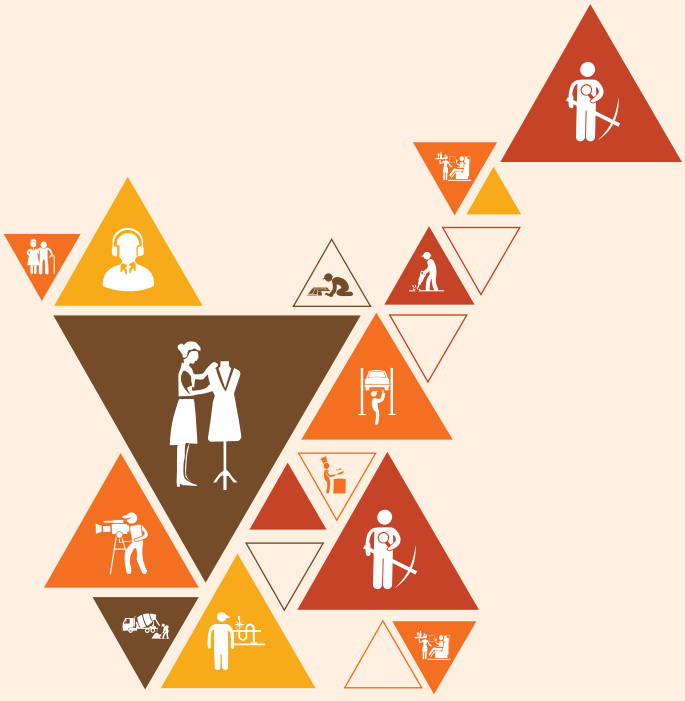
8. Carry out Manual Tests on Software Products/ Applications/Modules

Unit 8.1 – Carry out Manual Tests on Software Products/Applications/Modules



(SSC/N1303)

Key Learning Outcome

By the end of this module, participants will be able to:

1. Demonstrate understanding of the nature of testing to be carried out and usage of the test management tool to be used.
2. Evaluate the use of adhering conformance to usability guidelines in case of usability testing.

Unit 8.1 Carry out Manual Tests on Software Products/ Applications/Modules

Unit Objectives

By the end of this unit, participants will be able to:

1. Select the latest versions of the test cases and automated scripts.
2. Select correct alternative solution from software specification document.
3. Identify the correct versions of the application and data to be used for testing.
4. Analyse requirements from the software specification document.
5. Demonstrate the process of creating a test plan and developing test cases.
6. Develop test progress report, results and defects discovered, using the agreed test management tool.
7. Demonstrate contingency plans to monitor risk triggers during the project.
8. Analyse results to identify the defects and track the same in defect tracking system.

Resources to be Used

Participant Handbook, Pen, Writing Pad, Whiteboard, Flipchart, Markers, Laptop, Overhead Projector, Laser Pointer, equipment, and Tools (as recommended for the job role)

Note

This is the eight session of the program, which will provide you an understanding of the purpose of analyzing results to identify defects and track the same in defect tracking system.

Say

Good day and a very warm welcome to this training program. Before we begin this session, let us have a round of interaction.

Ask

Ask the participants the following questions:

- Examine how applying different values and data impacts the manual test report.

Write down the participants' answers on whiteboard/flipchart. Take appropriate cues from the answers and start teaching the lesson.

Elaborate

In this session, we will discuss the following points:

- Manual Testing
- What is the Importance of Manual Testing?
- Platform and Application Versions
- Numeration conventions for identification of SCI and software versions
- Version History
- Writing Manual Test Case
- How to write test cases for software
- Test Progress Report
- Types of Test Reports
- Defect Resolution
- How to measure and evaluate the quality of the test execution?
- What Is a Test Report?
- Defect tracking system
- Effective Defect Reporting
- Impacts of Test Data on the manual test

Say

Let us now participate in an activity to understand the concept better.

Activity

- In this activity, the trainer will conduct a session on creating Test Report
- Each of the candidate will be provided with a common Test Report Template.
- Each of the candidate has to fill it for pre-release testing.
- It is important that the trainees present their answers not only rich in information but also supported by a flow chart.
- The group, which can present their answers in the best way within 30 minutes will be awarded appreciation and accolades.

Say

Did you find the activity fruitful? I hope all of you are aware of the Importance of Manual Testing.

Do

- Jot down the crucial points on the whiteboard as the students speak.
- Share your inputs and insight, to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Notes for Facilitation

- Ask the participants if they have any questions
- Encourage other participants to answer it and encourage peer learning in the class
- Answer all the doubts in case any to the participants
- Ask them to answer the questions given in the participant manual
- Ensure that all the participants answer every question

Answer Keys

1. **Answer the following questions:**

   a. **What Is a Test Report?**

   A test report is a well-organized summary of the goals, procedures, and outcomes of the test. It was developed and is employed to assist stakeholders (product manager, analysts, testing team, and developers) in understanding product quality and determining whether a product, feature, or defect resolution is on schedule for release.

   b. **What should a test summary report contain?**

   A test summary report that is instructive should be succinct and pertinent. There are numerous test summary report template examples online, but not all of them may be applicable in your situation. Therefore, it is crucial to adjust our report after conducting a thorough analysis in accordance with the characteristics of our test project.

   The summary should contain

   1. Test Objective

   2. Areas Covered

   3. Areas not covered

   4. Testing Approach

   5. Defect Report

   6. Platform specifics– Products are currently tested on a variety of platforms

   c. **Enumerate the Importance of Manual Testing?**

   Although there are still many reasons for manual testing, software professionals are ineteent automated testing more and more. Few are:

   Human Perspective: Humans can quickly assess the app's fundamental usefulness and appearance by giving it a quick glance. A tester may spot usability issues and user interface flaws when they interact with software in the same way that a user would. These issues cannot be found by automated test scripts.

   A larger view of the System workflows: A more comprehensive view of the app is always provided by manual verification. Instead of being in a coding mode that repeats processes, the human mind is constantly exploring. So, it will cover the greater ground for system validation.

   - Human Perspective: Humans can quickly assess the app's fundamental usefulness and appearance by giving it a quick glance. A tester may spot usability issues and user interface flaws when they interact with software in the same way that a user would. These issues cannot be found by automated test scripts.

- A larger view of the System workflows: A more comprehensive view of the app is always provided by manual verification. Instead of being in a coding mode that repeats processes, the human mind is constantly exploring. So, it will cover the greater ground for system validation.

- Automation costs money because it frequently results in false positives and false negatives during testing. By incorporating a human touch throughout the testing process, these errors are avoided.

Scenarios that aren't automatable or don't offer obvious confidence in user ineteent when testing with automation, for example, “Tap & Pay” on mobile devices, have distinct behaviors when automated using tools vs. manually verified. Despite this, manual testing still holds a prominent place in the quick-moving validation stage of the software development life cycle. Additionally, there are instances where manual verification is the best choice.

Automation is expensive, often Testing that is automated might produce false positives and false negatives. By incorporating a human touch throughout the testing process, these errors are avoided.

2. Fill in the blanks:

a. Test

b. Manual testing

c. Version

d. defect

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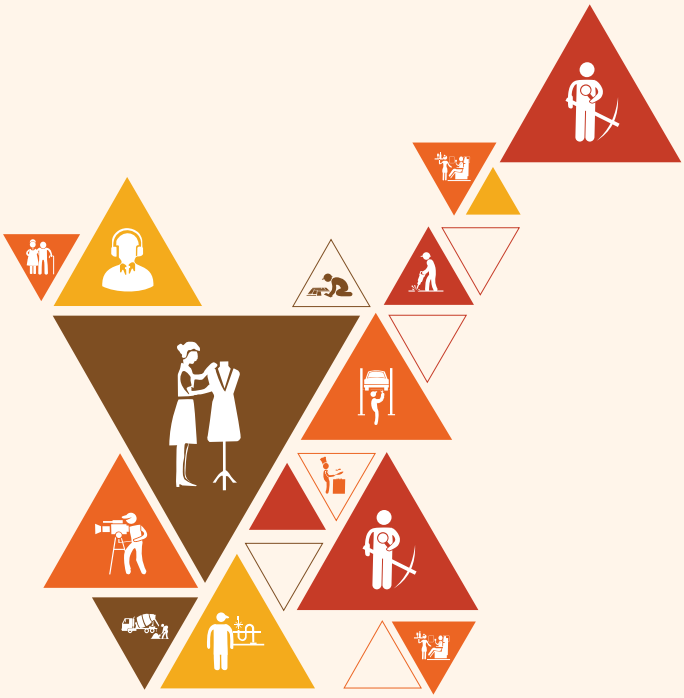
9. Implement & Improve the Gender Sensitivity, PWD (Person/People with Disability) Sensitivity and Greening

Unit 9.1 - Sustainable Practices

Unit 9.2 - Respect Diversity and Strengthen Practices to Promote Equality



SSC/N9014

Key Learning Outcomes

At the end of this module, the participant will be able to:

1. Illustrate sustainable practices in the workplace for energy efficiency and waste management
2. Apply different approaches to maintain gender equality and increase inclusiveness for PwD

Unit 9.1: Sustainable Practices

Unit Objectives

At the end of this unit, the participant will be able to:

1. Describe different approaches for efficient energy resource utilization and waste management
2. Describe the importance of following diversity policies

Resources to be Used

- Participant Handbooks
- Paper, Pens, Notepad, Chart paper
- Computer, Projector
- Whiteboard, Marker, and Duster

Notes for Facilitation

- Begin the session with a brief recapitulation of the previous session.

Say

- "In the previous module, we gain an understanding on workplace data management."
- "We will now discuss the sustainable practices in workplace that optimize usage of material and energy. Moreover, waste management is a significant aspect of every organization. We will also discuss proper waste management and recycling processes here."

Ask

- Why do you think promoting greenery is important?
- How should an organization manage its waste products?

Notes for Facilitation

- Write down the participants' answers on whiteboard.
- Take appropriate cues from the answers and start teaching the lesson.

Say

- "Plants in workplaces purify the air; they reduce the concentration of CO2 (Carbon dioxide gas) and other volatile organic compounds, keeping the air fresh and healthy."
- "External vegetation moderates heat in and around office block in the summertime, pulling down heat stress and decreasing the necessity for air-conditioning".
- "Green roofs and facades proliferate insulation or the absorption capacity of heat, plummeting heating and cooling expenses".
- "Green environments encourage people to undertake activities such as a lunchtime walk, keeping staff alert and healthy. Long periods of sitting adversely affect health."
- "Renewable Energy is an eternal energy source that does not get depleted on exploitation and fetch nil or minimal waste product".
- "Let us now participate in an activity to understand the concept better."

Activity

Objective	The purpose of this activity is to prepare a sample checklist and monitor energy usage.
Materials required	Pen, Paper
Steps/procedure	• This activity is in the form of "Prepare a sample checklist and monitor energy usage". • This activity targets to make the trainees understand the optimization of energy in the workplace. • The trainer will divide the class into three groups. • The trainer will distinguish one particular room for the case study. • Each group will be assigned with the following tasks. • Count the number of lights, fans and ACs in the case study room. • Note down the duration of their usage. • Assess the proper usage and wastage. • Prepare a checklist to evaluate how to optimize the energy usage. • Submit a document furnishing observations. • The trainer will check the documents and declare the best group.
Conclusion / what has been achieved	This activity helps the participants to understand the optimization of energy in the workplace.

Explain

- Explain how to optimize the usage of electricity/energy, materials and water.
- Explain the significance of greening.
- Explain the initiative towards efficient use of natural resources and energy, reduction and prevention of pollution with help of Table 12.1.1 given in the Participant Handbook.
- Explain various energy options including renewable and non-renewable.

Do/Demonstrate

- Demonstrate 'Sustainable Practices' with the help of the AV link - youtu.be/-0zQV8F03Og

Elaborate

- Elaborate the following topics:
  - Electricity first aid emergency procedures
  - Steps to free a person from electrocution
  - Segregate Recyclable, Non-Recyclable and Hazardous Waste
  - Process of reporting potential hazard
  - Hazard Identification
  - Hazard and Operability (HAZOP) Study
  - 3Rs of waste optimization

Activity

Objective	The purpose of this activity is to prepare a sample hazard measurement checklist.
Materials required	Pen, Paper
Steps/procedure	• This activity is in the form of "Waste management". • The trainer will ask every trainee to prepare a sample hazard measurement checklist. • The trainees should assess the waste management system of the building. • They should prepare a document on the existing waste management system and propose systems to enhance it. • They must be able to segregate between different types of waste and their treatment. • On the merit of the document submitted by the trainees, the trainer will announce the best reports. • The trainees who furnished best reports will be appreciated by the class.
Conclusion / what has been achieved	This activity helps the participants to recognize potential hazards at workplace.

Summarize

- Summarize the session using roleplay on the techniques of telecalling.
- Prepare a list of participants' doubts if they have any. Encourage them to ask questions.
- Answer their queries.

Unit 9.2: Respect Diversity and Strengthen Practices to Promote Equality

Unit Objectives

At the end of this unit, the participant will be able to:

1. Identify stereotypes and prejudices associated with people with disabilities and the negative consequences of prejudice and stereotypes
2. Discuss the importance of promoting, sharing, and implementing gender equality and PwD sensitivity guidelines at the organizational level

Notes for Facilitation

- Begin the session with a brief recapitulation of the previous session.

Say

- "In the previous unit, we discussed the sustainable practices in workplace that optimize usage of material and energy. Moreover, waste management is a significant aspect of every organization."
- "We also discussed proper waste management and recycling processes."
- "Today we will talk about gender sensitivity at workplace and PWD related policies to strengthen and promote equality."

Ask

- Why do you think promoting gender equality at workplace is important?

Notes for Facilitation

- Write down the participants' answers on whiteboard.
- Take appropriate cues from the answers and start teaching the lesson.

Say

- "The Constitution of India applies uniformly to equality of opportunity for all citizens (including every legal citizen of India, whether they are the disabled) in matters relating to employment or healthy or disabled."
- "The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013 prescribes a system for investigating and redressing complaints against sexual harassment of women at the workplace."
- "The definition of a 'disabled person' is broadened under the 2016 Act: it covers persons with disability, persons with benchmark disability, and persons with disability having high support needs
- The Indian Government respects the equality and therefore no discrimination should be made on the ground of disability."
- "The definition of a 'disabled person' is broadened under the 2016 Act: it covers persons with disability, persons with benchmark disability, and persons with disability having high support needs."
- "Let us now participate in an activity to understand the concept better."

Activity

Objective	The purpose of this activity is to learn the laws and regulations related to PWD issued by the government.
Materials required	N/A
Steps/procedure	• This activity is in the form of "elocution session." • The Trainer will divide the class into 4 groups. • Each group will be assigned with one law related to PWD compliance issued by the government of India (as discussed in the unit). • The groups will come in front of the class one by one and explain the key features and advantages of the law assigned to them. • The Trainer will supervise the session. • The best group will be appreciated by the class.
Conclusion / what has been achieved	This activity helps the participants to understand the laws and regulations related to PWD compliance issued by the government of India

Explain

- Explain the concept of Gender, Gender Equality and Gender discrimination.
- Explain the policies and procedures about gender inclusivity, equality and sustainability while working with colleagues.
- Explain the organization's Redressal Mechanisms.

Elaborate

- Elaborate the following topic - Comply to PWD Inclusive Policies.

Activity

Objective	The purpose of this activity is to learn the importance of gender equality at workplace.
Materials required	Pen, Paper
Steps/procedure	• This activity is in the form of 'written test" • Each Trainee will be provided with blank sheets and pen • The Trainer will read out the following question to the Trainees • What is gender equality and workplace and how that can be implemented and strengthened? • The Trainees will get 15 minutes to answer the above question • They should write the answer in the stipulated time • The Trainer will check the answers Trainees with best answers will be appreciated by the class.
Conclusion / what has been achieved	This activity helps the participants to implement gender equality at workplace.

Summarize

- Summarize the session using roleplay on the techniques of telecalling.
- Prepare a list of participants' doubts if they have any. Encourage them to ask questions.
- Answer their queries.

Exercise

- Instruct the trainees to open their Participant Handbook and complete the exercise given in Module 12.
- Ensure that the participants have opened the correct page for the activity.
- Give them 20 minutes to complete the exercise.
- Exercise Hints:
  - Answers to Questions I.
    1. The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act - 2013
    2. The Person with Disabilities Act - 1995
    3. The Mental Health Act - 1987
    4. The Rehabilitation Council of India - 1992
    5. The National Trust Act - 1999
  - Answers to Questions II
    1. 1. (b)
    2. 2. (c)
    3. 3. (a)
  - Answers to Questions III
    1. Identifying hazards, assessing the risks, controlling and mitigating risks
    2. Wind energy, solar energy, geothermal energy, bio energy, hydropower energy
    3. In order to ensure speedy justice, special courts are instituted in each district to deal with cases pertaining to the violation of the rights of disabled persons. Penalties for the violation of rights of disabled persons can extend to a monetary fine of US$7,750 (Rs 500,000) and imprisonment for up to five years.
    4. Switch off the main power, don't touch the person who is electrocuted, try to remove the person from the electrical source with the help of non-conducting objects like stick, cardboard, bamboo, etc. , lay the person in this position.

QR Code

Scan the QR Code to watch the related video

youtu.be/JPQq-hRR_bM

Sustainable Practices

Skill India
कौशल भारत-कुशल भारत

सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP

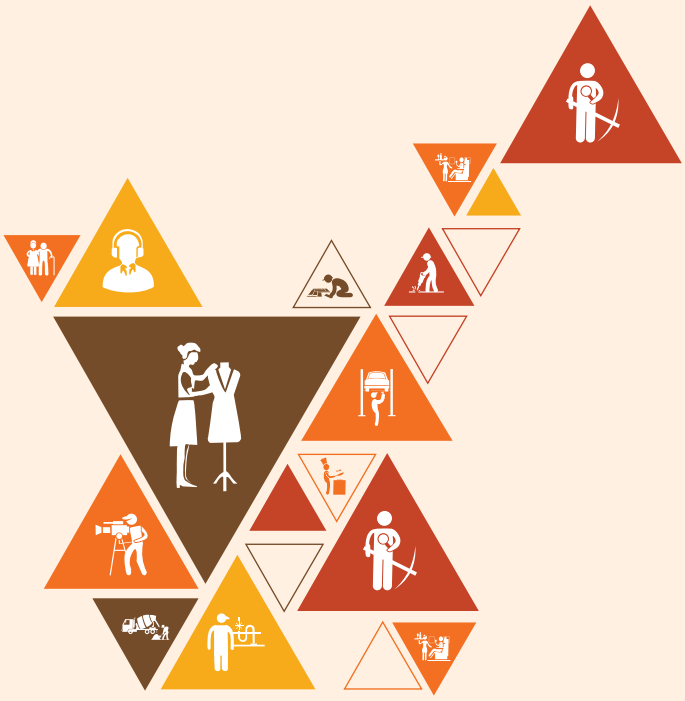
N·S·D·C
National
Skill Development
Corporation
Transforming the skill landscape

IT - ITeS SSC
nasscom

10. Annexures

Annexure 1: Training Delivery Plan

Annexure 2: Assessment Criteria



Annexure-I

Training Delivery Plan

Training Delivery Plan			
Program Name:	**Test Engineer**		
Qualification Pack Name & Ref. ID	**SSC/Q7001, Ver.3.0**		
Version No.	**3.0**	**Version Update Date**	**27-01-2022**
Pre-requisites to Training (if any)	Graduate (Computer Science or any related field) with 1 year of relevant experience in TQM, ISO etc. quality process, software testing techniques, test writing plans OR 12th Class (Science) with 4 years of relevant experience Recommended certifications: Software Development Certifications in C++, Embedded, C#, C, Java, etc. Minimum-18 Years		
Training Outcomes	**After completing this programme, participants will be able to:** • Identify any issues with software requirements for testing using codes. • Examine the process to modify test cases relevant to the requirements. • Identify the checkpoints that a project should comply with during every phase. • Identify the nature of testing to be carried out and the test management tool to be used. • Examine the process of functional, usability, compatibility, performance, and regression testing on application. • Identify the checkpoints that a project should comply with during every phase. • Identify the latest changes, procedures and practices in test designing. • Examine the purpose of source coding standards, and utilities/tools for handling quality assurance. • Demonstrate effective communication and collaboration with colleagues. • Apply measures to maintain standards of health and safety at the workplace. • Use different approaches to effectively manage and share data and information. • Develop strong relationships at the workplace through effective communication and conflict management. • Identify best practices to maintain an inclusive, environmentally sustainable workplace.		

S. No.	Module Name	Session Name	Session Objectives	NOS Reference	Methodology	Training Tools / Aids	Duration
1	Introduction T:2:00 P:2:00 (HH:MM)	Module 1: IT-IteS/BPM Industry – An Introduction	• Explain the relevance of the IT-IteS sector. • Outline the future of the IT-IteS industry. • Conduct an Internet search to collect data, evidence, and articles pertaining to IT-IteS/support services. • Identify the career path for a Test Engineer.	Bridge Module	Invite Industry Person for discussion,	• Whiteboard and Markers Chart paper and sketch pens • LCD Projector and Laptop for presentations	T:02 P: 02
2	SSC/N1301 Design tests for software products/ applications/ modules T:30:00 P:60:00 (HH:MM)	Module 2: Concept and Principle of Quality Testing	• Identify the version control and entry-exit criteria for testing. • Evaluate the methods of collecting data/ information to quality assure projects and how to apply these. • Evaluate the outputs of objective and subjective analysis. • Examine the process of failure test or stress test of data. • List the principles of effective quality assurance of projects. • Examine various aspects of quality assurance across any industry, including controls, job management, adequate processes, performance, and integrity criteria. • Evaluate the key skill sets of a test engineer, on software design, writing source code, control of source code, reviewing code, etc.	SSC/N1301 Pc1	Activity: Version controls	Labs equipped with the following: PCs/Laptops Internet with Wi-Fi (Min 2 Mbps Dedicated) Application Development environment (Suitable alternates may be added, as suited to local demands): • DOT Net, Visual studio 2010 – ultimate, IIS 7.5 • SQL server 2008 R2, JAVA • Eclipse SDE 7.0, Apache Tomcat 6.0 • My SQL & work bench 5.2, Oracle 11G – express edition • Selenium IDE, Selenium WebDriver, Active Scripting Engine Jscript, VB Script • QTP (Quick Test Professional) tool • Scripting and Programming environments for C, C++, SQL, Java, .Net and VB • Unit Testing Tool – Junit	T:20 P: 30

		Module 3: Design Tests for Software Products/Applications/Modules	• Access reusable scenarios, test cases, scripts and tools required for testing. • Design methods to test high level scenarios relevant to the requirements. • Evaluate the test cases that can be automated feasibly. • Examine ways to modify automated scripts relevant to the requirements. • Identify general policies, procedures and guidelines when designing tests for software products/applications/modules. • Evaluate how to design test data relevant to the requirements. • Create a test plan to cover all the requirements. • Examine methods to review the test plan, test cases and/or automated scripts with experts/trainer. • Modify the test plan, test cases and/or automated scripts before final delivery.	SSC/N1301 Pc2, PC3, PC4, PC5, PC6, PC7, PC8, KU1, KU2, KU3, KU4, KU5, KU6, KU7, KU8, KU9, KU10, KU11, KU12	Activity: Test planning concept	Labs equipped with the following: PCs/Laptops Internet with Wi-Fi (Min 2 Mbps Dedicated) Application Development environment (Suitable alternates may be added, as suited to local demands): • DOT Net, Visual studio 2010 – ultimate, IIS 7.5 • SQL server 2008 R2, JAVA • Eclipse SDE 7.0, Apache Tomcat 6.0 • My SQL & work bench 5.2, Oracle 11G – express edition • Selenium IDE, Selenium WebDriver, Active Scripting Engine Jscript, VB Script • QTP (Quick Test Professional) tool • Scripting and Programming environments for C, C++, SQL, Java, .Net and VB • Unit Testing Tool – Junit	T:10 P: 30

3	SSC/N1302 Carry out automated tests on software products /applications/ modules T:22:00 P:49:00 (HH:MM)	Module 4: Carry out Automated Tests on Software Products/ Applications/Modules	• Identify the test management tool to be used during testing. • Identify the latest versions of the test cases and automated scripts. • List the correct versions of the application and data. • Pan how to execute the automated test scripts according to instructions. • Evaluate the method of logging the test progress, results and defects discovered, using the agreed test management tool. • Analyse the results of testing to develop a clear understanding of the defects. • Utilize various programming languages like C, C++, SQL, Java, etc., for designing.	SSC/N1302 Pc1, PC4, PC5, PC6, PC7, KU1, KU4, KU5, KU6, KU7, KU8, KU9	Activity: Test Management Tools	Labs equipped with the following: PCs/Laptops Internet with Wi-Fi (Min 2 Mbps Dedicated) Application Development environment (Suitable alternates may be added, as suited to local demands): • DOT Net, Visual studio 2010 – ultimate, IIS 7.5 • SQL server 2008 R2, JAVA • Eclipse SDE 7.0, Apache Tomcat 6.0 • My SQL & work bench 5.2, Oracle 11G – express edition • Selenium IDE, Selenium WebDriver, Active Scripting Engine Jscript, VB Script • QTP (Quick Test Professional) tool • Scripting and Programming environments for C, C++, SQL, Java, .Net and VB • Unit Testing Tool – Junit	T:13 P:29

		Module 5: Contribute to Quality Assurance of Projects	• Discuss the scope of quality assurance for a test engineer. • Analyse the purpose of conducting review meetings at agreed project milestones. • Collate required data/information against key indicators using standard templates and tools. • Plan on delivering required information to project management reviewers, internal auditors, and technical reviewers. • Discuss with experts, any issues related to project data, where necessary. • Collect information to understand the nature of problems and perform initial diagnosis. • Evaluate the need for root cause analysis of process failures in projects. • Practice documenting good practices to improve productivity.	SSC/N1302 Pc2, PC3, KU2, KU3	Activity: Quality Assurance Process	Labs equipped with the following: PCs/Laptops Internet with Wi-Fi (Min 2 Mbps Dedicated) Application Development environment (Suitable alternates may be added, as suited to local demands): • DOT Net, Visual studio 2010 – ultimate, IIS 7.5 • SQL server 2008 R2, JAVA • Eclipse SDE 7.0, Apache Tomcat 6.0 • My SQL & work bench 5.2, Oracle 11G – express edition • Selenium IDE, Selenium WebDriver, Active Scripting Engine Jscript, VB Script • QTP (Quick Test Professional) tool • Scripting and Programming environments for C, C++, SQL, Java, .Net and VB • Unit Testing Tool – Junit	T:09 P:20

4.	SSC/N1303 Carry out manual tests on software products/ applications/ modules T:35:00 P:55:00 (HH:MM)	Module 6: Key indicators for software applications	• Identify the purpose of impact indicator, efficiency indicator in testing. • Identify why projects must comply with QA indicators. • Evaluate the types of risks arising from unproven technologies, user and functional requirements, application, and system architecture, etc. • Examine project risks and their potential/ actual impact on developing application. • Analyse how inadequate third-party performance, obsolete software, and lack of executive support impacts output.	SSC/N1303 Pc1, PC2, KU9	Activity: key performance assurance indicators	Labs equipped with the following: PCs/Laptops Internet with Wi-Fi (Min 2 Mbps Dedicated) Application Development environment (Suitable alternates may be added, as suited to local demands): • DOT Net, Visual studio 2010 – ultimate, IIS 7.5 • SQL server 2008 R2, JAVA • Eclipse SDE 7.0, Apache Tomcat 6.0 • My SQL & work bench 5.2, Oracle 11G – express edition • Selenium IDE, Selenium WebDriver, Active Scripting Engine Jscript, VB Script • QTP (Quick Test Professional) tool • Scripting and Programming environments for C, C++, SQL, Java, .Net and VB • Unit Testing Tool – Junit	T:17 P: 15

		Module 7: Technical skills for manual tests	• Discuss how to store and retrieve information. • Utilize information technology wisely to accurately input and/or extract data • Develop methods to analyse anomalies in data and risk triggers during test. • Evaluate the use of applications like .Net, SQL, Java, Oracle, VB Script, etc. • Identify methods to access and validate alerts and test service requests • Examine the process of conducting static testing, dynamic testing, white box/black box/grey box testing.	SSC/N1303 PC 6, PC7, KU1, KU2	Activity: Data extraction and its uses	Labs equipped with the following: PCs/Laptops Internet with Wi-Fi (Min 2 Mbps Dedicated) Application Development environment (Suitable alternates may be added, as suited to local demands): DOT Net, Visual studio 2010 – ultimate, IIS 7.5, SQL server 2008 R2, JAVA, Eclipse SDE 7.0 Apache Tomcat 6.0, My SQL & work bench 5.2, Oracle 11G – express edition, Selenium IDE, Selenium WebDriver, Active Scripting Engine Jscript, VB Script, QTP (Quick Test Professional) tool Scripting and Programming environments for C, C++, SQL, Java, .Net and VB	T:08 P:10

		Module 8: Carry out manual tests on software products/ applications/ modules	• Check that the correct versions of the application and data are used. • Plan how to execute manual test scripts according to instructions. • Collate advice and guidance from experts in case of problems with testing that are beyond the level of competence. • Construct test progress report, results and defects discovered, using the agreed test management tool. • Examine the purpose of analyzing results to identify defects and track the same in defect tracking system. • Design plans to deliver documented report of defects. • Examine how applying different values and data impacts the manual test report.	SSC/N1303 PC 3, PC4, PC5, KU3, KU4, KU5, KU6, KU7, KU8	Activity: Test Report	Labs equipped with the following: PCs/Laptops Internet with Wi-Fi (Min 2 Mbps Dedicated) Application Development environment (Suitable alternates may be added, as suited to local demands): • DOT Net, Visual studio 2010 – ultimate, IIS 7.5 • SQL server 2008 R2, JAVA • Eclipse SDE 7.0, Apache Tomcat 6.0 • My SQL & work bench 5.2, Oracle 11G – express edition • Selenium IDE, Selenium WebDriver, Active Scripting Engine Jscript, VB Script • QTP (Quick Test Professional) tool • Scripting and Programming environments for C, C++, SQL, Java, .Net and VB • Unit Testing Tool – Junit	T:10 P:30

9.	SSC/N9014 Implement & Improve the Gender Sensitivity, PWD (Person/People with Disability) Sensitivity and Greening T:05:00 P:20:00 (HH:MM)	Module 13: Inclusive and Environmentally Sustainable Workplaces	• Describe different approaches for efficient energy resource tilization and waste management. • Describe the importance of following the diversity policies. • Identify stereotypes and prejudices associated with people with disabilities and the negative consequences of prejudice and stereotypes. • Discuss the importance of promoting, sharing, and implementing gender equality and PwD sensitivity guidelines at organization level. • Practice the segregation of recyclable, non-recyclable and hazardous waste generated. • Demonstrate different methods of energy resource use optimization and conservation. • Demonstrate essential communication methods in line with gender inclusiveness and PwD sensitivity.	SSC/N9014 Pc1, PC2, PC3, PC4, PC5, PC6, KU1, KU2, KU3, KU4, KU5, KU6, KU7, KU8, KU9, KU10, KU11, KU12	Activity: Prepare a sample checklist and monitor energy usage, Elocution Session on PWD compliance issued by the government of India, Written Test on gender equality and workplace	Labs equipped with the following: PCs/Laptops Internet with Wi-Fi (Min 2 Mbps Dedicated) Microphone / voice system for lecture and class activities	T:05 P:20
5	Bridge Module Employability Skills T: 24:00 P: 36:00 (HH:MM)	Module 10. Introduction to Employability Skills	Discuss the importance of learning employability skills Illustrate on the future of work skills and reducing skill gaps	NA	Team Activity: Round of Interactive discussion	Whiteboard and Markers Chart paper and sketch pens LCD Projector and Laptop for presentations.	T: 2 P: 2
		Module 11. Constitutional Values: Citizenship	Discuss the guiding principles of the constitution of India Identify the use and importance of protecting environment	NA			T: 2 P: 2

		Module 12 Becoming a Professional in the 21st Century	Identify potential skills for employability Practice critical thinking and decision making skills	NA			T: 2 P: 2
		Module 13 Basic English Skills	Discuss the purpose and use of learning English Practice basic English words, sentences and punctuation Demonstrate active listening and reading skills Practice writing applications and formal notations	NA	Team Activity: Role play, video session		T: 3 P: 4
		Module 14 Communication Skills	Explain the importance of communication at workplace Practice verbal and non-verbal communication Demonstrate effective communication strategies Practice methods to enhance workplace communication	NA			T: 3 P: 4
		Module 15 Essential Digital Skills	Illustrate on the use and features of MS Office tools, like MS Word, MS Excel, MS PowerPoint, etc. Demonstrate practical knowledge of the use of computers Show the use of search engines and internet Discuss on the purpose and use of e-mail communication Practice using mobile applications	NA			T: 2 P: 4
		Module 16 Diversity and Inclusion	Explain the need and features of diversity at workplace Illustrate the PwD policies applicable at workplace Illustrate the use and features of inclusive approach in workplace	NA	Team Activity: Round of Interactive discussion		T: 2 P: 4

		Module 17 Financial and Legal Literacy	Discuss about money management Discuss the basics of banking services Practice online banking features Discuss about legal literacy and it's purpose	NA			T: 2 P: 4
		Module 18 Career Developme nt and Goal-Setting	Discuss about the process of career development Explain how to build a career pathway Conduct job market research Show how to decide and set career goals.	NA		Whiteboard and Markers Chart paper and sketch pens LCD Projector and Laptop for presentations.	T: 2 P: 3
		Module 19 Customer Service	Identify the features of customer service and management Identify types of customers and how to deal with them Practice customer handling skills Demonstrate customer communication skills Identify methods to get customer feedback and how to implement them	NA	Team Activity: Role play, video session		T: 2 P: 3
		Module 20 Apprentice ships and Jobs	Practice personal grooming strategies Practice resume making Practice preparing for interviews Show how to handle interviews, negative and positive responses, etc. Illustrate the use of online platforms for job hunting Discuss the concept of Apprenticeships Show how to enroll on Apprenticeship programs.	NA			T: 2 P: 4
						On The Job Training	**60**
						Total Duration	**330**

Annexure-II

Assessment Criteria

CRITERIA FOR ASSESSMENT OF TRAINEES

AssessmentCriteriafor IT-ITeS SSC -Test Engineer	
Job Role	**Test Engineer**
Qualification Pack Name & Ref. ID	**SSC/Q7001**
Sector Skill Council	**IT-ITES Sector Skill Council**

S.No	Guide lines for Assessment
1.	Criteria for assessment for each Qualification File will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC
2.	The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3.	Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective / option NOS/set of NOS
4.	Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below)
5.	Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criterion
6.	To pass a QF, a trainee should score an average of 70% across generic NOS' and a minimum of 70% for each technical NOS
7.	In case of unsuccessful completion, the trainee may seek reassessment on the Qualification File.

				MARKS ALLOCATIONS	
Assessable Outcomes	**Assessment criteria for the outcome**	**Total Marks**	**Out of**	**Theory**	**Skills Practical**
1. SSC/N1301: Design tests for software products/applications/modules	**PC1.** identify any issues with the requirements for testing and clarify these with supervisors	**100**	10	10	-
	PC2. access reusable scenarios, test cases, scripts, and tools from the organization's knowledge base		5	-	5

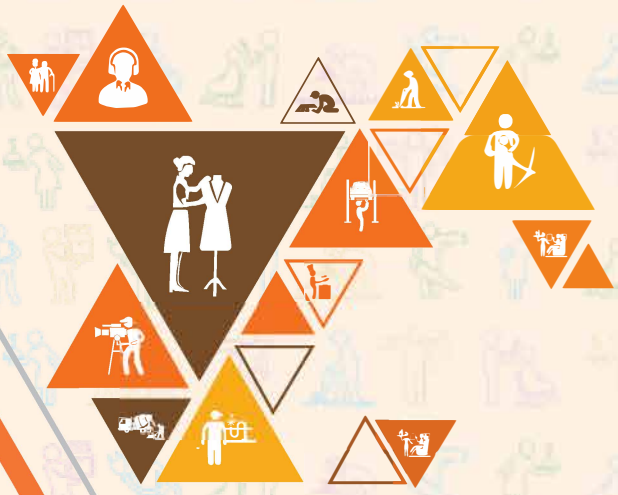
	PC3. create or modify high level scenarios and test cases relevant to the requirements		15	-	15
	PC4. create or modify automated scripts and test data as per requirement		15	-	15
	PC5. review and rework on the test plan, test cases and/or automated scripts with consultation from supervisor or industry experts		30	10	20
	PC6. submit the test plan, test cases and/or automated scripts for approval by experts		5	5	-
	PC7. update the organization's knowledge base with the inputs for designing tests for software products/applications/modules		10	-	10
	PC8. comply with the organization's policies, procedures and guidelines when designing tests for software products/applications/modules		10	-	10
		Total	**100**	**25**	**75**
2.SSC/N1302: Carry out automated tests on software products/applications/modules	**PC1.** establish with superiors the nature of testing to be carried out and the test management tool to be used	**100**	6.25	6.25	-
	PC2. verify that the latest and correct versions of the test cases and automated scripts are used		25	-	25
	PC3. execute the automated test scripts according to instructions		12.5	-	12.5
	PC4. log the test progress, results and defects discovered, using the agreed test management tool		18.75	-	18.75
	PC5. analyze the results to develop a clear understanding of the defects and discuss the same during defect management discussions		25	6.25	18.75

	PC6. obtain advice and guidance from industry experts in case of problems with testing that are beyond the level of competence		6.25	6.25	-
	PC7. comply with the organization's policies, procedures and guidelines when carrying out automated tests on software products/applications/modules		6.25	6.25	-
		Total	**100**	**25**	**75**
SSC/N1303: Carry out manual tests on software products/ applications/ modules	**PC1.** Verify that the latest and correct versions of the test cases and automated scripts are used	**100**	18.75	6.25	12.5
	PC2. execute the manual test scripts according to instructions and act in event of failure		12.5	-	12.5
	PC3. verify conformance to usability guidelines in case of usability testing		12.5	-	12.5
	PC4. log the test progress, results and defects discovered, using the agreed test management tool		12.5	-	12.5
	PC5. analyze results to develop a clear understanding of the defects and discuss the same in open houses		25	12.5	12.5
	PC6. obtain advice and guidance from supervisors in case problems with testing are beyond the level of competence		6.25	6.25	-
	PC7. comply with the organization's policies, procedures and guidelines when carrying out manual tests on software products /applications /modules		12.5	-	12.5
		Total	**100**	**25**	**75**

8. SSC/N9014: Maintain an inclusive, environmentally sustainable workplace	**PC1.** optimize usage of electricity/energy, materials, and water in various tasks/ activities/ processes and plan the implementation of energy efficient systems in a phased manner	**20**	20	5	15
	PC2. segregate recyclable, non-recyclable and hazardous waste generated for disposal or efficient waste management		20	5	15
	Respect diversity and strengthen practices to promote equity (equality)/inclusivity		60	10	50
	PC3. understand the diversity policy of the organization and use internal & external communication to colleagues to improve		15	5	10
	PC4. comply with PwD inclusive policies for an adaptable and equitable work environment		10	-	10
	PC5. improve through specifically designed recruitment practices, PwD friendly infrastructure, job roles, etc.		20	-	20
	PC6. use and advocate for appropriate verbal/nonverbal communication, schemes, and benefits of PwD		15	5	10
		Total	**100**	**80**	**100**
Employability NOS for 60 Hours	**PC1.** Introduction to Employability Skills		4	4	-
	Pc2. Constitutional values – Citizenship		4	4	-
	PC3. Becoming a Professional in the 21st Century		12	12	-
	PC4. Basic English Skills		12	6	6
	Pc5. Career Development & Goal Setting		6	3	3
	PC6. Communication Skills		8	3	5
	PC7. Diversity & Inclusion		4	4	-

	PC8. Financial and Legal Literacy		10	4	6
	PC9. Essential Digital Skills		16	6	10
	PC10. Entrepreneurship		8	2	6
	PC11. Customer Service		6	2	4
	PC12. Getting Ready for Apprenticeship & Jobs		10	4	6
		Total	**100**	**20**	**80**

Notes



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