



NATIONAL SKILLS QUALIFICATION

LEVEL 3

TITLE:

Programming with Java

YEAR: 2024

NATIONAL SKILLS QUALIFICATION

NSQ LEVEL 3- *PROGRAMMING WITH JAVA*

GENERAL INFORMATION

QUALIFICATION PURPOSE

This qualification is designed to equip learners to acquire fundamental knowledge & Understanding of Java programming syntax and structure, including basic concepts of object-oriented programming (OOP).

QUALIFICATION OBJECTIVES

At the learner should be able to:

- i. Understand Java syntax, variables, and basic control structures.
- ii. Know Fundamental Object-Oriented Programming concepts
- iii. Develop simple Java programs that include basic input/output.
- iv. Develop problem-solving skills using Java.

Mandatory Units

Unit No	Reference Number	NOS Title	Credit Value	Guided Learning Hours	Remark
1	ICT/JAVA/001/L3	Health and Safety	2	20	Level 3
2	ICT/JAVA/002/L3	TeamWork	2	20	Level 3
3	ICT/JAVA/003/L3	Communication in Workplace	2	20	Level 3
4	ICT/JAVA /004/L3	Understand Object-Oriented Programming (OOP) in Java	3	30	Level 3
5	ICT/JAVA /005/L3	Understand basics Java: Variables, data types, operators, control structures	3	30	Level 3
6	ICT/JAVA /006/L3	Exception handling and debugging	3	30	Level 3
7	ICT/JAVA /007/L3	Understand Arrays, Strings, and Collections	3	30	Level 3
			18	180	

NATIONAL SKILLS QUALIFICATION

LEVEL 3: *PROGRAMMING WITH JAVA FOUNDATIONS*

Unit 1: OCCUPATIONAL HEALTH AND SAFETY

Unit Reference Number: ICT/JAVA/001/L3

NSQ Level: 3

Credit Value: 3

Guided Learning Hours: 30

Unit Purpose: This Unit aims to equip trainees with health and safety knowledge to build & work in conducive workspace, practice safe habits during programming activities, and mitigate the risks associated with prolonged computer use.

Unit assessment requirements/ evidence requirements:

Assessment must be carried out in real workplace environment in which learning and human development is carried out.

Assessment methods to be used include:

1. Direct Observation/oral questions (DO)
2. Question and Answer (QA)
3. Witness Testimony (WT)
4. Assignment (ASS)

UNIT 01: OCCUPATIONAL HEALTH AND SAFETY

LEARNING OBJECTIVE (LO)		PERFORMANCE CRITERIA	Evidence Type						Evidence Ref. Page No.			
The learner will:		The learner can:										
LO 1: Understand the Basics of Health & Safety	1.1	Demonstrate Proper Workstation Setup										
	1.2	Explain Frequent Breaks										
	1.3	State factors that prevent eye level & neck strains										
	1.4	Explain the Use of 20-20-20 Rule										
	1.5	Explain the effects of Screen Brightness										
LO 2: Understand Electrical Safety	2.1	Define key electrical safety terms (e.g., voltage, current, resistance, grounding, circuit breaker).										
	2.2	Explain the principles of electrical safety, including Ohm's Law and Kirchhoff's Laws.										
	2.3	Identify potential electrical hazards in the workplace (e.g., exposed wires, faulty equipment, wet conditions).										
	2.4	Recognize the signs and symptoms of electrical shock.										
	2.5	Demonstrate Proper Use of Electrical Devices										
LO 3: Understand Mental Health and Wellbeing	3.1	Describe factors which aid stress management.										
	3.2	Explain the importance of regular exercise leading to long working hours.										
	3.3	Define key mental health terms (e.g., mental health, mental illness, stress, anxiety, depression).										
	3.4	Explain the importance of mental health and wellbeing.										
LO 4: Understand Online Safety & Cyber security	4.1	Identify common mental health issues and their symptoms.										
	4.2	Recognize the factors that can affect mental health (e.g., genetics, environment, lifestyle).										
	4.3	Understand the impact of mental health on work performance and relationships.										
	4.4	Define key mental health terms (e.g., mental health, mental illness, stress, anxiety, depression).										
	4.5	Explain the importance of mental health and wellbeing.										

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LEVEL 3: *PROGRAMMING WITH JAVA FOUNDATIONS*

Unit 2: Team work

Unit Reference Number: ICT/JAVA/002/L3

NSQ Level: 3

Credit Value: 3

Guided Learning Hours: 30

Unit Purpose: This Unit aims to equip trainees with knowledge and skills on hands - on remote communications skills.

Unit assessment requirements/ evidence requirements:

Assessment must be carried out in real workplace environment in which learning and human development is carried out.

Assessment methods to be used include:

1. Direct Observation/oral questions (DO)
2. Question and Answer (QA)
3. Witness Testimony (WT)
4. Assignment (ASS)

UNIT 2: Team work

LEARNING OUTCOME (LO)		PERFORMANCE CRITERIA	Evidence Type	Evidence Ref. No.	Page No.
The learner will:		The learner can:			
LO 1: Understand Version Control Collaboration	1.1	Define Pair Programming			
	1.2	Explain importance of Pair programming			
	1.3	Demonstrate how Pair programming promotes solving coding challenges.			
	1.4	Working on group projects where each team member contributes code using branches, commits, and pull requests.			
	1.5	Resolving merge conflicts together.			
	1.6	Carry out pull, push, & commit for clarity when committing changes during development			
LO 2: Understand Agile Methodologies	2.1	Define Agile Methodology			
		Explain sprints, standups, and retrospectives.			
	2.2	Carry out role of a Scrum or Kanban environment where each Trainee has a role (e.g., Scrum Master, Developer).			
		Describe Daily Standups and it's principles			
	2.3	Demonstrate daily standups to report on progress, blockers, and next steps.			
	2.4	Conduct sprint planning and retrospectives to improve teamwork.			
LO 3: Code Reviews and Pair Programming	3.1	Define Pair Programming			
	3.2	Explain importance of Code Review			
	3.3	Explain Pair programming through code reuse/review in real-time.			
LO 4: Project Management Tools (e.g., Jira, Trello)	4.1	Define boards (Scrum boards in Jira, Kanban boards in Trello) for visualizing tasks.			
	4.2	Explain the importance of boards (Scrum boards in Jira, Kanban boards in Trello) for visualizing tasks.			
	4.3	Explain how tasks are created, assigned, and categorized.			
	4.4	Describe list representation of different stages of work (e.g., To-Do, In Progress, Done).			
	5.1	Describe Reporting and Analytics on Jira-specific particularly areas such as			

LEARNING OUTCOME (LO)		PERFORMANCE CRITERIA	Evidence Type				Evidence Ref. Page No.			
The learner will:		The learner can:								
LO 5: Understand Progress & Reports Tracking		velocity reports, issue reports, cycle time								
	5.2	Describe Dependencies using case study of building a shopping cart system.								
	5.3	Carry out Tracking Progress and Updating Status such as Burndown, Task Movement, Task updates								
	5.4	Carry out Issue Tracking and Bug Reporting i.e. Issue creation, Issue lifecycle, Bug priority								
	5.5	Carry out Retrospective and Continuous Improvement on retrospective board with action items.								
	5.6	Describe Collaboration and Communication on comments made, attachments, notifications								

Resources required

- Jira and Trello
- Slack or Microsoft Teams
- GitHub/GitLab
- Visual Studio Code Live Share
- Jet Brains
- Miro or FunRetro
- IntelliJ IDEA, Maven

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LEVEL 3: JAVA PROGRAMMING FOUNDATIONS

Unit: 3 Communications in Workplace

Unit Reference Number: ICT/JAVA/003/L3

NSQ Level: 3

Credit Value: 3

Guided Learning Hours: 30

Unit Purpose: The purpose of the Communication Skills in the Workplace unit aims to train trainees with essential communication abilities that are critical for professional practice in programming with java.

Unit Objectives:

At the end of this unit, the learner should be able to:

1. Develop effective verbal and non-verbal communication skills to engage with colleagues, clients, and stakeholders professionally.
2. Enhance written communication abilities to produce clear, error-free emails, reports, and workplace documents.
3. Apply communication strategies to collaborate in cross-functional teams and diverse workplace settings.
4. Demonstrate conflict resolution skills through empathetic and constructive communication techniques to resolve workplace issues effectively.

Unit assessment requirements/ evidence requirements:

Assessment must be carried out in real workplace environment in which learning and human development is carried out.

Assessment methods to be used include:

1. Direct Observation/oral questions (DO)
2. Question and Answer (QA)
3. Witness Testimony (WT)
4. Assignment (ASS)

UNIT 3: Communication in Workplace

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type				Evidence Ref. Page No.			
LO 1: Develop Clear and Effective Verbal Communication	1.1	Define Communications in workplace								
	1.2	State Advantages and Disadvantages of Communications								
	1.3	Explain the need for continuous communications while programming								
	1.4	Differentiate between code comments, documentations, and messages in communication.								
	1.5	Use appropriate language and tone when communicating with different stakeholders in the workplace.								
	1.6	Clearly articulate tasks, instructions, or requests to colleagues and customers to avoid misunderstandings.								
	1.7	Maintain active listening skills by asking clarifying questions and providing feedback during conversations.								
LO 2: Use Written Communication for Workplace Correspondence	2.1	Demonstrate clear, concise, and professional emails or memos that reflect the intended message.								
	2.2	Demonstrate all written communication is free from errors in grammar, spelling, and punctuation.								
	2.3	Demonstrate the writing style based on the recipient (formal communication with clients, less formal with internal colleagues).								
LO 3: Apply Non-Verbal Communication Techniques in the Workplace	3.1	Demonstrate the Use of positive body language (maintaining eye contact, nodding, open posture) to show attentiveness and engagement during interactions.								
	3.2	Recognize and appropriately respond to the non-verbal cues of others in conversations, such as facial expressions or tone of voice.								
	3.3	Explain ways to Avoid distracting or negative body language, such as crossed arms or lack of eye contact, which may convey disinterest or disengagement.								

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type	Evidence Ref. Page No.
LO 4: Communicate Effectively in Cross-Functional Teams	4.1	Explain open dialogue by actively seeking input and feedback from team members across various departments.		
	4.2	Demonstrate the Use of technical and non-technical language appropriately to bridge communication gaps between teams with different expertise.		
	4.3	Carry out team discussions by summarizing points clearly and ensuring all team members understand the objectives.		
	4.4	Demonstrate cultural sensitivity and respect when communicating with individuals from different backgrounds		

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LEVEL 3: *PROGRAMMING WITH JAVA FOUNDATIONS*

Unit 4: OBJECT ORIENTED PROGRAMMING (OOP)

Unit Reference Number: ICT/JAVA/004/L3

NSQ Level: 3

Credit Value: 3

Guided Learning Hours: 30

Unit Purpose: This Unit aims to equip learner with knowledge and skills in Oriented Programming (OOP).

Unit assessment requirements/ evidence requirements:

Assessment must be carried out in real workplace environment in which learning and human development is carried out.

Assessment methods to be used include:

1. Direct Observation/oral questions (DO)
2. Question and Answer (QA)
3. Witness Testimony (WT)
4. Assignment (ASS)

UNIT 4: UNDERSTAND OBJECT-ORIENTED PROGRAMMING (OOP) IN JAVA

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
LO 1: Classes and Objects	1.1	Declare a class in Java, including attributes (fields) and methods.									
	1.2	Instantiate objects from a class and demonstrate the relationship between a class and an object.									
	1.3	Explain the purpose of constructors in OOP and in Java.									
	1.4	Demonstrate how to use constructors to initialize objects									
	1.5	Demonstrate the creation and use of multiple objects from the same class.									
	1.6	Carry out ways to Access and modify object fields using methods (getters/setters)									
LO 2: Understand Inheritance	2.1	Define Inheritance									
	2.2	Explain the importance of Inheritance									
	2.3	Mention all inheritance keywords									
	2.4	Define a subclass that inherits from a superclass using code.									
	2.5	Apply the <code>extends</code> keyword to create a class hierarchy.									
LO 3: Understand Polymorphism	3.1	Define Polymorphism & Methods									
	3.2	Explain the importance of Polymorphism to OOP									
	3.3	Describe Polymorphism in context of method Overloading and Method Overriding									
	3.4	Demonstrate how to Override superclass methods in the subclass to provide specific functionality									
	3.5	Use the <code>super</code> keyword to access superclass members from a subclass.									
	3.6	Explain and demonstrate the difference between <code>IS-A</code> and <code>HAS-A</code> relationships.									
	3.7	Implement method overriding to achieve runtime polymorphism (dynamic binding).									
	3.8	Demonstrate method overloading for compile-time polymorphism (static binding).									

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LEVEL 3: *PROGRAMMING WITH JAVA FOUNDATIONS*

Unit 5: UNDERSTAND BASICS JAVA: VARIABLES, DATA TYPES, OPERATORS, CONTROL STRUCTURES

Unit Reference Number: ICT/JAVA/004/L3

NSQ Level: 3

Credit Value: 3

Guided Learning Hours: 30

Unit Purpose: This unit aims to equip learner with knowledge and skills on variables are, the scopes, data types and control structures.

Unit assessment requirements/ evidence requirements:

Assessment must be carried out in real workplace environment in which learning and human development is carried out.

Assessment methods to be used include:

1. Direct Observation/oral questions (DO)
2. Question and Answer (QA)
3. Witness Testimony (WT)
4. Assignment (ASS)

UNIT 5: JAVA BASICS

LEARNING OBJECTIVE (LO)		PERFORMANCE CRITERIA	Evidence Type	Evidence Ref. Page No.
The learner will:		The learner can:		
LO 1: Understanding Variables,	1.1	Define Java as OOP Language		
	1.2	Explain brief History behind Java		
	1.3	Explain Variables		
	1.4	Describe the scope of variables (local, instance, and class variables)		
	1.5	Explain appropriate naming conventions for variables according to Java standards.		
LO 2: Understand Data Types	2.1	Define Data types		
	2.2	Differentiate between primitive and reference data types (arrays, objects).		
	2.3	Explain importance of Data Types to programming		
	2.4	Use wrapper classes (Integer, Double, etc.) when necessary		
LO 3: Understand OOP Operators	3.1	Define Java Operators		
	3.2	Describe when to use operators		
	3.3	Explain arithmetic operators (+, -, *, /, %) to perform mathematical operations.		
	3.4	Use relational operators (==, !=, >, <, >=, <=) for comparison.		
	3.5	Implement logical operators (&&, , !) to create complex conditions.		
	3.6	Demonstrate the use of increment and decrement operators (++ , --) correctly		
LO 4: Understand Control Structures	4.1	Define Control Structures in Java		
	4.2	Explain the role of control structures in Java		
	4.3	Explain the Use of if statement, else if statement, & switch statements to implement decision-making structures.		
	4.4	Implement switch statements for multi-branch conditional logic.		
	4.5	Describe the importance of Loops in Java		
	4.6	Explain for, while, and do-while loops to control iterative processes.		
	4.7	Use break and continue to control loop execution.		
	4.8	Demonstrate nesting of control structures (if within a for loop).		
	4.9	Handle infinite loops and avoid common pitfalls in loop structures.		

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Unit 6: EXCEPTION HANDLING & DEBUGGING

Unit Reference Number: ICT/JAVA/006/L3

NSQ Level: 3

Credit Value: 3

Guided Learning Hours: 30

Unit Purpose: This unit aims to equip learner with knowledge and skills on OOP skills to **exception handling** and **debugging** in Java.

Unit assessment requirements/ evidence requirements:

Assessment must be carried out in real workplace environment in which learning and human development is carried out.

Assessment methods to be used include:

1. Direct Observation/oral questions (DO)
2. Question and Answer (QA)
3. Witness Testimony (WT)
4. Assignment (ASS)

UNIT 6: Exception Handling and Debugging

LEARNING OBJECTIVE (LO)		PERFORMANCE CRITERIA	Evidence Type	Evidence Ref. No.	Page No.
The learner will:		The learner can:			
LO 1: Understand Exception Handling in Java	1.1	Define the concept of exceptions			
	1.2	Differentiate between checked and unchecked exceptions.			
	1.3	Explain how to Use <code>try</code> , <code>catch</code> , and <code>finally</code> blocks to handle exceptions			
	1.4	Implement <code>throw</code> and <code>throws</code> keywords to raise exceptions and declare exceptions in method signatures.			
	1.5	Explain how to Handle other common built-in exceptions such as <code>IOException</code> , <code>NullPointerException</code> , and <code>ArrayIndexOutOfBoundsException</code> .			
	1.6	Create and use custom exception classes to handle application-specific errors.			
LO2: Understand Debugging Techniques in Java	2.1	Demonstrate ways to Utilize IDE-based debugging tools (breakpoints, step execution, and variable inspection) to identify and resolve issues.			
	2.2	Interpret stack traces, logs, and error messages to diagnose problems in the code.			
	2.3	Demonstrate how to print statements with <code>System.out.println()</code> or use logging frameworks (Log4j , SLF4J) for structured debugging and tracking.			
	2.4	Debug logical errors that do not trigger exceptions by analyzing code behavior and output.			
	2.5	Use unit testing frameworks (e.g., JUnit) to test individual components and ensure code correctness before integrating it into larger systems.			

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Unit 7: Arrays, Strings, and Collections

Unit Reference Number: ICT/JAVA/007/L3

NSQ Level: 3

Credit Value: 3

Guided Learning Hours: 30

Unit Purpose: This unit aims to equip learner with knowledge and skills on arrays, strings, and collections, across wide range of programming tasks.

Unit assessment requirements/ evidence requirements:

Assessment must be carried out in real workplace environment in which learning and human development is carried out.

Assessment methods to be used include:

1. Direct Observation/oral questions (DO)
2. Question and Answer (QA)
3. Witness Testimony (WT)
4. Assignment (ASS)

Unit 7: ARRAYS, STRINGS, AND COLLECTIONS

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type	Evidence Ref. Page No.
LO1: Understand Arrays	1.1	Declare and initialize arrays of different data types (e.g., <code>int</code> , <code>double</code> , <code>String</code>).		
	1.2	Demonstrate how to Access and modify array elements using indices.		
	1.3	Carry out Iteration over arrays using loops (e.g., <code>for</code> , <code>enhanced for</code>).		
	1.4	Demonstrate the use of multi-dimensional arrays for complex data structures.		
	1.5	Describe how to Utilize built-in array methods for sorting and searching (e.g., <code>Arrays.sort()</code> , <code>Arrays.binarySearch()</code>).		
	1.6	Explain how to Handle common array operations such as resizing and copying.		
LO2: Understand Strings in Java	2.1	Create and manipulate <code>String</code> objects using methods from the <code>String</code> class (e.g., <code>substring()</code> , <code>concat()</code> , <code>replace()</code>).		
	2.2	Use <code>StringBuilder</code> and <code>StringBuffer</code> for mutable string operations and efficient string concatenation.		
	2.3	Apply string formatting techniques using <code>String.format()</code> and <code>printf()</code> .		
	2.4	Perform common string operations such as splitting, trimming, and checking for substrings.		
	2.5	Explain the use of regular expressions for advanced string matching and manipulation.		
LO3: Understand Collections	3.1	Define Java Collections Framework and its core interfaces (e.g., <code>List</code> , <code>Set</code> , <code>Map</code>).		
	3.2	Implement the use of common collection classes such as <code>ArrayList</code> , <code>LinkedList</code> , <code>HashSet</code> , <code>TreeSet</code> , <code>HashMap</code> , and <code>TreeMap</code> .		
	3.3	Perform basic operations on collections including adding, removing, and accessing elements.		

LEARNING OBJECTIVE (LO)		PERFORMANCE CRITERIA	Evidence Type					Evidence Ref. Page No.			
		The learner can:									
The learner will:											
	3.4	Demonstrate Iteration over collections using iterators and enhanced for loops.									
	3.5	Carry out sorting and searching methods available in the collections framework (e.g., <code>Collections.sort()</code> , <code>Collections.binarySearch()</code>).									
	3.6	Explain generic types to ensure type safety in collections.									
	3.7	Describe collection operations such as filtering and mapping using Java Streams API.									

PARTICIPANT FOR CRITIQUE WORKSHOP

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