**LEARNER WORKBOOK**

**SAQA: 14915**

**DESIGN A COMPUTER PROGRAM ACCORDING TO GIVEN SPECIFICATIONS**

**FURTHER EDUCATION AND TRAINING CERTIFICATE: INFORMATION TECHNOLOGY: SYSTEMS DEVELOPMENT**

**ID 78965 LEVEL 4 – CREDITS 165**

# Learner Information:

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| --- | --- |
| **Details** | **Please Complete this Section** |
| Name & Surname: | Mila Ngewu |
| Organisation: | Nelson Mandela Bay Ihub |
| Unit/Dept: | ICT |
| Facilitator Name: | Anneline Nombeko |
| Date Started: | 05 September 2023 |
| Date of Completion | 06 September 2023 |

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**OVERVIEW**

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| **About the Learner Workbook** | This Learner Exercise Workbook has been designed and developed to evaluate learners’ level of understanding of the **Design a computer program according to given specifications.** It forms part of a series of Learner Workbooks that have been developed for **FURTHER EDUCATION AND TRAINING CERTIFICATE: INFORMATION TECHNOLOGY: SYSTEMS DEVELOPMENT ID 78965**  **LEVEL 4 – CREDITS 165** | | |
| **Purpose** | The purpose of this Learner Exercise Workbook is to evaluate learners understanding on the specific outcomes and/or assessment criteria of the following SAQA Registered Unit Standards: | | |
| **US No** | **US Title** | **Level** | **Credits** |
| **14915** | **Design a computer program according to given specifications** | **4** | **8** |
| **Context** | This assessment represents the Formative Assessment component of the **FURTHER EDUCATION AND TRAINING CERTIFICATE: INFORMATION TECHNOLOGY: SYSTEMS DEVELOPMENT**  **ID 78965 LEVEL 4 – CREDITS 165** and should be completed in the classroom/training room. | | |
| **Resources** | The following are resources needed for this assessment:   * Learner Guide; and * Assessment Preparation. | | |
| **Instructions to**  **Facilitators** | Facilitators will be required to: | | |

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|  | * Explain the completion of the workbook to each learner; and * Interview the learner on similar questions, should he/she   not be able to write. |
| **Instructions to Learners** | Learners will be required to:   * Complete the workbook as per the instructions; * Ensure that all questions are completed; * Ensure that the completion of the workbook is their own work; * Ensure that all annexure are attached to the workbook   and clearly referred to; |
| **Assessment**  **Time** | Learners are required to complete this assessment within the  allocated time frame of. hours. |
| **Total Mark** | This formative assessment carries a total mark of **\_ points**. In order to meet the pass mark, learners are required to achieve  a minimum of **80%** of the total marks. |
| **Equipment** | Learners are required to have the following equipment in order to complete this workbook:   * Pen and Pencil; * Ruler; and * Exam Pad – for additional paper. |

# GENERAL INFORMATION

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| **LEARNER DETAILS** | | |
| **Learner Full Names** | **Ngewu Mila Mihlali** | |
| **Learner ID No.:** | **9909106615084** | |
| **Organisation:** | **Nelson Mandela Ihub** | |
| **Unit/Dept:** | **ICT** | |
| **Contact Details:** | **Telephone /Cell**  **Numbers:** | **Email Address:** |
| 0823655804 | [ngewumila007@gmail.com](mailto:ngewumila007@gmail.com) |
| **WORKSHOP DETAILS** | | |
| **Workshop Venue:** | **NMB iHUB** | |
| **Facilitator Name:** | **Anneline Nombeko** | |
| **Date Started:** | **05 September 2023** | |
| **Date Completed:** | **06 September 2023** | |

**ASSESSMENT PREPARATION CHECKLIST**

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| **DESCRIPTION** | **YES** | **NO** | **COMMENTS/CONTINGENCY** |
| This assessment is a formative assessment and it is based on the outlined unit standard/s for the **Design a computer program according to given specifications**  module. | ✔ |  |  |
| Your assessment evidence for **Design a computer program according to given specifications** module needs to be submitted on....... (day) of...............(month)...........(year) at the following  address/place................................................................ | ✔ |  |  |
| You will be assessed based on the outlined Unit Standards. The assessment activities are linked to specific outcomes/assessment criteria of the outlined  Unit Standards. | ✔ |  |  |
| To determine your competence level, the following are the methods to be used for this assessment:   * ..................................................... * ..................................................... | ✔ |  |  |
| To be declared competent on **Design a computer**  **program according to given specifications** module | ✔ |  |  |

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| (formative assessment), you should have obtained at  least 80% of the total mark of this assessment. | ✔ |  |  |
| You will be provided with detailed feedback on your performance of this assessment as follows:   * Written Feedback * Verbal Feedback | ✔ |  |  |
| Should you be declared “not yet competent” on this  assessment, you will be entitled for re-assessment opportunity/ies. | ✔ |  |  |
| You will be required to re-submit evidence (only for areas) you were declared not yet competent. A date  for re-submission will be agreed with the assessor. | ✔ |  |  |
| You will be entitled to lodge an appeal should you not be satisfied with the assessment decision of your  assessment. | ✔ |  |  |
| You will be required to provide the assessor feedback on assessment procedure – this is to assist in improving  the assessment practices. | ✔ |  |  |
| Your results of assessment and portfolio of evidence  information will not be provided to any person without your written consent. | ✔ |  |  |

**Learner’s Declaration**

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| I Mila Mihlal Ngewu herewith declare that I am ready for the assessment, that we have reviewed the assessment preparation and plan, I understand the assessment process and I am happy that  the assessment will be conducted in a fair manner. | | | |
| **Learner Signature:** | **Date:** | **Facilitator Signature:** | **Date:** |
|  | 06 September 2023 |  | 06 September 2023 |

Learning Unit1

**UNIT STANDARD NUMBER :** 14915

**LEVEL ON THE NQF :** 4

**CREDITS :** 8

**FIELD :** Physical, Mathematical, Computer and Life Sciences

**SUB FIELD :** Construction Information Technology and Computer Sciences

Apply the fundamental principles of procedural programming design techniques.

1.

Qualifying learners are able to:

to provide a proficient knowledge of the areas covered.

for those entering the workplace in the area of systems development.

1.

2.

This unit standard is intended:

**PURPOSE:**

|  |  |
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|  | 1. Demonstrate an understanding of the features of a procedural computer program that will solve a given simple problem. 2. Operate procedural computer program development toolsThe performance of   all elements is to a standard that allows for further learning in this area. |
| **LEARNING ASSUMED TO BE IN PLACE:** | |
| Open.  The credit value of this unit is based on a person having the prior knowledge and skills to:  1. be able to apply the principles of Computer Programming (SGB-ID = SDG001). | |

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| **SESSION 1.**  **Apply the fundamental principles of program design techniques to the given specification.** |
| **Learning Outcomes** |
| * 1. The application includes the drawing of a program structure diagram for a given simple problem. * 2. The application includes the drawing of a decision tree for a given simple problem. * 3. The application includes the creation of a decision table for a given simple problem * 4. The application allows previously-prepared design technique outputs to be read   and desk-checked for accuracy. |



**Answer the following questions according to the instructions provided**

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| **Activity** | **Questions Description** | **Mark** |
| **1** | **Outline key design considerations in designing or architectures** | **5** |

* Determine application type

It is essential to choose the right application type to satisfy the particular needs. Applications must be able to run many client types.Detemine the deployment strategy

* Determine the apprropriate technologies

You must take into account the kind of application you are creating as well as your preferred topologies and architectural designs for its application deployment. These decisions might also be constrained by organizational policies, infrastructure restrictions, and other factors.

* Determine the Deployment Strategy

Your application might be put into use in a variety of contexts, each of which has its own unique set of restrictions, such as the need to physically separate server components, a cap on networking protocols, firewall and router setups, and more.

* + Scalable Architecture

Choose an appropriate architectural pattern (e.g., microservices, monolithic, serverless) based on project requirements.

Ensure components of the architecture can evolve independently.

* ……..(5)

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| **Activity** | **Questions Description** | **Mark** |
| **2** | **List the suitability of Decision trees in Decision Making** | **4** |

* Clearly lays out the issues so that all potential solutions can be contested.
* On the basis of available information and our best assumptions, assist us in making the best selections.
* Allow us to analyze fully the possilble outcomes of the decision.
* Offer a framework for quantifying the worth of outcomes and their chances of being attained.
* ……..(4)

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| **Activity** | **Questions Description** | **Mark** |
| **3** | **Distinguish between Decision trees and Decision tables** | **4** |

# Decision tree

A decision tree is a graph that consistently employs the branching method to illustrate all the consequences of each action.

They are made up of three nodes: decision, chance, and terminal nodes.

# Decision Table

All criteria and actions are listed in a table in a decision table.

whenever the processing logic is intricate and comprises several criteria, they are always applied.

* ……..(4)
* 1. The demonstration includes the research of a problem in terms of inputs and outputs.
* 2. The demonstration includes the features of a procedural computer program that will solve the given problem.
* 3. The demonstration outlines why a batch or online program will be the best solution

to the problem

**Learning Outcomes**

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| **Activity** | **Questions Description** | **Mark** |
| **4** | **Describe the use of sequence diagram** | **5** |

A sequence diagram is a visual representation used in systems analysis and software engineering to show how multiple items interact and communicate.

Sequence diagrams are part of the Unified Modeling Language (UML) and serve several important purposes:

1. Modeling Object Interactions:Sequence diagrams show how various system elements work together to accomplish a certain capability or use case. These

interactions are represented as messages sent and received over time by the objects.

1. Clarifying Use Cases: this is where they detail the step-by-step execution of a use case or scenario. They show the order of interactions and the timing of messages, making it easier to validate and refine use case descriptions.

* ……..(5)

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| **Activity** | **Questions Description** | **Mark** |
| **5** | **Outline why a batch program will be the best solution to the**  **problem** | **5** |

* It can move job processing to a period when the computing resources are less utilized.
* It allows the system to use different priorities for batch and interactive work.
* It prevents idle computing resources by manually intervening and monitoring them minute by minute.
* The computer, especially a costly one, is amortized by keeping an overall record of uterlization.
* ……..(5)
* 1. The operation demonstrates the use of the editor of the development tools to produce procedural program source code
* 2. The operation includes the use of the syntax checker of the tools to check for syntax errors.
* 3. The operation uses the tool to compile the procedural source code produced.

**Learning Outcomes**

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| **Activity** | **Questions Description** | **Mark** |
| **6** | **Describe the use of the syntax checker of the tools to check for**  **syntax errors.** | **5** |

Syntax checkers are tools used in software development to identify and report syntax errors in source code. These errors are typically violations of the programming language's rules for proper syntax, which can prevent the code from being compiled or executed correctly.

1. Input: The input to a syntax checker is the source code written by a developer in a specific programming language. This code can be written in a text editor or an integrated development environment (IDE).
2. Error Detection: The code is scanned by the syntax checker, which then compares it to the established syntax standards. It recognizes any contraventions or departures from these guidelines as syntax mistakes. Missing semicolons, improperly spaced parentheses or braces, undeclared variables, and improper function calls are examples of common syntax mistakes.

* ……..(5)

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| **Activity** | **Questions Description** | **Mark** |
| **7** | **Describe the use of User Defined Functions:** | **3** |

User-defined functions are a fundamental idea in programming and are frequently used in different programming languages to encapsulate a block of code that does a particular operation or calculation. UDFs give programmers the ability to write reused code, organize it better, and modularize complicated programs.

* ……..(3)

**SESSION 4.**

**Apply fundamental principles of problem analysis.**

* The application provides an appreciation of the steps and techniques of program maintenance.
* The application provides examples to demonstrate different problem analysis techniques (at least 2).
* The application uses logic flow techniques to solve given elementary problems.

**Learning Outcomes**

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| **Activity** | **Questions Description** | **Mark** |
| **8** | **Outline steps and techniques of program maintenance.** | **5** |

* Identify the problem by gathering feedback from users
* Analyze the identified problems in detail to understand their root causes and implications.
* Make a maintenance schedule outlining the duties, supplies, and due dates for resolving the found issues.
* Test and debug the program
* Put the program into production
* Maintain and enhance the program
* ……..(5)

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| **Activity** | **Questions Description** | **Mark** |
| **9** | **Distinguish between Desk-checking and Translating.** | **5** |

# Desk-checking

Desk checking is a similar process to proofreading; in this exercise, the programmer runs through lines of code to identify errors and to check logic.

This usually involves creating a table with columns containing line numbers, variables, conditions, and inputs and outputs, depending on the checks he is making.

# Translating

Refers to the process of converting high-level code or specifications into machine code or a lower-level representation that can be executed by a computer.

Translating involves using a compiler or an interpreter to convert human-readable source code (written in high-level languages like C++, Java, Python, etc.) into machine-readable code (usually binary code or intermediate code).

* ……..(5)