REPUBLIC OF KENYA

NATIONAL OCCUPATIONAL STANDARDS

FOR

ICT TECHNICIAN

KNQF LEVEL 5

PROGRAMME ISCED CODE: 061 2454A

APPLY COMPUTER PROGRAMMING PRINCIPLES

UNIT CODE: 0613 451 05A

UNIT DESCRIPTION

This unit covers the competencies required to apply computer programming principles. It involves applying computer programming skills, demonstrating structured programming skills and demonstrating object-oriented programming skills.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace functions	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements ***(Bold and italicized terms are elaborated in the range)***
1. Apply computer programming skills	1.1 Programming language types are identified as per the user requirements.
	1.2 ***Programming paradigms*** are applied as per user requirements.
	1.3 Program development life cycle is applied as per the work requirements.
	1.4 ***Program design tools*** are applied as per the user requirements.
	1.5 ***Program writing tools*** are identified as per the system requirements.
2. Demonstrate structured programming skills	2.1 ***Identifiers*** are declared as per program design specification.
	2.2 Initialization of variables and constants is performed according to program design specifications.
	2.3 User-defined data types are applied as per system requirements.

ELEMENT These describe the key outcomes which make up workplace functions	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements ***(Bold and italicized terms are elaborated in the range)***
	2.4 Computer program input is created as per program design.
	2.5 ***Data control structures*** in a program are applied as per program design requirements.
	2.6 ***Data structures*** in a program are applied as per program design specifications.
	2.7 Computer program subroutines are created as per user needs.
	2.8 Computer program output is coded as per user requirements.
	2.9 Computer program debugging is performed as per work procedures.
	2.10 Computer program is compiled as per system requirements.
3. Demonstrate object-oriented programming skills	3.1 Objects and classes are implemented as per work procedures.
	3.2 Objects methods are declared as per application requirements.
	3.3 Namespaces are applied as per wok procedures.
	3.4 Data abstraction concepts are applied as per work procedures.

ELEMENT These describe the key outcomes which make up workplace functions	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements ***(Bold and italicized terms are elaborated in the range)***
	3.5 Object encapsulations are applied as per work procedures.
	3.6 Class templates are implemented as per application requirements.
	3.7 Class inheritance is implemented as per application requirements.
	3.8 Polymorphism is implemented as per application requirements.

RANGE

This section provides a work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

Variable	Range
1. Programming paradigms may include but not limited to:	● Imperative ● Functional ● Procedural ● Object-oriented
2. Program design tools may include but not limited to:	● Flow charts ● Decision tables ● Decision trees ● Pseudocode ● Algorithm
3. Program writing tools may include but not limited to:	● Text editors ● Compilers Linkers ● Debuggers ● Special Integrated development Environment (IDE)

Variable	Range
4. Identifier may include but not limited to:	● Names assigned to different entities such as variable, functions and arrays.
5. Data control structures may include but not limited to:	● Selection ● Loops ● Sequence
6. Data structures may include but not limited to:	● Arrays ● Queue ● Stack ● Linked lists

REQUIRED KNOWLEDGE AND SKILLS

This section describes the knowledge and skills required for this unit of competency.

Required knowledge

The individual needs to demonstrate knowledge of:

- Structured programming principles.
- Object oriented programming principles.
- Techniques of system analysis and design.
- Software development methodologies.
- Program development techniques.
- Software program testing and debugging techniques.

Required skills

The individual needs to demonstrate the following skills:

- Communications (verbal and written)
- Proficient in ICT
- Time management
- Problem solving
- Planning
- Decision making

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills range.

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Applied program design tools as per the user requirements. 1.2 Created computer program input as per program design. 1.3 Data control structures in a program are applied as per program design requirements. 1.4 Applied data structures in a program as per program design specifications. 1.5 Created computer program subroutines as per user needs. 1.6 Coded computer program output as per user requirements. 1.7 Compiled computer program as per system requirements 1.8 Compiled objects and classes as per work procedures. 1.9 Declared objects methods as per application requirements. 1.10 Applied namespaces as per wok procedures. 1.11 Applied data abstraction concepts as per work procedures. 1.12 Applied object encapsulation as per work procedures. 1.13 Implemented class templates as per application requirements.
2. Resource implications	The following resources should be provided: 2.1 Access to relevant workplace where assessment can take place. 2.2 Appropriately simulated environment where assessment can take place. 2.3 Resources relevant to the proposed activity or tasks.
3. Methods of assessment	Competency in this unit may be assessed through: 3.1 Observation 3.2 Portfolio of evidence 3.3 Interviews

	3.4 Third party reports 3.5 Written assessment 3.6 Practical assessment 3.7 Projects
4. Context of assessment	Competency may be assessed: 4.1 On-the-job 4.2 In a simulated work environment
5. Guidance information for assessment	5.1 Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.