

Assessment Evidence Guide

For

“IoT Programmer”

Level-4

(Summative Assessment)

Dec 2021



**National Vocational & Technical
Training Commission**

Title of Qualification: Level 4 National Qualification Certificate, in Internet of Things (IoT programmer)	CS Code:	Level: 4	Version: 01
Competency Standard Title: Interface Sensors and Actuators Apply Microcontroller interfacing protocols Configure ADC and PWM of a Controller Identify and interface Short Range Wireless Technologies (Wifi, Bluetooth, BLE, Zigbee,) with the microcontrollers	Assessment Date (DD/MM/YY): Assessment Time: 3 Hours		

Candidate Details	Name: Registration/Roll Number:
Guidance for Candidate	<p>To meet this standard, you are required to complete the following within the given time frame (for practical demonstration & assessment):</p> <p>Assessment Task 1: Candidate is required to build a timer circuit to turn on and off LED with 50% duty cycle.</p> <p>And complete:</p> <ol style="list-style-type: none"> Knowledge assessment test (Written or Oral) Portfolios at the time of assessment (if any)
Minimum Evidence Required	<p>During a practical assessment, under observation by an assessor, you will complete:</p> <p>Assessment Task 1</p> <p>Performance Criteria 1: Declare variables according to the requirements</p> <p>Performance Criteria 2: Implement arithmetic expression in program</p> <p>Performance Criteria 3: Run the code to display the correct answer</p> <p>Performance Criteria 4: Use decision statement as per the requirement of problem</p> <p>Performance Criteria 5: Debug the code in case of error</p> <p>Performance Criteria 6: Set loop condition</p> <p>Performance Criteria 7: Set loop invariant</p> <p>Performance Criteria 8: Write the loop as per the requirement of the problem</p> <p>Performance Criteria 9: Declare and initialize array</p> <p>Performance Criteria 10: Access elements of array to perform actions as per requirement of the problem</p>

	<p>Performance Criteria 11: Initialize the function header, with parameters and return type</p> <p>Performance Criteria 12: Declare the function, to perform the assigned task.</p> <p>Performance Criteria 13: Call the user created function as per requirement of problem</p> <p>Performance Criteria 14: Call multiple functions with different parameters and display results.</p> <p>Performance Criteria 15: Include the header file as required by the problem</p> <p>Performance Criteria 16: Call the functions instructed by task from the built-in library.</p> <p>Performance Criteria 17: Run the code to display the correct answer</p> <p>Performance Criteria 18: Access the functions and data of particular objects.</p> <p>Performance Criteria 19: Write the code to open file from program</p> <p>Performance Criteria 20: Write data in that file from the program.</p> <p>Performance Criteria 21: Write code to open another file from program</p> <p>Performance Criteria 22: Read data from that file and display it</p> <p>Performance Criteria 23: Debug the code in case of error</p> <p>Performance Criteria 24: Run the code to display the correct answer</p> <p>Performance Criteria 25: Interrupt handling with button</p> <p>Performance Criteria 26: Setup environment for Raspberry Pi</p> <p>Performance Criteria 27: Perform LED blink with Basic digital write</p> <p>Performance Criteria 28: Control Multiple LEDs with loops and arrays</p> <p>Performance Criteria 29: Control digital input and output</p> <p>Performance Criteria 30: Control LED's glow with Analog Input handling</p> <p>Performance Criteria 31: Control Interrupts with push button</p>
	<p>Portfolios required at the time of assessment (if any) for</p> <p>Performance Criteria 1: Diary log or any other evidence of work completed on Interface Sensors and Actuators</p> <p>Performance Criteria 2: Diary log or any other evidence of work completed on Apply Microcontroller interfacing protocols</p> <p>Performance Criteria 3: Diary log or any other evidence of work completed on Configure ADC and PWM of a Controller</p> <p>Performance Criteria 4: Diary log or any other evidence of work completed on Identify and interface Short Range Wireless Technologies (Wifi,</p> <p>Performance Criteria 5: Diary log or any other evidence of work completed on Bluetooth, BLE, Zigbee,) with the microcontrollers</p>

Continued on following page

Assessors Judgment Guide (to be completed by the Assessor and signed both by the assessor and the candidate after the assessment)

Candidate Details	Name: Registration/Roll Number: Candidate Signature:.....
Assessment Outcome	COMPETENT <input type="checkbox"/> NOT YET COMPETENT <input type="checkbox"/> Name of the Assessor: Assessor's code: Signature of the Assessor:

Assessment Summary (to be filled by the assessor)							
Activity	Method					Result	
Nature of Activity	Written	Oral	Observation	Portfolio	Role Play	Competent	Not Yet Competent
Practical Skill Demonstration			✓				
Knowledge Assessment	✓	✓					
Other Requirement							

Each Assessment Task (with performance criteria)				
Assessment Task 1		Description of assessment task 1		
		Candidate is required to build a timer circuit to turn on and off LED with 50% duty cycle.		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1	Declare variables according to the requirements			
2	Implement arithmetic expression in program			
3	Run the code to display the correct answer			
4	Use decision statement as per the requirement of problem			
5	Debug the code in case of error			
6	Set loop condition			
7	Set loop invariant			
8	Write the loop as per the requirement of the problem			
9	Declare and initialize array			
10	Access elements of array to perform actions as per requirement of the problem			
11	Initialize the function header, with parameters and return type			
12	Declare the function, to perform the assigned task.			
13	Call the user created function as per requirement of problem			
14	Call multiple functions with different parameters and display results.			
15	Include the header file as required by the problem			
16	Call the functions instructed by task from the built-in library.			
17	Run the code to display the correct answer			
18	Access the functions and data of particular objects.			
19	Write the code to open file from program			
20	Write data in that file from the program.			
21	Write code to open another file from program			
22	Read data from that file and display it			
23	Debug the code in case of error			
24	Run the code to display the correct answer			

25	Interrupt handling with button			
26	Setup environment for Raspberry Pi			
27	Perform LED blink with Basic digital write			
28	Control Multiple LEDs with loops and arrays			
29	Control digital input and output			
30	Control LED's glow with Analog Input handling			
31	Control Interrupts with push button			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

KNOWLEDGE ASSESSMENT

Title of Qualification: Level 4 National Qualification Certificate, in Internet of Things (IoT programmer)	CS Code:	Level: 4	Version: 01
Competency Standard Title: Interface Sensors and Actuators Apply Microcontroller interfacing protocols Configure ADC and PWM of a Controller Identify and interface Short Range Wireless Technologies (Wifi, Bluetooth, BLE, Zigbee,) with the microcontrollers	Assessment Date (DD/MM/YY): Assessment Time: 30min		

Guidance for Candidate	To complete your assessment for this Competency Standard, you need to answer the questions on the following pages successfully.
------------------------	--

Candidate Details	Name:Registration/Roll Number: Candidate Signature:.....
Written Assessment Outcome	COMPETENT <input type="checkbox"/> NOT YET COMPETENT <input type="checkbox"/> Name of the Assessor:Assessor's code: Signature of the Assessor:.....

Questions (Candidate confidently answered questions correctly and demonstrated understanding of the topics and their application)	
What is MIT App Inventor?	
What are the limitations of MIT App Inventor?	

Questions (Candidate confidently answered questions correctly and demonstrated understanding of the topics and their application)	
What is DNS servers?	
Differentiate of TCP and UDP?	
Define RFID Module?	
Define Ultrasonic Sensor?	
Define serial communication	
Define interrupt?	
Define object-oriented programming (OOP).	
What is difference between BLE and Bluetooth?	

ANSWER KEY

Sr.	Answers
------------	----------------

1	MIT App Inventor is an online platform that uses mobile app development to teach computational thinking concepts.
2	<p>The user interface builder has improved but is still a bit buggy and limited, so can't build any user interface.</p> <ul style="list-style-type: none"> • Limited Access to Web. • Limited Access to the device. • No polymorphic components.
3	The Domain Name System is the phonebook of the Internet. When users type Domain Name such as 'google.com' or 'nytimes.com' into web browsers, DNS is responsible for finding the correct IO address.
4	TCP is a connection-oriented protocol, whereas UDP is a connectionless protocol. A key difference between TCP and UDP is speed, as TCP is comparatively slower than UDP. Overall, UDP is a much faster, simpler, and efficient protocol, however, retransmission of lost data packets is only possible with TCP.
5	RFID or Radio Frequency Identification system consists of two main components, a transponder/tag attached to an object to be identified, and a Transceiver also known as interrogator/Reader.
6	An ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves.
7	Serial communication is the process of sending data one bit at a time, sequentially, over a communication channel or computer bus.
8	An interrupt occurs when an application program terminates or requests certain services from the operating system.
9	Object-oriented programming has four basic concepts: encapsulation, abstraction, inheritance, and polymorphism
10	Bluetooth can handle a lot of data but quickly consumes battery life and costs a lot more. Bluetooth Low Energy is used for applications that do not need to exchange large amounts of data and can run on battery power for years at a cheaper cost.

