

**Assessment Evidence
Guide
For
“IoT Associate Engineer”
Level-5**

**Identify and Interface Long Range Wireless
Technologies (LoRa, NB IoT, MTC) with Micro-
controller**

(Formative Assessment)



**National Vocational & Technical
Training Commission**

Instruction Sheet for the Candidate

Title of Qualification: National Vocational Certificate Level 5 in IoT (IoT Associate Engineer)	CS Code:	Level:5	Version:01
Competency Standard Title: Identify and Interface Long Range Wireless Technologies (LoRa, NB IoT, MTC) with Micro-controller	Assessment Date (DD/MM/YY): Assessment Time:		

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 establish a LoRa communication with Arduino that can send and receive application data.</p> <p>Assessment Task 2: Candidate is required to establish a NB IoT communication with Arduino that can send and receive application data.</p> <p>Assessment Task 3: Candidate is required to establish a 4G network communication with Raspberry Pi that can send and receive application data.</p> <p>And complete:</p> <ol style="list-style-type: none"> 1. Knowledge assessment test (Written or Oral) 2. 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: Download datasheet</p> <p>Performance Criteria 2: Identify pin configuration and interfacing protocol</p> <p>Performance Criteria 3: Install the required library on IDE</p> <p>Performance Criteria 4: Configure LoRa settings</p> <p>Performance Criteria 5: Establish LoRa communication between two different modules</p> <p>Performance Criteria 6: Transmit and receive application data</p> <p>Performance Criteria 7: Rectify the issues in connectivity of the device</p>
	<p>Assessment Task 2</p> <p>Performance Criteria 1: Select pin configuration and communication interface from datasheet</p> <p>Performance Criteria 2: Setup NB-IoT and access point</p> <p>Performance Criteria 3: Open a UDP socket in another compatible mobile</p> <p>Performance Criteria 4: Transmit and receive application data</p> <p>Performance Criteria 5: Rectify the issues in connectivity of the device</p>
	<p>Assessment Task 3</p> <p>Performance Criteria 1: Make hardware connections of the LTE module with Raspberry Pi</p> <p>Performance Criteria 2: Install any required software and configure settings</p> <p>Performance Criteria 3: Setup network interface</p> <p>Performance Criteria 4: Establish communication between two different modules</p> <p>Performance Criteria 5: Transmit and receive application data</p> <p>Performance Criteria 6: Rectify the issues in connectivity of the device</p>
	<p>Portfolios required at the time of assessment (if any) for</p>

Assessors Judgment Guide

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							

Observation Checklist

Assessment Task 1	Description of Assessment Task 1 Candidate is required to establish a LoRa communication with Arduino that can send and receive application data.		
During the practical assessment, candidate demonstrated the following:	Yes	No	Remarks
1. Download datasheet			
2. Identify pin configuration and interfacing protocol			
3. Install the required library on IDE			
4. Configure LoRa settings			
5. Establish LoRa communication between two different modules			
6. Transmit and receive application data			
7. Rectify the issues in connectivity of the device			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>	
Each Assessment Task (with performance criteria)			

Assessment Task 2	Description of Assessment Task 2 Candidate is required to establish a NB IoT communication with Arduino that can send and receive application data.		
During the practical assessment, candidate demonstrated the following:	Yes	No	Remarks
1. Select pin configuration and communication interface from datasheet			
2. Setup NB-IoT and access point			
3. Open a UDP socket in another compatible mobile			
4. Transmit and receive application data			
5. Rectify the issues in connectivity of the device			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>	
Each Assessment Task (with performance criteria)			

Assessment Task 3		Description of Assessment Task 3		
		Candidate is required to establish a 4G network communication with Raspberry Pi that can send and receive application data.		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Make hardware connections of the LTE module with Raspberry Pi			
2.	Install any required software and configure settings			
3.	Setup network interface			
4.	Establish communication between two different modules			
5.	Transmit and receive application data			
6.	Rectify the issues in connectivity of the device			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		
Each Assessment Task (with performance criteria)				

Knowledge Assessment

Title of Qualification: National Vocational Certificate Level 5 in IoT (IoT Associate Engineer)	CS Code:	Level: 5	Version: 01
Competency Standard Title: Identify and Interface Long Range Wireless Technologies (LoRa, NB IoT, MTC) with Micro-controller	Assessment Date (DD/MM/YY): Assessment Time: 30 min		

Guidance for Candidate	To complete your assessment for this Competency Standard, you need to answer the questions on the following pages successfully.
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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)	
1. What are the protocols for wireless communication?	
2. Differentiate infrastructure-based and ad-hoc networks?	
3. Give examples of Short-range protocols?	

Questions (Candidate confidently answered questions correctly and demonstrated understanding of the topics and their application)	
4. What are LoRa, NB IoT protocols?	
5. Which factors are necessary to choose the best topology as per the application?	

ANSWER KEY

Sr.	Answers
1.	Communication (Wireless) Protocols in IOT Wi-Fi. Wi-Fi direct. Zigbee. Z wave. Bluetooth. RF. 6LowPAN. GPRS/3G/LTE.
2.	In infrastructure mode, all devices on a wireless network communicate with each other through an access point (wireless router). In ad hoc mode, a computer with a wireless network adapter communicates directly with a printer equipped with a wireless print server.
3.	Examples of short-range wireless communications are Bluetooth, Infrared, Near Field Communication, Ultra- Wide Band, Wi-Fi and Zig- Bee.
4.	LoRa (short for long range) is a spread spectrum modulation technique derived from chirp spread spectrum (CSS) technology. Narrowband IoT (NB-IoT) is a wireless internet of things (IoT) protocol using low-power wide area network (LPWAN) technology.
5.	To choose best topology the following factors should be focused

	<p>Available hardware resources.</p> <p>Application invocation patterns.</p> <p>Types of business processes that you plan to implement (interruptible versus non-interruptible)</p> <p>Individual scalability requirements.</p> <p>Administrative effort involved.</p>
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**Assessment Evidence
Guide
For
“IoT Associate Engineer”
Level-5
Apply MQTT, CoAP, HTTP on IoT Nodes
(Formative Assessment)**



**National Vocational & Technical
Training Commission**

Instruction Sheet for the Candidate

Title of Qualification: National Vocational Certificate Level 5 in IoT (IoT Associate Engineer)	CS Code:	Level: 5	Version: 01
Competency Standard Title: Apply MQTT, CoAP, HTTP on IoT Nodes	Assessment Date (DD/MM/YY): Assessment Time:		

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 configure and send/receive data to IoT devices using MQTT, CoAP and HTTP.</p> <p>And complete:</p> <ol style="list-style-type: none"> 1. Knowledge assessment test (Written or Oral) 2. 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: Establish MQTT Client</p> <p>Performance Criteria 2: Establish MQTT broker</p> <p>Performance Criteria 3: Use MQTT built-in libraries for MQTT communication in application codes</p> <p>Performance Criteria 4: Send and receive data using publish subscribe paradigm</p> <p>Performance Criteria 5: Set up CoAP client</p> <p>Performance Criteria 6: Set up CoAP server</p> <p>Performance Criteria 7: Establish intercommunication of CoAP server with client</p> <p>Performance Criteria 8: Use HTTP GET method to receive data</p> <p>Performance Criteria 9: Use HTTP POST method to send data</p> <p>Performance Criteria 10: Use HTTP CONNECT method for TCP connections</p>
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Assessors Judgment Guide

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							

Observation Checklist

Each Assessment Task (with performance criteria)				
Assessment Task 1		Description of Assessment Task 1 Candidate is required to configure and send/receive data to IoT devices using MQTT, CoAP and HTTP.		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Establish MQTT Client			
2.	Establish MQTT broker			
3.	Use MQTT built-in libraries for MQTT communication in application codes			
4.	Send and receive data using publish subscribe paradigm			
5.	Set up CoAP client			
6.	Set up CoAP server			
7.	Establish intercommunication of CoAP server with client			
8.	Use HTTP GET method to receive data			
9.	Use HTTP POST method to send data			
10.	Use HTTP CONNECT method for TCP connections			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

Knowledge Assessment

Title of Qualification: National Vocational Certificate Level 5 in IoT (IoT Associate Engineer)	CS Code:	Level: 5	Version: 01
Competency Standard Title: Apply MQTT, CoAP, HTTP on IoT Nodes	Assessment Date (DD/MM/YY): Assessment Time: 30 min		

Guidance for Candidate	To complete your assessment for this Competency Standard, you need to answer the questions on the following pages successfully.
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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)	
1. What is the concept of Networking?	
2. What is MQTT protocols?	
3. Differentiate confirmable and non- confirmable message type?	

ANSWER KEY

Sr.	Answers
1.	Network is usually short for "computer network" or "data network" and implies that computers are the things sharing the meaningful information.
2.	MQTT is an OASIS standard messaging protocol for the Internet of Things (IoT). It is designed as an extremely lightweight publish/subscribe messaging transport that is ideal for connecting remote devices with a small code footprint and minimal network bandwidth.
3.	<p>Some messages require an acknowledgement. These messages are called "Confirmable". A confirmable message always carries either a request or response and MUST NOT be empty.</p> <p>A non-confirmable message always carries either a request or response, as well, and MUST NOT be empty.</p>

**Assessment Evidence
Guide
For
“IoT Associate Engineer”
Level-5
Configure IoT Gateways (Wi-Fi/LoRa/NB-IoT)
(Formative Assessment)**



**National Vocational & Technical
Training Commission**

Instruction Sheet for the Candidate

Title of Qualification: National Vocational Certificate Level 5 in IoT (IoT Associate Engineer)	CS Code:	Level: 5	Version: 01
Competency Standard Title: Configure IoT Gateways (Wi-Fi/LoRa/NB-IoT)	Assessment Date (DD/MM/YY): Assessment Time :		

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 configure WiFi gateway on Raspberry pi and run MQTT client to send data to another MQTT broker on the cloud.</p> <p>Assessment Task 2: Candidate is required to configure LoRa and NB-IoT Gateway on Raspberry Pi.</p> <p>And complete:</p> <ol style="list-style-type: none"> 1. Knowledge assessment test (Written or Oral) 2. 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: Setup a Raspberry Pi</p> <p>Performance Criteria 2: Install MQTT Broker</p> <p>Performance Criteria 3: Run a MQTT C client to read the data from broker.</p> <p>Performance Criteria 4: Run another MQTT client to send data to the MQTT broker on the cloud</p> <p>Performance Criteria 5: Confirm data receipt on gateway from multiple end nodes</p>

	Assessment Task 2 Performance Criteria 1: Run the configuration tool Performance Criteria 2: Select required parameters (channels etc.) Performance Criteria 3: Test the configuration
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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)							

Observation Checklist

Assessment Task 1	Description of Assessment Task 1			
	Candidate is required to configure WiFi gateway on Raspberry pi and run MQTT client to send data to another MQTT broker on the cloud.			
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Setup a Raspberry Pi			
2.	Install MQTT Broker			
3.	Run a MQTT C client to read the data from broker.			
4.	Run another MQTT client to send data to the MQTT broker on the cloud			
5.	Confirm data receipt on gateway from multiple end nodes			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

Assessment Task 2	Description of Assessment Task 2			
	Candidate is required to configure LoRa and NB-IoT Gateway on Raspberry Pi.			
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Run the configuration tool			
2.	Select required parameters (channels etc.)			
3.	Test the configuration			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

Knowledge Assessment

Title of Qualification: National Vocational Certificate Level 5 in IoT (IoT Associate Engineer)	CS Code:	Level: 5	Version: 01
Competency Standard Title: Configure IoT Gateways (Wi-Fi/LoRa/NB-IoT)	Assessment Date (DD/MM/YY): Assessment Time: 30 min		

Guidance for Candidate	To complete your assessment for this Competency Standard, you need to answer the questions on the following pages successfully.
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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)	
1. What are hybrid networks?	
2. What are the three application layer protocols?	
3. What is interfacing in microcontroller?	

ANSWER KEY

Sr.	Answers
1.	If there is a ring topology in one office department while a bus topology in another department, connecting these two will result in Hybrid topology. Star--Ring and Star--Bus networks are most common examples of hybrid network
2.	DNS, DHCP, and FTP are all application layer protocols in the TCP/IP protocol suite.
3.	Interfacing can be defined as transferring data between microcontrollers and interfacing peripherals such as sensors, keypads, microprocessors, analog to digital converters
Competent <input type="checkbox"/>	
Not Yet Competent <input type="checkbox"/>	

**Assessment Evidence
Guide
For
“IoT Associate Engineer”
Level-5
Install/Configure Android Studio
(Formative Assessment)**



**National Vocational & Technical
Training Commission**

Instruction Sheet for the Candidate

Title of Qualification: National Vocational Certificate Level 5 in IoT (IoT Associate Engineer)	CS Code:	Level: 5	Version: 01
Competency Standard Title: Install/Configure Android Studio	Assessment Date (DD/MM/YY): Assessment Time :		

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 create an XML web page and database.</p> <p>Assessment Task 2: Candidate is required to install and configure Android Studio and install any android phone image on Android Virtual Device.</p> <p>And complete:</p> <ol style="list-style-type: none"> 1. Knowledge assessment test (Written or Oral) 2. 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: Build XML (eXtensible Markup Language) Application</p> <p>Performance Criteria 2: Build XSLT/Schema</p> <p>Performance Criteria 3: Build database in XML</p>

	<p>Assessment Task 2</p> <p>Performance Criteria 1: Download any latest version of android studio</p> <p>Performance Criteria 2: Install android studio</p> <p>Performance Criteria 3: Download/Install required system Images for AVD</p> <p>Performance Criteria 4: Configure Android Virtual Device (AVD)</p> <p>Performance Criteria 5: Explore Android Studio options</p>
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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							

Observation Checklist

Assessment Task 1		Description of Assessment Task 1		
		Candidate is required to create an XML web page and database.		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Build XML (eXtensible Markup Language) Application			
2.	Build XSLT/Schema			
3.	Build database in XML			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

Assessment Task 2		Description of Assessment Task 2		
		Candidate is required to install and configure Android Studio and install any android phone image on Android Virtual Device.		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Download any latest version of android studio			
2.	Install android studio			
3.	Download/Install required system Images for AVD			
4.	Configure Android Virtual Device (AVD)			
5.	Explore Android Studio options			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

Knowledge Assessment

Title of Qualification: National Vocational Certificate Level 5 in IoT (IoT Associate Engineer)	CS Code:	Level: 5	Version: 01
Competency Standard Title: Install/Configure Android Studio	Assessment Date (DD/MM/YY): Assessment Time: 30 min		

Guidance for Candidate	To complete your assessment for this Competency Standard, you need to answer the questions on the following pages successfully.
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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)	
Describe different versions and API levels of Android	
Which is the best API level SDK for development?	

ANSWER KEY

Sr.	Answers
1.	API Level is an integer value that uniquely identifies the framework API revision offered by a version of the Android platform. .
2.	For the best development experience with the Android SDK, use Android Studio 4.2 or higher.

**Assessment Evidence
Guide
For
“IoT Associate Engineer”
Level-5
Build Mobile Application
(Formative Assessment)**



**National Vocational & Technical
Training Commission**

Instruction Sheet for the Candidate

Title of Qualification: National Vocational Certificate Level 5 in IoT (IoT Associate Engineer)	CS Code:	Level: 5	Version: 01
Competency Standard Title: Build Mobile Application	Assessment Date (DD/MM/YY): Assessment Time :		

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 calculator application using layout and indents and run it on android virtual device.</p> <p>Assessment Task 2: Candidate is required to create a service on android studio and a simple application with free and paid products on android studio using Gradle.</p> <p>And complete:</p> <ol style="list-style-type: none"> 1. Knowledge assessment test (Written or Oral) 2. 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: Create new project</p> <p>Performance Criteria 2: Choose best suitable API and language</p> <p>Performance Criteria 3: Add views in the Constraint Layout editor.</p> <p>Performance Criteria 4: Update the UI dynamically depending on user input</p> <p>Performance Criteria 5: Update Mobile application layout to perform well in portrait and landscape mode.</p> <p>Performance Criteria 6: Run application on emulator</p> <p>Performance Criteria 7: Write code in all lifecycle functions and observe the output</p> <p>Performance Criteria 8: Debug application using android studio debugger</p> <p>Performance Criteria 9: Create new activities and start them by sending an explicit Intents.</p> <p>Performance Criteria 10: Start a new activity by sending an implicit intent that looks for an activity to handle the request.</p>
	<p>Assessment Task 2</p> <p>Performance Criteria 1: Create service in android studio</p> <p>Performance Criteria 2: Transfer data between services and activities.</p> <p>Performance Criteria 3: Select Gradle files</p> <p>Performance Criteria 5: Add libraries</p> <p>Performance Criteria 6: Build an Android app with free and paid product.</p>

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							

Observation Checklist

Assessment Task 1	Description of Assessment Task 1 Candidate is required to build a calculator application using layout and indents and run it on android virtual device.		
During the practical assessment, candidate demonstrated the following:	Yes	No	Remarks
1. Create new project			
2. Choose best suitable API and language			
3. Add views in the Constraint Layout editor.			
4. Update the UI dynamically depending on user input			
5. Update Mobile application layout to perform well in portrait and landscape mode.			
6. Run application on emulator			
7. Write code in all lifecycle functions and observe the output			
8. Debug application using android studio debugger			
9. Create new activities and start them by sending an explicit Intents.			
10. Start a new activity by sending an implicit intent that looks for an activity to handle the request.			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>	

Assessment Task 2		Description of Assessment Task 2		
		Candidate is required to create a service on android studio and a simple application with free and paid products on android studio using Gradle.		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Create service in android studio			
2.	Transfer data between services and activities.			
3.	Select Gradle files			
4.	Add libraries			
5.	Build an Android app with free and paid product.			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

Knowledge Assessment

Title of Qualification: National Vocational Certificate Level 5 in IoT (IoT Associate Engineer)	CS Code:	Level: 5	Version: 01
Competency Standard Title: Build Mobile Application	Assessment Date (DD/MM/YY): Assessment Time: 30 min		

Guidance for Candidate	To complete your assessment for this Competency Standard, you need to answer the questions on the following pages successfully.
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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)	
Define steps of development process for building Android apps	
How an explicit intent used to start a particular activity?	
Describe stages of activity lifecycles?	

ANSWER KEY

Sr.	Answers
1.	<p>The first phase of the mobile app development process is defining the strategy for evolving your idea into a successful app.</p> <p>Analysis and Planning.</p> <p>UI / UX Design.</p> <p>App Development.</p> <p>Testing.</p> <p>Deployment & Support.</p>
2.	<p>An explicit intent is one that you use to launch a specific app component, such as a particular activity or service in your app.</p>
3.	<p>Stages of the activity lifecycle, the Activity class provides a core set of six callbacks: onCreate(), onStart(), onResume(), onPause(), onStop(), and onDestroy(). The system invokes each of these callbacks as an activity enters a new state.</p>

Assessment Evidence Guide For “IoT Associate Engineer”

Level-5

**Build robust UI for Greater UX (user
experience)**

(Formative Assessment)



**National Vocational & Technical
Training Commission**

Instruction Sheet for the Candidate

Title of Qualification: National Vocational Certificate Level 5 in IoT (IoT Associate Engineer)	CS Code:	Level: 5	Version: 01
Competency Standard Title: Build robust UI for Greater UX (user experience)	Assessment Date (DD/MM/YY): Assessment Time :		

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 create an application and design it using controls and implement material designs.</p> <p>And complete:</p> <ol style="list-style-type: none"> 1. Knowledge assessment test (Written or Oral) 2. 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: Build activity and use image buttons, clickable images, input controls like switches, spinners (Drop down menu).</p> <p>Performance Criteria 2: Setup application bar and option menu in application.</p> <p>Performance Criteria 3: Use alert dialog and date picker.</p> <p>Performance Criteria 4: Add tabs to application.</p> <p>Performance Criteria 5: Add drawable, styles and themes to app</p> <p>Performance Criteria 6: Apply material design guidelines to lists and cards.</p> <p>Performance Criteria 7: Use material design colors.</p> <p>Performance Criteria 8: Use resource layout folders to allow app to work well in different orientations and screen sizes.</p> <p>Performance Criteria 9: Use Espresso, a mechanism for recording user interactions, to test app's user interface.</p>

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							

Observation Checklist

Assessment Task 1		Description of Assessment Task 1 Candidate is required to create an application and design it using controls and implement material designs.		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Build activity and use image buttons, clickable images, input controls like switches, spinners (Drop down menu).			
2.	Setup application bar and option menu in application.			
3.	Use alert dialog and date picker.			
4.	Add tabs to application.			
5.	Add drawable, styles and themes to app			
6.	Apply material design guidelines to lists and cards.			
7.	Use material design colors.			
8.	Use resource layout folders to allow app to work well in different orientations and screen sizes.			
9.	Use Espresso, a mechanism for recording user interactions, to test app's user interface.			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

Knowledge Assessment

Title of Qualification: National Vocational Certificate Level 5 in IoT (IoT Associate Engineer)	CS Code:	Level: 5	Version: 01
Competency Standard Title: Build robust UI for Greater UX (user experience)	Assessment Date (DD/MM/YY): Assessment Time: 30 min		

Guidance for Candidate	To complete your assessment for this Competency Standard, you need to answer the questions on the following pages successfully.
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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)	
1. Define visual design philosophy?	
2. Differentiate manual testing and automated Testing?	
3. Define UI Automator?	
4. What is espresso test used for?	

ANSWER KEY

Sr.	Answers
1.	Visual design aims to improve a design's/product's aesthetic appeal and usability with suitable images, typography, space, layout and color include material design attributes, such as depth and elevation.
2.	In manual testing (as the name suggests), test cases are executed manually (by a human, that is) without any support from tools or scripts. But with automated testing, test cases are executed with the assistance of tools, scripts, and software.
3.	UI Automator is a UI testing framework suitable for cross-app functional UI testing across system and installed apps
4.	Espresso tests run optimally fast! It lets you leave your waits, syncs, sleeps, and polls behind while it manipulates and asserts on the application UI when it is at rest.

**Assessment Evidence
Guide
For
“IoT Associate Engineer”
Level-5
Test, Debug and Use Support Libraries
(Formative Assessment)**



**National Vocational & Technical
Training Commission**

Instruction Sheet for the Candidate

Title of Qualification: National Vocational Certificate Level 5 in IoT (IoT Associate Engineer)	CS Code:	Level: 5	Version: 01
Competency Standard Title: Test, Debug and Use Support Libraries	Assessment Date (DD/MM/YY): Assessment Time :		

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 test make an application backward compatible and test the application using unit.</p> <p>And complete:</p> <ol style="list-style-type: none"> 3. Knowledge assessment test (Written or Oral) 4. 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: Create local unit testing using Junit</p> <p>Performance Criteria 2: Build test cases</p> <p>Performance Criteria 3: Run test</p> <p>Performance Criteria 4: Select Android Support libraries</p> <p>Performance Criteria 5: Use support libraries to get backward compatible version of new Android features</p>

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							

Observation Checklist

Assessment Task 1	Description of Assessment Task 1 Candidate is required to test make an application backward compatible and test the application using unit.		
During the practical assessment, candidate demonstrated the following:	Yes	No	Remarks
1. Create local unit testing using Junit			
2. Build test cases			
3. Run test			
4. Select Android Support libraries			
5. Use support libraries to get backward compatible version of new Android features			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>	

Knowledge Assessment

Title of Qualification: National Vocational Certificate Level 5 in IoT (IoT Associate Engineer)	CS Code:	Level: 5	Version: 01
Competency Standard Title: Test, Debug and Use Support Libraries	Assessment Date (DD/MM/YY): Assessment Time: 30 min		

Guidance for Candidate	To complete your assessment for this Competency Standard, you need to answer the questions on the following pages successfully.
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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)	
1. What does “setting a breakpoint” do?	
2. What is support library and how it compatible to android API level?	

ANSWER KEY

Sr.	Answers
1.	Breakpoints are one of the most important debugging techniques in your developer's toolbox. You set breakpoints wherever you want to pause debugger execution.
2.	<p>The Android Support Library package is a set of code libraries that provide backward-compatible versions of Android framework APIs as well as features that are only available through the library APIs.</p> <p>Each Support Library is backward-compatible to a specific Android API level.</p>

**Assessment Evidence
Guide
For
“IoT Associate Engineer”
Level-5
Program/Use Background Applications
(Formative Assessment)**



**National Vocational & Technical
Training Commission**

Instruction Sheet for the Candidate

Title of Qualification: National Vocational Certificate Level 5 in IoT (IoT Associate Engineer)	CS Code:	Level: 5	Version: 01
Competency Standard Title: Program/Use Background Applications	Assessment Date (DD/MM/YY): Assessment Time :		

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 run background task using timer.</p> <p>Assessment Task 2: Candidate is required to authorize and use Google API in code.</p> <p>Assessment Task 3: Candidate is required to make an application that shows notification.</p> <p>And complete:</p> <ol style="list-style-type: none"> 5. Knowledge assessment test (Written or Oral) 6. 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: Add background threads to run a task in the background.</p> <p>Performance Criteria 2: Enable app to connect to the internet using a background task.</p> <p>Performance Criteria 3: Update task keeps running if the user changes their device's orientation.</p> <p>Performance Criteria 4: Responds to a system broadcast.</p> <p>Performance Criteria 5: Send and receive a custom broadcast.</p> <p>Performance Criteria 6: Use Job Scheduler to schedule tasks in a way that reduces battery drain.</p> <p>Performance Criteria 7: Schedule and cancel an alarm.</p> <p>Performance Criteria 8: Create code to integrate API</p>
	<p>Assessment Task 2</p> <p>Performance Criteria 1: Authorize API</p> <p>Performance Criteria 2: Use Google APIs</p>
	<p>Assessment Task 3</p> <p>Performance Criteria 1: Program to send a notification.</p> <p>Performance Criteria 2: Program to update a notification</p>

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							

Observation Checklist

Assessment Task 1	Description of Assessment Task 1			
	Candidate is required to run background task using timer.			
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Add background threads to run a task in the background.			
2.	Enable app to connect to the internet using a background task.			
3.	Update task keeps running if the user changes their device's orientation.			
4.	Responds to a system broadcast.			
5.	Send and receive a custom broadcast.			
6.	Use Job Scheduler to schedule tasks in a way that reduces battery drain.			
7.	Schedule and cancel an alarm.			
8.	Create code to integrate API			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

Assessment Task 2	Description of Assessment Task 2			
	Candidate is required to authorize and use Google API in code.			
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Authorize API			
2.	Use Google APIs			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

Assessment Task 3		Description of Assessment Task 3		
		Candidate is required to make an application that shows notification.		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Program to send a notification.			
2.	Program to update a notification			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

Knowledge Assessment

Title of Qualification: National Vocational Certificate Level 5 in IoT (IoT Associate Engineer)	CS Code:	Level: 5	Version: 01
Competency Standard Title: Program/Use Background Applications	Assessment Date (DD/MM/YY): Assessment Time: 30 min		

Guidance for Candidate	To complete your assessment for this Competency Standard, you need to answer the questions on the following pages successfully.
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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)	
1. Define the functionality of JSON?	
2. Define background threads?	
3. How to minimize battery drain?	

ANSWER KEY

Sr.	Answers
1.	JavaScript Object Notation (JSON) is a standard text-based format for representing structured data based on JavaScript object syntax. It is commonly used for transmitting data in web applications (e.g., sending some data from the server to the client, so it can be displayed on a web page, or vice versa)
2.	A background thread is a thread that runs behind the scenes, while the foreground thread continues to run. For instance, a background thread may perform calculations on user input while the user is entering information using a foreground thread.
3.	<p>How can I make my battery drain less?</p> <p>Choose settings that use less battery</p> <p>Let your screen turn off sooner.</p> <p>Reduce screen brightness.</p> <p>Turn off keyboard sounds or vibrations.</p> <p>Restrict apps with high battery use.</p> <p>Turn on adaptive battery or battery optimization.</p>

**Assessment Evidence
Guide
For
“IoT Associate Engineer”
Level-5
Save User Data/Integrate Android
Application With Database
(Formative Assessment)**



**National Vocational & Technical
Training Commission**

Instruction Sheet for the Candidate

Title of Qualification: National Vocational Certificate Level 5 in IoT (IoT Associate Engineer)	CS Code:	Level: 5	Version: 01
Competency Standard Title: Save User Data/Integrate Android Application With Database	Assessment Date (DD/MM/YY): Assessment Time :		

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 create a program and store/get values using SharedPreferences.</p> <p>Assessment Task 2: Candidate is required to create a file and store/get values using File I/O.</p> <p>Assessment Task 3: Candidate is required to create a database and store/get data using SQLite/Room.</p> <p>Assessment Task 4: Candidate is required to create a database and store/get values using firebase.</p> <p>And complete:</p> <p>7. Knowledge assessment test (Written or Oral)</p> <p>8. Portfolios at the time of assessment (if any)</p>
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: Use Shared Preferences to save and retrieve user preferences.</p> <p>Performance Criteria 2: Add a settings activity to an app to save the user's preferred app settings.</p>

	Assessment Task 2 Performance Criteria 1: Build activity to store data in file Performance Criteria 2: Add/update and delete data from file
	Assessment Task 3 Performance Criteria 1: Create database in SQLite database Performance Criteria 2: Use Android's Room to save and retrieve data in the database. Performance Criteria 3: Add / update and delete data
	Assessment Task 4 Performance Criteria 1: Create online database (Like firebase) Performance Criteria 2: Import libraries to connect with database Performance Criteria 3: Store, update, retrieve and update data

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							

Observation Checklist

Assessment Task 1		Description of Assessment Task 1 Candidate is required to create a program and store/get values using Shared Preferences.		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Use SharedPreferences to save and retrieve user preferences.			
2.	Add a settings activity to an app to save the user's preferred app settings.			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

Assessment Task 2		Description of Assessment Task 2 Candidate is required to create a file and store/get values using File I/O.		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Build activity to store data in file			
2.	Add/update and delete data from file			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

Assessment Task 3		Description of Assessment Task 3 Candidate is required to create a database and store/get data using SQLite/Room.		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Create database in SQLite database			
2.	Use Android's Room to save and retrieve data in the database.			
3.	Add / update and delete data			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

Assessment Task 4		Description of Assessment Task 4		
		Candidate is required to create a database and store/get values using firebase.		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Create online database (Like firebase)			
2.	Import libraries to connect with database			
3.	Store, update, retrieve and update data			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

Knowledge Assessment

Title of Qualification: National Vocational Certificate Level 5 in IoT (IoT Associate Engineer)	CS Code:	Level: 5	Version: 01
Competency Standard Title: Save User Data/Integrate Android Application With Database	Assessment Date (DD/MM/YY): Assessment Time: 30 min		

Guidance for Candidate	To complete your assessment for this Competency Standard, you need to answer the questions on the following pages successfully.
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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)	
1. Describe the functionality of Shared Preferences?	
2. What is functionality of DBMS?	
3. Define database?	

ANSWER KEY

Sr.	Answers
1.	SharedPreferences is the way in which one can store and retrieve small amounts of primitive data as key/value pairs to a file on the device storage such as String, int, float, Boolean that make up your preferences in an XML file inside the app on the device storage. ²
2.	A database management system is a software tool that makes it possible to organize data in a database. It is often referred to by its acronym, DBMS. The functions of a DBMS include concurrency, security, backup and recovery, integrity and data descriptions.
3.	A database is an organized collection of structured information, or data, typically stored electronically in a computer system

Assessment Evidence Guide

For

“IoT Associate Engineer”

Level-5

Set up Cloud Sever

(Formative Assessment)



**National Vocational & Technical
Training Commission**

Instruction Sheet for the Candidate

Title of Qualification: National Vocational Certificate Level 5 in IoT (IoT Associate Engineer)	CS Code:	Level:5	Version:01
Competency Standard Title: Set up Cloud Sever	Assessment Date (DD/MM/YY): Assessment Time:		

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 configure Virtual machine and Virtual Network on cloud server and select security operations for network.</p> <p>Assessment Task 2: Candidate is required to create a backup of virtual machine after performing cloud computations and restore from that created backup.</p> <p>And complete:</p> <ol style="list-style-type: none"> 3. Knowledge assessment test (Written or Oral) 4. 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: Perform social engineering on cloud service provider and generate comparison report</p> <p>Performance Criteria 2: Evaluate Technical capabilities and processes</p> <p>Performance Criteria 3: Set up cloud account</p> <p>Performance Criteria 4: Login to the subjected cloud</p> <p>Performance Criteria 5: Select the required Operating System for server</p> <p>Performance Criteria 6: Create the Virtual machine</p> <p>Performance Criteria 7: Configure accessibility using FTP/SSH</p> <p>Performance Criteria 8: Conduct test for verification of allocated resources</p> <p>Performance Criteria 9: Install applications on the subjected machines</p> <p>Performance Criteria 10: Select the requirement and specification for your network</p> <p>Performance Criteria 11: Select resources to create virtual network</p> <p>Performance Criteria 12: Connect the hosts with virtual network</p> <p>Performance Criteria 13: Test the virtual network</p> <p>Performance Criteria 14: Determine security requirements and specifications</p> <p>Performance Criteria 15: Inspect network design to detect security flaws</p> <p>Performance Criteria 16: Select security operation as per requirement</p> <p>Performance Criteria 17: Add from for input controls on off button</p>
	<p>Assessment Task 2</p> <p>Performance Criteria 1: Determine the requirement and specification for computing of applications</p> <p>Performance Criteria 2: Launch cloud tool for required application</p> <p>Performance Criteria 3: Assign resources to host</p> <p>Performance Criteria 4: Install the required application as per instruction</p> <p>Performance Criteria 5: Test the environment</p> <p>Performance Criteria 6: Find suitable utilities</p> <p>Performance Criteria 7: Install utility on sever</p> <p>Performance Criteria 8: Create virtual machine image</p> <p>Performance Criteria 9: Create job schedule for backups</p> <p>Performance Criteria 10: Configure backup repository</p> <p>Performance Criteria 11: Restore virtual machine backups</p>

	<p>Performance Criteria 12: Determine the requirement and specification for deployment of resources</p> <p>Performance Criteria 13: Launch the cloud tool for deploying of application</p> <p>Performance Criteria 14: Create the resources for required tasks</p> <p>Performance Criteria 15: Install the required application as per instruction</p> <p>Performance Criteria 16: Select the management tool to manage resources as per instruction</p> <p>Performance Criteria 17: Make the local backup on storage device</p> <p>Performance Criteria 18: Finalize the process</p>
	Portfolios required at the time of assessment (if any) for

Assessors Judgment Guide

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							

Observation Checklist

Assessment Task 1	Description of Assessment Task 1 Candidate is required to configure Virtual machine and Virtual Network on cloud server and select security operations for network.			
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Perform social engineering on cloud service provider and generate comparison report			
2.	Evaluate Technical capabilities and processes			
3.	Set up cloud account			
4.	Login to the subjected cloud			
5.	Select the required Operating System for server			
6.	Create the Virtual machine			
7.	Configure accessibility using FTP/SSH			
8.	Conduct test for verification of allocated resources			
9.	Install applications on the subjected machines			
10.	Select the requirement and specification for your network			
11.	Select resources to create virtual network			
12.	Connect the hosts with virtual network			
13.	Test the virtual network			
14.	Determine security requirements and specifications			
15.	Inspect network design to detect security flaws			
16.	Select security operation as per requirement			
17.	Add from for input controls on off button			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		
Each Assessment Task (with performance criteria)				

Assessment Task 2		Description of Assessment Task 2		
		Candidate is required to create a backup of virtual machine after performing cloud computations and restore from that created backup.		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Determine the requirement and specification for computing of applications			
2.	Launch cloud tool for required application			
3.	Assign resources to host			
4.	Install the required application as per instruction			
5.	Test the environment			
6.	Find suitable utilities			
7.	Install utility on sever			
8.	Create virtual machine image			
9.	Create job schedule for backups			
10.	Configure backup repository			
11.	Restore virtual machine backups			
12.	Determine the requirement and specification for deployment of resources			
13.	Launch the cloud tool for deploying of application			
14.	Create the resources for required tasks			
15.	Install the required application as per instruction			
16.	Select the management tool to manage resources as per instruction			
17.	Make the local backup on storage device			
18.	Finalize the process			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

Knowledge Assessment

Title of Qualification: National Vocational Certificate Level 5 in IoT (IoT Associate Engineer)	CS Code:	Level: 5	Version: 01
Competency Standard Title: Set up Cloud Sever	Assessment Date (DD/MM/YY): Assessment Time: 30 min		

Guidance for Candidate	To complete your assessment for this Competency Standard, you need to answer the questions on the following pages successfully.
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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)	
1. What is a cloud server?	
2. What is Infrastructure as a service (IaaS) in cloud computing?	
3. What is Mobile "backend" as a service (MBaaS) in cloud computing?	

Questions (Candidate confidently answered questions correctly and demonstrated understanding of the topics and their application)	
4. What is Virtualized Physical Servers?	

ANSWER KEY

Sr.	Answers
1.	A cloud server is powerful physical or virtual infrastructure that performs application- and information-processing storage. Cloud servers are created using virtualization software to divide a physical (bare metal) server into multiple virtual servers. Organizations use an infrastructure-as-a-service (IaaS) model to process workloads and store information. They can access virtual server functions remotely through an online interface.
2.	"Infrastructure as a service" (IaaS) refers to online services that provide high-level APIs used to abstract various low-level details of underlying network infrastructure like physical computing resources, location, data partitioning, scaling, security, backup, etc.
3.	In the mobile "backend" as a service (m) model, also known as backend as a service (BaaS), web app and mobile app developers are provided with a way to link their applications to cloud storage and cloud computing services with application programming interfaces (APIs) exposed to their applications and custom software development kits (SDKs).
4.	Cloud servers begin as virtualized versions of physical servers, existing as partitioned spaces within a physical environment. With the help of software like a hypervisor or virtual machine monitor, which connects and runs one or more virtual machines (VMs), a host computer lets VMs share resources like memory and processing.

Assessment Evidence Guide

For

“IoT Associate Engineer”

Level-5

Develop Program in Python

(Formative Assessment)



**National Vocational & Technical
Training Commission**

Instruction Sheet for the Candidate

Title of Qualification: National Vocational Certificate Level 5 in IoT (IoT Associate Engineer)	CS Code:	Level:5	Version:01
Competency Standard Title: Develop Program in Python	Assessment Date (DD/MM/YY): Assessment Time:		

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 create following program using python</p> <ul style="list-style-type: none"> • Calculate grading system based on final marks • Take two-character arrays in first insert string "Hello" and in 2nd insert "world" and take 3rd array and copy previous array elements in it and print 3rd array elements <p>Assessment Task 2: Candidate is required to create 4 classes in a program "apple" "orange" "banana" and "grapes" and apply the concept of polymorphism using python and display the result on the screen.</p> <p>And complete:</p> <ol style="list-style-type: none"> 5. Knowledge assessment test (Written or Oral) 6. 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: Install Python</p> <p>Performance Criteria 2: Set environment variable</p> <p>Performance Criteria 3: Execute python script terminal</p> <p>Performance Criteria 4: Declare variables according to the requirements</p> <p>Performance Criteria 5: Use decision statement as per the requirement of problem</p> <p>Performance Criteria 6: Initialize loop control variable</p> <p>Performance Criteria 7: Declare and initialize different data structures</p> <p>Performance Criteria 8: Define loop to access array</p> <p>Performance Criteria 9: Access elements of array to perform actions as per requirement of the problem</p> <p>Performance Criteria 10: Debug the code in case of error</p> <p>Performance Criteria 11: Run the code to display the correct answer</p>
	<p>Assessment Task 2</p> <p>Performance Criteria 1: Declare the functions to perform the assigned task</p> <p>Performance Criteria 2: Call multiple functions with different parameters and display results.</p> <p>Performance Criteria 3: Declare member functions and variables of the class</p> <p>Performance Criteria 4: Create the objects</p> <p>Performance Criteria 5: Access the functions and data of particular objects.</p> <p>Performance Criteria 6: Debug the code in case of error</p> <p>Performance Criteria 7: Run the code to display the correct answer</p>
	<p>Portfolios required at the time of assessment (if any) for</p>

Assessors Judgment Guide

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							

Observation Checklist

Assessment Task 1	Description of Assessment Task 1 Candidate is required to create following program using python <ul style="list-style-type: none"> Calculate grading system based on final marks Take two-character arrays in first insert string "Hello" and in 2nd insert "world" and take 3rd array and copy previous array elements in it and print 3rd array elements 		
During the practical assessment, candidate demonstrated the following:	Yes	No	Remarks
1. Install Python			
2. Set environment variable			
3. Execute python script terminal			
4. Declare variables according to the requirements			
5. Use decision statement as per the requirement of problem			
6. Initialize loop control variable			
7. Declare and initialize different data structures			
8. Define loop to access array			
9. Access elements of array to perform actions as per requirement of the problem			
10. Debug the code in case of error			
11. Run the code to display the correct answer			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>	
Each Assessment Task (with performance criteria)			

Assessment Task 2		Description of Assessment Task 2		
		Candidate is required to create 4 classes in a program “apple” “orange” “banana” and “grapes” and apply the concept of polymorphism using python and display the result on the screen.		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Declare the functions to perform the assigned task			
2.	Call multiple functions with different parameters and display results.			
3.	Declare member functions and variables of the class			
4.	Create the objects			
5.	Access the functions and data of particular objects.			
6.	Debug the code in case of error			
7.	Run the code to display the correct answer			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		
Each Assessment Task (with performance criteria)				

Knowledge Assessment

Title of Qualification: National Vocational Certificate Level 5 in IoT (IoT Associate Engineer)	CS Code:	Level: 5	Version: 01
Competency Standard Title: Develop Program in Python	Assessment Date (DD/MM/YY): Assessment Time: 30 min		

Guidance for Candidate	To complete your assessment for this Competency Standard, you need to answer the questions on the following pages successfully.
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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)	
1. Define Python (Programming Language)	
2. What are the Libraries in python programming language?	
3. What is python Syntax and semantics?	

Questions (Candidate confidently answered questions correctly and demonstrated understanding of the topics and their application)	
4. What is Duck typing?	
5. What Is Python Used For?	

ANSWER KEY

Sr.	Answers
1.	Python is an interpreted high-level general-purpose programming language. Its design philosophy emphasizes code readability with its use of significant indentation. Its language constructs as well as its object-oriented approach aim to help programmers write clear, logical code for small and large-scale projects.
2.	Python's large standard library, commonly cited as one of its greatest strengths, provides tools suited to many tasks. For Internet-facing applications, many standard formats and protocols such as MIME and HTTP are supported. It includes modules for creating graphical user interfaces, connecting to relational databases, generating pseudorandom numbers, arithmetic with arbitrary-precision decimals, manipulating regular expressions, and unit testing.
3.	Python is meant to be an easily readable language. Its formatting is visually uncluttered, and it often uses English keywords where other languages use punctuation. Unlike many other languages, it does not use curly brackets to delimit blocks, and semicolons after statements are allowed but are rarely, if ever, used. It has fewer syntactic exceptions and special cases than C or Pascal.
4.	Duck typing in computer programming is an application of the duck test—"If it walks like a duck and it quacks like a duck, then it must be a duck"
5.	It's used in everything from machine learning to building websites and software testing. It can be used by developers and non-developers alike.

Assessment Evidence Guide

For

“IoT Associate Engineer”

Level-5

Deploy Hardware Protection

(Formative Assessment)



**National Vocational & Technical
Training Commission**

Instruction Sheet for the Candidate

Title of Qualification: National Vocational Certificate Level 5 in IoT (IoT Associate Engineer)	CS Code:	Level:5	Version:01
Competency Standard Title: Deploy Hardware Protection	Assessment Date (DD/MM/YY): Assessment Time:		

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 setup firewall and make hardware firewall using Raspberry Pi and protect other devices and perform full security scan.</p> <p>And complete:</p> <ul style="list-style-type: none"> 7. Knowledge assessment test (Written or Oral) 8. 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: Install firewall on operating system</p> <p>Performance Criteria 2: Update firewall</p> <p>Performance Criteria 3: Delete, disable, or rename any default user accounts, and change all default passwords</p> <p>Performance Criteria 4: Create additional accounts with limited privileges based on responsibilities</p> <p>Performance Criteria 5: Configure access control lists (i.e set inbound and outbound rules)</p> <p>Performance Criteria 6: Configure other firewall services and logging</p> <p>Performance Criteria 7: Perform testing on firewall configuration</p> <p>Performance Criteria 8: Update firmware and firewall, if required.</p> <p>Performance Criteria 9: Generate report from firewall logs</p> <p>Performance Criteria 10: Perform vulnerability scans</p> <p>Performance Criteria 11: Detect intruders in the communication network through vulnerability scans</p> <p>Performance Criteria 12: Select packet capture and injection in Wi-Fi attacks</p> <p>Performance Criteria 13: Prepare IoT against Wi-Fi intruder attack</p> <p>Performance Criteria 14: Apply AES/TKIP on IoT gateway</p> <p>Performance Criteria 15: Apply MAC address filtering</p> <p>Performance Criteria 16: Perform vulnerability test for IoT gateway</p> <p>Performance Criteria 17: Delete, disable, or rename any default user accounts, and change all default passwords</p> <p>Performance Criteria 18: Create additional accounts with limited privileges based on responsibilities</p> <p>Performance Criteria 19: Isolate IoT devices by securing device to device communication through wireless PAN protocols</p> <p>Performance Criteria 20: Secure cloud and IoT device connection by applying SSL</p> <p>Performance Criteria 21: Secure communication from device to gateway by encryption protocols</p>
	Portfolios required at the time of assessment (if any) for

Assessors Judgment Guide

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							

Observation Checklist

Assessment Task 1		Description of Assessment Task 1		
		Candidate is required to setup firewall and make hardware firewall using Raspberry Pi and protect other devices and perform full security scan.		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Install firewall on operating system			
2.	Update firewall			
3.	Delete, disable, or rename any default user accounts, and change all default passwords			
4.	Create additional accounts with limited privileges based on responsibilities			
5.	Configure access control lists (i.e set inbound and outbound rules)			
6.	Configure other firewall services and logging			
7.	Perform testing on firewall configuration			
8.	Update firmware and firewall, if required.			
9.	Generate report from firewall logs			
10.	Perform vulnerability scans			
11.	Detect intruders in the communication network through vulnerability scans			
12.	Select packet capture and injection in Wi-Fi attacks			
13.	Prepare IoT against Wi-Fi intruder attack			
14.	Apply AES/TKIP on IoT gateway			
15.	Apply MAC address filtering			
16.	Perform vulnerability test for IoT gateway			
17.	Delete, disable, or rename any default user accounts, and change all default passwords			
18.	Create additional accounts with limited privileges based on responsibilities			

19.	Isolate IoT devices by securing device to device communication through wireless PAN protocols			
20.	Secure cloud and IoT device connection by applying SSL			
21.	Secure communication from device to gateway by encryption protocols			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

Knowledge Assessment

Title of Qualification: National Vocational Certificate Level 5 in IoT (IoT Associate Engineer)	CS Code:	Level: 5	Version: 01
Competency Standard Title: Deploy Hardware Protection	Assessment Date (DD/MM/YY): Assessment Time: 30 min		

Guidance for Candidate	To complete your assessment for this Competency Standard, you need to answer the questions on the following pages successfully.
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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)	
1. What is Cloud computing security?	
2. What are the possible Attacks to servers?	

Questions (Candidate confidently answered questions correctly and demonstrated understanding of the topics and their application)	
3. What Security issues associated with the cloud?	
4. What is Data security?	
5. What Risks and vulnerabilities of Cloud Computing have?	

ANSWER KEY

Sr.	Answers
1.	Cloud computing security or, more simply, cloud security refers to a broad set of policies, technologies, applications, and controls utilized to protect virtualized IP, data, applications, services, and the associated infrastructure of cloud computing
2.	There are several different types of attacks on cloud computing / Servers, one that is still very much untapped into is infrastructure compromise. Though not completely known it is listed as the attack with the highest amount of payoff.
3.	Cloud computing and storage provide users with capabilities to store and process their data in third-party data centers. Organizations use the cloud in a variety of different service models (with acronyms such as SaaS, PaaS, and IaaS) and deployment models (private, public, hybrid, and community)
4.	There are numerous security threats associated with cloud data services. This includes traditional threats and non-traditional threats. Traditional threats include: network eavesdropping, illegal invasion, and denial of service attacks, but also specific cloud computing threats, such as side channel attacks, virtualization vulnerabilities, and abuse of cloud services
5.	While cloud computing is on the cutting edge of information technology there are risks and vulnerabilities to consider before investing fully in it. Security controls and services do exist for the cloud but as with any security system they are not guaranteed to succeed. Furthermore, some risks extend beyond asset security and may involve issues in productivity and even privacy as well.

**Assessment Evidence
Guide
For
“IoT Associate Engineer”
Level-5
Perform Software Security
(Formative Assessment)**



**National Vocational & Technical
Training Commission**

Instruction Sheet for the Candidate

Title of Qualification: National Vocational Certificate Level 5 in IoT (IoT Associate Engineer)	CS Code:	Level:5	Version:01
Competency Standard Title: Perform Software Security	Assessment Date (DD/MM/YY): Assessment Time:		

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 apply and generate SSL on client application</p> <p>Assessment Task 2: Candidate is required to program NodeMCU to connect to a MQTT broker and perform security operation audit.</p> <p>And complete:</p> <p>9. Knowledge assessment test (Written or Oral)</p> <p>10. Portfolios at the time of assessment (if any)</p>
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: Install OpenSSL library on server and client side.</p> <p>Performance Criteria 2: Create TCP socket and apply SSL on server application</p> <p>Performance Criteria 3: Create TCP socket and apply SSL on client application</p> <p>Performance Criteria 4: Generate SSL certificates for client.</p> <p>Performance Criteria 5: Install these certificates on server</p> <p>Performance Criteria 6: Establish SSL based client server communication</p>

	<p>Assessment Task 2</p> <p>Performance Criteria 1: Install NodeMCU Crypto module in Arduino IDE</p> <p>Performance Criteria 2: Program NodeMCU to connect to a MQTT broker</p> <p>Performance Criteria 3: Generate a pseudorandom initialization vector</p> <p>Performance Criteria 4: Program a hash function for authentication with nodeid, iv, data, and session ID</p> <p>Performance Criteria 5: Compute a HMAC SHA1</p> <p>Performance Criteria 6: Store payload in a structure</p> <p>Performance Criteria 7: Send payload structure via function</p> <p>Performance Criteria 8: Load payload information</p> <p>Performance Criteria 9: Compare the received and computed HMAC</p>
	<p>Portfolios required at the time of assessment (if any) for</p>

Assessors Judgment Guide

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							

Observation Checklist

Assessment Task 1		Description of Assessment Task 1		
		Candidate is required to apply and generate SSL on client application		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Install OpenSSL library on server and client side.			
2.	Create TCP socket and apply SSL on server application			
3.	Create TCP socket and apply SSL on client application			
4.	Generate SSL certificates for client.			
5.	Install these certificates on server			
6.	Establish SSL based client server communication			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		
Each Assessment Task (with performance criteria)				

Assessment Task 2		Description of Assessment Task 2		
		Candidate is required to program NodeMCU to connect to a MQTT broker and perform security operation audit.		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Install NodeMCU Crypto module in Arduino IDE			
2.	Program NodeMCU to connect to a MQTT broker			
3.	Generate a pseudorandom initialization vector			
4.	Program a hash function for authentication with nodeid, iv, data, and session ID			
5.	Compute a HMAC SHA1			
6.	Store payload in a structure			
7.	Send payload structure via function			
8.	Load payload information			
9.	Compare the received and computed HMAC			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		
Each Assessment Task (with performance criteria)				

Knowledge Assessment

Title of Qualification: National Vocational Certificate Level 5 in IoT (IoT Associate Engineer)	CS Code:	Level: 5	Version: 01
Competency Standard Title: Perform Software Security	Assessment Date (DD/MM/YY): Assessment Time: 30 min		

Guidance for Candidate	To complete your assessment for this Competency Standard, you need to answer the questions on the following pages successfully.
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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)	
1. What is Computer security software?	
2. What is Prevent access type of security?	
3. What is Regulate access type of security?	

Questions (Candidate confidently answered questions correctly and demonstrated understanding of the topics and their application)	
4. What does Block or remove malware means?	

ANSWER KEY

Sr.	Answers
1.	Computer security software or cybersecurity software is any computer program designed to influence information security. This is often taken in the context of defending computer systems or data, yet can incorporate programs designed specifically for subverting computer systems due to their significant overlap, and the adage that the best defense is a good offense.
2.	The primary purpose of these types of systems is to restrict and often to completely prevent access to computers or data except to a very limited set of users. The theory is often that if a key, credential, or token is unavailable then access should be impossible. This often involves taking valuable information and then either reducing it to apparent noise or hiding it within another source of information in such a way that it is unrecoverable.
3.	The purpose of these types of systems is usually to restrict access to computers or data while still allowing interaction. Often this involves monitoring or checking credential, separating systems from access and view based on importance, and quarantining or isolating perceived dangers. A physical comparison is often made to a shield. A form of protection whose use is heavily dependent on the system owners preferences and perceived threats.
4.	The purpose of these types of software is to remove malicious or harmful forms of software that may compromise the security of a computer system. These types of software are often closely linked with software for computer regulation and monitoring.

Assessment Evidence Guide

For

“IoT Associate Engineer”

Level-5

Implement Cryptography and Network Security

(Formative Assessment)



**National Vocational & Technical
Training Commission**

Instruction Sheet for the Candidate

Title of Qualification: National Vocational Certificate Level 5 in IoT (IoT Associate Engineer)	CS Code:	Level:5	Version:01
Competency Standard Title: Implement Cryptography and Network Security	Assessment Date (DD/MM/YY): Assessment Time:		

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 configure and execute anaconda environment on python platform</p> <p>Assessment Task 2: Candidate is required to make a program with hash function in Anaconda and add encryption code in the program and execute it.</p> <p>And complete:</p> <p>11. Knowledge assessment test (Written or Oral)</p> <p>12. Portfolios at the time of assessment (if any)</p>
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: Download the Anaconda for python platform</p> <p>Performance Criteria 2: Install Anaconda</p> <p>Performance Criteria 3: Set environment variable</p> <p>Performance Criteria 4: Execute python script on Anaconda terminal</p>
	<p>Assessment Task 2</p>

	<p>Performance Criteria 1: Import cryptography library in new notebook</p> <p>Performance Criteria 2: Apply cryptography library in program</p> <p>Performance Criteria 3: Execute the Code</p> <p>Performance Criteria 4: Verify the encrypted answer</p> <p>Performance Criteria 5: Add the decryption code in program and execute again</p> <p>Performance Criteria 6: Verify the answer for entered string</p> <p>Performance Criteria 7: Import Hash Function library in new notebook</p> <p>Performance Criteria 8: Apply hash functions in the program</p> <p>Performance Criteria 9: Execute the code</p> <p>Performance Criteria 10: Verify that entered string is Hash or not</p>
	Portfolios required at the time of assessment (if any) for

Assessors Judgment Guide

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							

Observation Checklist

Assessment Task 1		Description of Assessment Task 1		
		Candidate is required to configure and execute anaconda environment on python platform		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Download the Anaconda for python platform			
2.	Install Anaconda			
3.	Set environment variable			
4.	Execute python script on Anaconda terminal			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		
Each Assessment Task (with performance criteria)				

Assessment Task 2		Description of Assessment Task 2		
		Candidate is required to make a program with hash function in Anaconda and add encryption code in the program and execute it.		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Import cryptography library in new notebook			
2.	Apply cryptography library in program			
3.	Execute the Code			
4.	Verify the encrypted answer			
5.	Add the decryption code in program and execute again			
6.	Verify the answer for entered string			
7.	Import Hash Function library in new notebook			
8.	Apply hash functions in the program			
9.	Execute the code			
10.	Verify that entered string is Hash or not			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		
Each Assessment Task (with performance criteria)				

Knowledge Assessment

Title of Qualification: National Vocational Certificate Level 5 in IoT (IoT Associate Engineer)	CS Code:	Level: 5	Version: 01
Competency Standard Title: Implement Cryptography and Network Security	Assessment Date (DD/MM/YY): Assessment Time: 30 min		

Guidance for Candidate	To complete your assessment for this Competency Standard, you need to answer the questions on the following pages successfully.
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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)	
1. What is Cryptography?	
2. When Public-key cryptography used?	
3. What are Cryptographic Hash Functions?	

Questions (Candidate confidently answered questions correctly and demonstrated understanding of the topics and their application)	
4. Why Cryptographic primitives important?	
5. Which protocol used for secure communication?	

ANSWER KEY

Sr.	Answers
1.	Cryptography, or cryptology, is the practice and study of techniques for secure communication in the presence of adversarial behavior. More generally, cryptography is about constructing and analyzing protocols that prevent third parties or the public from reading private messages; various aspects in information security such as data confidentiality, data integrity, authentication, and non-repudiation are central to modern cryptography.
2.	Symmetric-key cryptosystems use the same key for encryption and decryption of a message, although a message or group of messages can have a different key than others. A significant disadvantage of symmetric ciphers is the key management necessary to use them securely. Each distinct pair of communicating parties must, ideally, share a different key, and perhaps for each ciphertext exchanged as well.
3.	Cryptographic Hash Functions are cryptographic algorithms that are ways to generate and utilize specific keys to encrypt data for either symmetric or asymmetric encryption, and such functions may be viewed as keys themselves. They take a message of any length as input, and output a short, fixed-length hash, which can be used in (for example) a digital signature.
4.	Much of the theoretical work in cryptography concerns cryptographic primitives algorithms with basic cryptographic properties and their relationship to other cryptographic problems. More complicated cryptographic tools are then built from these basic primitives. These primitives provide fundamental properties, which are used to develop more complex tools called cryptosystems or cryptographic protocols, which guarantee one or more high-level security properties.

5.	Cryptography can be used to secure communications by encrypting them. Websites use encryption via HTTPS. "End-to-end" encryption, where only sender and receiver can read messages, is implemented for email in Pretty Good Privacy and for secure messaging in general in Signal and WhatsApp.
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