Qualification Pack

Embedded Full Stack IoT Analyst

QP Code: ELE/Q1404

Version: 4.0

NSQF Level: 5

Electronics Sector Skills Council of India || 155, 2nd Floor, ESC House Okhla Industrial Area-Phase 3
New Delhi- 110020 || email:anu@essc-india.org

Contents

Qualification Pack

ELE/Q1404: Embedded Full Stack IoT Analyst

Brief Job Description

The individual in this job role creates and implements new embedded OS based on system requirements and/or industry specifications. The individual builds and manages OS drivers for any custom hardware and to enhance existing application with new features.

Personal Attributes

The individual must have attention to details, logical thinking, and ability to execute the project as per clients requirement. This job requires the individual to work collaboratively with diverse teams. The individual should be able to hold interest in technology changes, demonstrate strong technical expertise and possess good oral and written communications skills. The individual should also be comfortable working with deadlines and budgets. The Individual must exhibit good customer service attributescourteous, solution oriented, polite, reliable, good decision-making skills, etc.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. ELE/N1429: Design, Develop, and Test an IoT-Based System
2. ELE/N1430: Create GUI and Applications in a framework
3. ELE/N1431: Perform Firmware Testing and Troubleshooting
4. DGT/VSQ/N0102: Employability Skills (60 Hours)

Qualification Pack (QP) Parameters

Sector	Electronics
Sub-Sector	Semiconductor & Components
Occupation	Product Design-S&C
Country	India
NSQF Level	5
Credits	19
Aligned to NCO/ISCO/ISIC Code	NCO-2015/2512.0501

Minimum Educational Qualification & Experience	Completed 2nd year of UG (UG Diploma) (Physics/Electronics/Electrical/Computer Science) with 1.5 years of experience Relevant Experience in Semiconductor & Components OR Completed 3 year diploma after 10th (Electronics/Electrical/Computer Science) with 3 Years of experience Relevant Experience in Semiconductor & Components OR Previous relevant Qualification of NSQF Level (4.5) with 1.5 years of experience Relevant Experience in Semiconductor & Components
Minimum Level of Education for Training in School	10th Class
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 Years
Last Reviewed On	NA
Next Review Date	30/04/2028
NSQC Approval Date	08/05/2025
Version	4.0
Reference code on NQR	QG-05-EH-03981-2025-V4-ESSCI
NQR Version	4.0

Remarks:

NA

Qualification Pack

ELE/N1429: Design, Develop, and Test an IoT-Based System

Description

This NOS unit is about design, develop, secure, and validate IoT-based embedded systems by integrating hardware, software, communication protocols, and security measures, while ensuring compliance with industry standards and stakeholder requirements.

Scope

The scope covers the following :

- Understand the Role of IOT & its Security
- Prepare the design for IoT based system
- Use appropriate techniques to develop embedded design
- Test and debug the embedded system for proper functionality

Elements and Performance Criteria

Understand the Role of IOT & its Security

To be competent, the user/individual on the job must be able to:

PC1. Understand IoT Ecosystem and Components

PC2. Analyze IoT System Architecture

PC3. Implement IoT Communication Protocols

PC4. Develop IoT Data Processing Capabilities

PC5. Ensure IoT Device Security

PC6. Design and Deploy IoT Applications

PC7. Debug and Troubleshoot Embedded IoT Systems

PC8. Understand Emerging Trends in IoT

Prepare the design for IoT based system

To be competent, the user/individual on the job must be able to:

PC9. Collate the design and connectivity requirements to establish the inter-operability between various components of the system as per its needs

PC10. Review the specific needs of the stakeholders of an IoT system and convert them to a requirement specification document

PC11. Confirm that the software and firmware required are as per the given product specifications and system architecture

PC12. Monitor feasibility analysis of the proposed embedded product design by evaluating the required parameters such as compatibility of hardware & software, cost, space, technology, safety, functional requirements, performance requirements, etc.

PC13. Review list handshake protocols between the connected devices in the IoT system

PC14. Check all the Machine to Machine (M2M) information in a flow chart or a connected diagram that shows all inputs and outputs of the system

PC15. Check embedded OS, development machines like virtual machines, tools (cross compiler, device drivers), embedded language and GUI language required to develop the new product design

PC16. Plan to deduce security aspects to be provided in the design at all its stages and comply with globally accepted regulatory standards for technical specifications

PC17. Monitor proper coding requirements and use licensed software (or open source) as per the requirements

PC18. Check requirements for continuous integration/continuous development platform and automation test case

PC19. Test the functional specifications of each component as well as of the system

PC20. Verify technical evaluation and deployment of the overall IoT solution after discussing with experts and the internal team

PC21. Ensure the IoT based system as per quality, industry and compliance standards as well as performance and budget requirements

PC22. Supervise the personnel involved work and develop a work plan with agreed scheduled timelines

PC23. Test both high-level design document and the detailed low-level design document

PC24. Monitor specifications of the requirements, variables to be recorded, need for specific connectivity at each interface, security requirements, etc. and confirm the same with the client

Use appropriate techniques to develop embedded design

To be competent, the user/individual on the job must be able to:

PC25. Monitor device drivers for sensors, timers, data communication ports, analog-to-digital and digital-to- analog converters and other embedded product peripherals

PC26. Check microprocessor/microcontroller software to comply with a specified function and its operating parameters

PC27. Monitor applications that perform signal processing, data acquisition, event processing, data management and communication functions

PC28. Verify that systems are using real-time embedded operating systems (OS) such as VxWorks and QNX

PC29. Ensure proper use of Opensource by understanding General Public License (GPL) detail to use re-usable components in collaboration with legal/IP team

PC30. Guide intellectual property from unauthorized use by maintaining IP confidentiality rights

PC31. Check reusable software components, best practices and design standards

Test and debug the embedded system for proper functionality

To be competent, the user/individual on the job must be able to:

PC32. Check the Unit Test Cases (UTCs) by white box testing method

PC33. Plan to use proper testing methodologies to check that prototype devices are built as per specifications

PC34. Verify the microprocessor/microcontroller on the board and also all associated peripherals systematically

PC35. Test the performance of the prototype devices/components against product specifications and regulatory requirements

PC36. Review codes and UTCs from appropriate people to identify defects

PC37. Check inputs from concerned people to decide design corrections

PC38. Monitor bug tracking system to report problems or issues in accordance with the policy and procedure and seek guidance from the team on how to resolve them

PC39. Verify corrective actions taken for identified defects in the design to submit corrected code to concerned person for approval

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. Knowledge of IoT architecture and ecosystem components.

KU2. Understanding of communication protocols used in IoT systems.

KU3. Familiarity with embedded system design and firmware development.

KU4. Understanding of data processing and analytics in IoT.

KU5. Awareness of security principles and global regulatory standards for IoT.

KU6. Knowledge of embedded OS, development tools, and languages.

KU7. Understanding of continuous integration and automation testing platforms.

KU8. Familiarity with open-source licensing (e.g., GPL) and IP protection.

KU9. Knowledge of testing methods including unit testing, debugging, and defect tracking.

KU10. Awareness of emerging trends and technologies in the IoT landscape.

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. Ability to analyze system requirements and prepare design documentation.

GS2. Skill in debugging and troubleshooting embedded systems.

GS3. Effective communication with teams, stakeholders, and clients.

GS4. Time management and project scheduling for timely deliverables.

GS5. Team coordination and supervision to meet technical milestones.

GS6. Problem-solving to address design, integration, and operational issues.

GS7. Attention to detail in verifying technical specifications and compliance.

GS8. Adaptability to new tools, technologies, and industry practices.

GS9. Professionalism in maintaining IP confidentiality and licensing compliance.

GS10. Commitment to quality assurance and industry-standard compliance.

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Understand the Role of IOT & its Security	**8**	**8**	**-**	**-**
PC1. Understand IoT Ecosystem and Components	-	-	-	-
PC2. Analyze IoT System Architecture	-	-	-	-
PC3. Implement IoT Communication Protocols	-	-	-	-
PC4. Develop IoT Data Processing Capabilities	-	-	-	-
PC5. Ensure IoT Device Security	-	-	-	-
PC6. Design and Deploy IoT Applications	-	-	-	-
PC7. Debug and Troubleshoot Embedded IoT Systems	-	-	-	-
PC8. Understand Emerging Trends in IoT	-	-	-	-
Prepare the design for IoT based system	**16**	**16**	**-**	**10**
PC9. Collate the design and connectivity requirements to establish the inter-operability between various components of the system as per its needs	-	-	-	-
PC10. Review the specific needs of the stakeholders of an IoT system and convert them to a requirement specification document	-	-	-	-
PC11. Confirm that the software and firmware required are as per the given product specifications and system architecture	-	-	-	-
PC12. Monitor feasibility analysis of the proposed embedded product design by evaluating the required parameters such as compatibility of hardware & software, cost, space, technology, safety, functional requirements, performance requirements, etc.	-	-	-	-
PC13. Review list handshake protocols between the connected devices in the IoT system	-	-	-	-
PC14. Check all the Machine to Machine (M2M) information in a flow chart or a connected diagram that shows all inputs and outputs of the system	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC15. Check embedded OS, development machines like virtual machines, tools (cross compiler, device drivers), embedded language and GUI language required to develop the new product design	-	-	-	-
PC16. Plan to deduce security aspects to be provided in the design at all its stages and comply with globally accepted regulatory standards for technical specifications	-	-	-	-
PC17. Monitor proper coding requirements and use licensed software (or open source) as per the requirements	-	-	-	-
PC18. Check requirements for continuous integration/continuous development platform and automation test case	-	-	-	-
PC19. Test the functional specifications of each component as well as of the system	-	-	-	-
PC20. Verify technical evaluation and deployment of the overall IoT solution after discussing with experts and the internal team	-	-	-	-
PC21. Ensure the IoT based system as per quality, industry and compliance standards as well as performance and budget requirements	-	-	-	-
PC22. Supervise the personnel involved work and develop a work plan with agreed scheduled timelines	-	-	-	-
PC23. Test both high-level design document and the detailed low-level design document	-	-	-	-
PC24. Monitor specifications of the requirements, variables to be recorded, need for specific connectivity at each interface, security requirements, etc. and confirm the same with the client	-	-	-	-
Use appropriate techniques to develop embedded design	**7**	**7**	**-**	**7**
PC25. Monitor device drivers for sensors, timers, data communication ports, analog-to-digital and digital-to-analog converters and other embedded product peripherals	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC26. Check microprocessor/microcontroller software to comply with a specified function and its operating parameters	-	-	-	-
PC27. Monitor applications that perform signal processing, data acquisition, event processing, data management and communication functions	-	-	-	-
PC28. Verify that systems are using real-time embedded operating systems (OS) such as VxWorks and QNX	-	-	-	-
PC29. Ensure proper use of Opensource by understanding General Public License (GPL) detail to use re-usable components in collaboration with legal/IP team	-	-	-	-
PC30. Guide intellectual property from unauthorized use by maintaining IP confidentiality rights	-	-	-	-
PC31. Check reusable software components, best practices and design standards	-	-	-	-
Test and debug the embedded system for proper functionality	**9**	**9**	**-**	**3**
PC32. Check the Unit Test Cases (UTCs) by white box testing method	-	-	-	-
PC33. Plan to use proper testing methodologies to check that prototype devices are built as per specifications	-	-	-	-
PC34. Verify the microprocessor/microcontroller on the board and also all associated peripherals systematically	-	-	-	-
PC35. Test the performance of the prototype devices/components against product specifications and regulatory requirements	-	-	-	-
PC36. Review codes and UTCs from appropriate people to identify defects	-	-	-	-
PC37. Check inputs from concerned people to decide design corrections	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC38. Monitor bug tracking system to report problems or issues in accordance with the policy and procedure and seek guidance from the team on how to resolve them	-	-	-	-
PC39. Verify corrective actions taken for identified defects in the design to submit corrected code to concerned person for approval	-	-	-	-
NOS Total	**40**	**40**	**-**	**20**

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	ELE/N1429
NOS Name	Design, Develop, and Test an IoT-Based System
Sector	Electronics
Sub-Sector	
Occupation	Product Design-S&C
NSQF Level	5
Credits	5
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	30/04/2028
NSQC Clearance Date	08/05/2025

ELE/N1430: Create GUI and Applications in a framework

Description

This NOS unit is about develop and integrate IoT applications with responsive GUI/web UI by using appropriate platforms, programming languages, protocols, and security measures for real-world smart systems.

Scope

The scope covers the following :

- Develop application for IoT system
- Develop the appropriate GUI/web UI for the entire IoT system

Elements and Performance Criteria

Develop application for IoT system

To be competent, the user/individual on the job must be able to:

PC1. Check wireless sensor networks for IoT and select the right platform for development for example arduino, raspberry pi

PC2. Review IoT application development using embedded OS for example Cotiki OS, mbedOS etc.

PC3. Verify user flow diagram and design map for the interface

PC4. Monitor the style of interface and validate the same design of the application to identify wireframe and mockup

PC5. Ensure lightweight framework, responsive design, event handling, interactivity etc. in GUI designing

PC6. Test the correct syntax when developing code

PC7. Monitor programming languages such as Python, C#, C/C++, Java etc. to build programs to communicate to cloud server using various application protocols such as HTTP/CoAP/ MQTT/AMQP

PC8. Observe a complete IoT application by using appropriate programming language, by interfacing with sensors and actuators using GPIO pins and also interfacing with the camera

PC9. Plan to select, install and troubleshoot various modules/devices for real applications for smart traffic system, smart parking system, healthcare, wearables, smart lighting, smart homes etc.

Develop the appropriate GUI/web UI for the entire IoT system

To be competent, the user/individual on the job must be able to:

PC10. Verify proper graphical user interface, programming languages and hardware for compatibility between GUI and IoT system to use for the IoT system

PC11. Check the wireframe design while developing the GUI

PC12. Verify the front end as per the design configuration and execute functionality to the components on front end

PC13. Check the program to test the functionality of the GUI

PC14. Review the syntaxes to remove the faults in the program

PC15. Verify UI/UX design done up front to ensure ease of use and simplicity of the GUI program

PC16. Monitor the security aspects for IoT applications and comply with them to publish performance metrics of the application in real time

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. Knowledge of IoT development platforms like Arduino, Raspberry Pi, etc.

KU2. Understanding of embedded operating systems such as Contiki OS, mbedOS.

KU3. Familiarity with GUI/UX principles, wireframing, and responsive design.

KU4. Knowledge of cloud communication protocols (HTTP, MQTT, CoAP, AMQP).

KU5. Proficiency in programming languages like Python, Java, C.

KU6. Understanding of interfacing with sensors, actuators, GPIOs, and cameras.

KU7. Awareness of design mapping, user flow, and front-end architecture.

KU8. Knowledge of syntax validation and debugging in code development.

KU9. Understanding of module integration for smart systems (e.g., smart homes, traffic, health).

KU10. Familiarity with IoT application security and real-time performance monitoring.

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. Ability to select and integrate hardware and software for IoT applications.

GS2. Skill in designing and implementing interactive GUI/web UI.

GS3. Analytical thinking to test and validate user flow and component functionality.

GS4. Problem-solving in identifying and fixing code syntax and runtime issues.

GS5. Creativity in designing wireframes and improving user experience (UX).

GS6. Communication skills to collaborate on interface design and functionality.

GS7. Adaptability in working with different development frameworks and devices.

GS8. Attention to detail when testing GUI responsiveness and performance.

GS9. Project planning to troubleshoot and deploy modules in real-world scenarios.

GS10. Awareness of security and compliance requirements in IoT deployments.

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Develop application for IoT system	**20**	**24**	**-**	**5**
PC1. Check wireless sensor networks for IoT and select the right platform for development for example arduino, raspberry pi	-	-	-	-
PC2. Review IoT application development using embedded OS for example Cotiki OS, mbedOS etc.	-	-	-	-
PC3. Verify user flow diagram and design map for the interface	-	-	-	-
PC4. Monitor the style of interface and validate the same design of the application to identify wireframe and mockup	-	-	-	-
PC5. Ensure lightweight framework, responsive design, event handling, interactivity etc. in GUI designing	-	-	-	-
PC6. Test the correct syntax when developing code	-	-	-	-
PC7. Monitor programming languages such as Python, C#, C/C++, Java etc. to build programs to communicate to cloud server using various application protocols such as HTTP/CoAP/ MQTT/AMQP	-	-	-	-
PC8. Observe a complete IoT application by using appropriate programming language, by interfacing with sensors and actuators using GPIO pins and also interfacing with the camera	-	-	-	-
PC9. Plan to select, install and troubleshoot various modules/devices for real applications for smart traffic system, smart parking system, healthcare, wearables, smart lighting, smart homes etc.	-	-	-	-
Develop the appropriate GUI/web UI for the entire IoT system	**20**	**26**	**-**	**5**
PC10. Verify proper graphical user interface, programming languages and hardware for compatibility between GUI and IoT system to use for the IoT system	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. Check the wireframe design while developing the GUI	-	-	-	-
PC12. Verify the front end as per the design configuration and execute functionality to the components on front end	-	-	-	-
PC13. Check the program to test the functionality of the GUI	-	-	-	-
PC14. Review the syntaxes to remove the faults in the program	-	-	-	-
PC15. Verify UI/UX design done up front to ensure ease of use and simplicity of the GUI program	-	-	-	-
PC16. Monitor the security aspects for IoT applications and comply with them to publish performance metrics of the application in real time	-	-	-	-
NOS Total	**40**	**50**	**-**	**10**

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	ELE/N1430
NOS Name	Create GUI and Applications in a framework
Sector	Electronics
Sub-Sector	
Occupation	Product Design-S&C
NSQF Level	5
Credits	6
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	30/04/2028
NSQC Clearance Date	08/05/2025

ELE/N1431: Perform Firmware Testing and Troubleshooting

Description

This NOS unit is about test, validate, and troubleshoot embedded IoT software and prototypes to ensure functional correctness, performance, and compliance with industry standards.

Scope

The scope covers the following :

- Test the software solutions for embedded IoT products
- Testing and rectify malfunctions in the IoT prototype
- Validate and configur the entire embedded IOT system

Elements and Performance Criteria

Test the software solutions for embedded IoT products

To be competent, the user/individual on the job must be able to:

PC1. Verify testing procedures to analyse code

PC2. Manage the key features of the programming language used to develop and test solutions.

PC3. Check the embedded code to determine root cause of defects and implement corrective action

PC4. Check problems and bugs in code by applying debugging techniques such as Break-points, to ensure specifications are met

PC5. Test the compiled code into the memory of the embedded product

PC6. Check the embedded product to see if it is working as per the functional and performance requirements

PC7. Verify program using debug tools such as JTAG, GDB etc.

PC8. Test the functional correctness for industry standard interfaces using protocol analyzers.

Testing and rectify malfunctions in the IoT prototype

To be competent, the user/individual on the job must be able to:

PC9. Monitor the malfunctions in constructed prototype devices/components using appropriate software, hardware and testing methods

PC10. Verify the bugs in tracking systems and automat test plans

PC11. Ensure unit failures and develop corrective actions to verify interoperability testing with other elements in the IoT network

PC12. Verify the test/QA team to fix identified problems and compliance with quality standards

PC13. Suggest correct techniques to rectify malfunctions as per standard operating system to the specifications or to the final design

PC14. Test the prototype devices/components using approved procedures and ensure that operational requirements are met

PC15. Monitor the completed new product design work appropriately and submit to relevant authority/person for approval

Validate and configure the entire embedded IoT system

To be competent, the user/individual on the job must be able to:

PC16. Review and interpret test results against specifications and check for compliance

PC17. Review root cause analysis to identify the cause of the problem, if test results are in disagreement with specifications, then check, troubleshoot and correct any defects in the design

PC18. Test the system to various intended applications by selecting the different combinations possible

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. Knowledge of embedded system testing procedures and workflows.

KU2. Understanding of debugging tools such as JTAG, GDB, and protocol analyzers.

KU3. Familiarity with software QA processes and compliance standards.

KU4. Knowledge of root cause analysis methods for defect identification.

KU5. Understanding of system-level testing techniques for IoT devices.

KU6. Knowledge of programming languages used in embedded systems (e.g., C).

KU7. Awareness of standard operating procedures for malfunction rectification.

KU8. Understanding of test result interpretation and specification matching.

KU9. Familiarity with integration and interoperability testing across IoT networks.

KU10. Knowledge of validation procedures for new product designs and their approval process.

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. Analytical thinking to identify, isolate, and correct design defects.

GS2. Problem-solving skills to rectify malfunctions in software and hardware components.

GS3. Attention to detail in testing and verifying system compliance.

GS4. Ability to collaborate effectively with QA/test teams.

GS5. Communication skills to document and report test findings clearly.

GS6. Project management to oversee testing cycles and approval workflows.

GS7. Adaptability in applying different test methods for diverse IoT applications.

GS8. Technical judgment to suggest appropriate rectification techniques.

GS9. Commitment to quality standards and continuous improvement.

GS10. Time management to meet testing deadlines and product release schedules.

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Test the software solutions for embedded IoT products	**16**	**24**	**-**	**5**
PC1. Verify testing procedures to analyse code	-	-	-	-
PC2. Manage the key features of the programming language used to develop and test solutions.	-	-	-	-
PC3. Check the embedded code to determine root cause of defects and implement corrective action	-	-	-	-
PC4. Check problems and bugs in code by applying debugging techniques such as Break-points, to ensure specifications are met	-	-	-	-
PC5. Test the compiled code into the memory of the embedded product	-	-	-	-
PC6. Check the embedded product to see if it is working as per the functional and performance requirements	-	-	-	-
PC7. Verify program using debug tools such as JTAG, GDB etc.	-	-	-	-
PC8. Test the functional correctness for industry standard interfaces using protocol analyzers.	-	-	-	-
Testing and rectify malfunctions in the IoT prototype	**14**	**16**	**-**	**3**
PC9. Monitor the malfunctions in constructed prototype devices/components using appropriate software, hardware and testing methods	-	-	-	-
PC10. Verify the bugs in tracking systems and automat test plans	-	-	-	-
PC11. Ensure unit failures and develop corrective actions to verify interoperability testing with other elements in the IoT network	-	-	-	-
PC12. Verify the test/QA team to fix identified problems and compliance with quality standards	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. Suggest correct techniques to rectify malfunctions as per standard operating system to the specifications or to the final design	-	-	-	-
PC14. Test the prototype devices/components using approved procedures and ensure that operational requirements are met	-	-	-	-
PC15. Monitor the completed new product design work appropriately and submit to relevant authority/person for approval	-	-	-	-
Validate and configure the entire embedded IoT system	**10**	**10**	**-**	**2**
PC16. Review and interpret test results against specifications and check for compliance	-	-	-	-
PC17. Review root cause analysis to identify the cause of the problem, if test results are in disagreement with specifications, then check, troubleshoot and correct any defects in the design	-	-	-	-
PC18. Test the system to various intended applications by selecting the different combinations possible	-	-	-	-
NOS Total	**40**	**50**	**-**	**10**

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	ELE/N1431
NOS Name	Perform Firmware Testing and Troubleshooting
Sector	Electronics
Sub-Sector	
Occupation	Product Design-S&C
NSQF Level	5
Credits	6
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	30/04/2028
NSQC Clearance Date	08/05/2025

Qualification Pack

DGT/VSQ/N0102: Employability Skills (60 Hours)

Description

This unit is about employability skills, Constitutional values, becoming a professional in the 21st Century, digital, financial, and legal literacy, diversity and Inclusion, English and communication skills, customer service, entrepreneurship, and apprenticeship, getting ready for jobs and career development.

Scope

The scope covers the following :

- Introduction to Employability Skills
- Constitutional values - Citizenship
- Becoming a Professional in the 21st Century
- Basic English Skills
- Career Development & Goal Setting
- Communication Skills
- Diversity & Inclusion
- Financial and Legal Literacy
- Essential Digital Skills
- Entrepreneurship
- Customer Service
- Getting ready for Apprenticeship & Jobs

Elements and Performance Criteria

Introduction to Employability Skills

To be competent, the user/individual on the job must be able to:

PC1. identify employability skills required for jobs in various industries

PC2. identify and explore learning and employability portals

Constitutional values – Citizenship

To be competent, the user/individual on the job must be able to:

PC3. recognize the significance of constitutional values, including civic rights and duties, citizenship, responsibility towards society etc. and personal values and ethics such as honesty, integrity, caring and respecting others, etc.

PC4. follow environmentally sustainable practices

Becoming a Professional in the 21st Century

To be competent, the user/individual on the job must be able to:

PC5. recognize the significance of 21st Century Skills for employment

PC6. practice the 21st Century Skills such as Self-Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn for continuous learning etc. in personal and professional life

Basic English Skills

To be competent, the user/individual on the job must be able to:

PC7. use basic English for everyday conversation in different contexts, in person and over the telephone

PC8. read and understand routine information, notes, instructions, mails, letters etc. written in English

PC9. write short messages, notes, letters, e-mails etc. in English

Career Development & Goal Setting

To be competent, the user/individual on the job must be able to:

PC10. understand the difference between job and career

PC11. prepare a career development plan with short- and long-term goals, based on aptitude

Communication Skills

To be competent, the user/individual on the job must be able to:

PC12. follow verbal and non-verbal communication etiquette and active listening techniques in various settings

PC13. work collaboratively with others in a team

Diversity & Inclusion

To be competent, the user/individual on the job must be able to:

PC14. communicate and behave appropriately with all genders and PwD

PC15. escalate any issues related to sexual harassment at workplace according to POSH Act

Financial and Legal Literacy

To be competent, the user/individual on the job must be able to:

PC16. select financial institutions, products and services as per requirement

PC17. carry out offline and online financial transactions, safely and securely

PC18. identify common components of salary and compute income, expenses, taxes, investments etc

PC19. identify relevant rights and laws and use legal aids to fight against legal exploitation

Essential Digital Skills

To be competent, the user/individual on the job must be able to:

PC20. operate digital devices and carry out basic internet operations securely and safely

PC21. use e- mail and social media platforms and virtual collaboration tools to work effectively

PC22. use basic features of word processor, spreadsheets, and presentations

Entrepreneurship

To be competent, the user/individual on the job must be able to:

PC23. identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research

PC24. develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion

PC25. identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity

Customer Service

To be competent, the user/individual on the job must be able to:

PC26. identify different types of customers

PC27. identify and respond to customer requests and needs in a professional manner.

PC28. follow appropriate hygiene and grooming standards

Getting ready for apprenticeship & Jobs

To be competent, the user/individual on the job must be able to:

PC29. create a professional Curriculum vitae (Résumé)

PC30. search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively

PC31. apply to identified job openings using offline /online methods as per requirement

PC32. answer questions politely, with clarity and confidence, during recruitment and selection

PC33. identify apprenticeship opportunities and register for it as per guidelines and requirements

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. need for employability skills and different learning and employability related portals

KU2. various constitutional and personal values

KU3. different environmentally sustainable practices and their importance

KU4. Twenty first (21st) century skills and their importance

KU5. how to use English language for effective verbal (face to face and telephonic) and written communication in formal and informal set up

KU6. importance of career development and setting long- and short-term goals

KU7. about effective communication

KU8. POSH Act

KU9. Gender sensitivity and inclusivity

KU10. different types of financial institutes, products, and services

KU11. how to compute income and expenditure

KU12. importance of maintaining safety and security in offline and online financial transactions

KU13. different legal rights and laws

KU14. different types of digital devices and the procedure to operate them safely and securely

KU15. how to create and operate an e- mail account and use applications such as word processors, spreadsheets etc.

KU16. how to identify business opportunities

KU17. types and needs of customers

KU18. how to apply for a job and prepare for an interview

KU19. apprenticeship scheme and the process of registering on apprenticeship portal

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. read and write different types of documents/instructions/correspondence

GS2. communicate effectively using appropriate language in formal and informal settings

GS3. behave politely and appropriately with all
GS4. how to work in a virtual mode
GS5. perform calculations efficiently
GS6. solve problems effectively
GS7. pay attention to details
GS8. manage time efficiently
GS9. maintain hygiene and sanitization to avoid infection

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Introduction to Employability Skills	**1**	**1**	**-**	**-**
PC1. identify employability skills required for jobs in various industries	-	-	-	-
PC2. identify and explore learning and employability portals	-	-	-	-
Constitutional values – Citizenship	**1**	**1**	**-**	**-**
PC3. recognize the significance of constitutional values, including civic rights and duties, citizenship, responsibility towards society etc. and personal values and ethics such as honesty, integrity, caring and respecting others, etc.	-	-	-	-
PC4. follow environmentally sustainable practices	-	-	-	-
Becoming a Professional in the 21st Century	**2**	**4**	**-**	**-**
PC5. recognize the significance of 21st Century Skills for employment	-	-	-	-
PC6. practice the 21st Century Skills such as Self-Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn for continuous learning etc. in personal and professional life	-	-	-	-
Basic English Skills	**2**	**3**	**-**	**-**
PC7. use basic English for everyday conversation in different contexts, in person and over the telephone	-	-	-	-
PC8. read and understand routine information, notes, instructions, mails, letters etc. written in English	-	-	-	-
PC9. write short messages, notes, letters, e-mails etc. in English	-	-	-	-
Career Development & Goal Setting	**1**	**2**	**-**	**-**

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. understand the difference between job and career	-	-	-	-
PC11. prepare a career development plan with short- and long-term goals, based on aptitude	-	-	-	-
Communication Skills	**2**	**2**	**-**	**-**
PC12. follow verbal and non-verbal communication etiquette and active listening techniques in various settings	-	-	-	-
PC13. work collaboratively with others in a team	-	-	-	-
Diversity & Inclusion	**1**	**2**	**-**	**-**
PC14. communicate and behave appropriately with all genders and PwD	-	-	-	-
PC15. escalate any issues related to sexual harassment at workplace according to POSH Act	-	-	-	-
Financial and Legal Literacy	**2**	**3**	**-**	**-**
PC16. select financial institutions, products and services as per requirement	-	-	-	-
PC17. carry out offline and online financial transactions, safely and securely	-	-	-	-
PC18. identify common components of salary and compute income, expenses, taxes, investments etc	-	-	-	-
PC19. identify relevant rights and laws and use legal aids to fight against legal exploitation	-	-	-	-
Essential Digital Skills	**3**	**4**	**-**	**-**
PC20. operate digital devices and carry out basic internet operations securely and safely	-	-	-	-
PC21. use e- mail and social media platforms and virtual collaboration tools to work effectively	-	-	-	-
PC22. use basic features of word processor, spreadsheets, and presentations	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Entrepreneurship	**2**	**3**	**-**	**-**
PC23. identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research	-	-	-	-
PC24. develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion	-	-	-	-
PC25. identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity	-	-	-	-
Customer Service	**1**	**2**	**-**	**-**
PC26. identify different types of customers	-	-	-	-
PC27. identify and respond to customer requests and needs in a professional manner.	-	-	-	-
PC28. follow appropriate hygiene and grooming standards	-	-	-	-
Getting ready for apprenticeship & Jobs	**2**	**3**	**-**	**-**
PC29. create a professional Curriculum vitae (Résumé)	-	-	-	-
PC30. search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively	-	-	-	-
PC31. apply to identified job openings using offline /online methods as per requirement	-	-	-	-
PC32. answer questions politely, with clarity and confidence, during recruitment and selection	-	-	-	-
PC33. identify apprenticeship opportunities and register for it as per guidelines and requirements	-	-	-	-
NOS Total	**20**	**30**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	DGT/VSQ/N0102
NOS Name	Employability Skills (60 Hours)
Sector	Cross Sectoral
Sub-Sector	Professional Skills
Occupation	Employability
NSQF Level	4
Credits	2
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	31/10/2025
NSQC Clearance Date	08/05/2025

Assessment Guidelines and Assessment Weightage

Assessment Guidelines

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down the proportion of marks for Theory and Skills Practical for each PC.

2. The assessment for the theory part will be based on the knowledge bank of questions created by the SSC.

3. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.

4. Individual assessment agencies will create unique question papers for the theory part for each candidate at each examination/training center (as per assessment criteria below).

5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/ training center based on these criteria.

6. To pass the Qualification Pack assessment, every trainee should score a minimum of 70% of % aggregate marks to successfully clear the assessment.

7. In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack.

Minimum Aggregate Passing % at QP Level : 70

(**Please note**: Every Trainee should score a minimum aggregate passing percentage as specified above, to successfully clear the Qualification Pack assessment.)

Assessment Weightage

Compulsory NOS

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
ELE/N1429.Design, Develop, and Test an IoT-Based System	40	40	-	20	100	30
ELE/N1430.Create GUI and Applications in a framework	40	50	-	10	100	30
ELE/N1431.Perform Firmware Testing and Troubleshooting	40	50	-	10	100	30
DGT/VSQ/N0102.Employability Skills (60 Hours)	20	30	-	-	50	10
Total	**140**	**170**	**-**	**40**	**350**	**100**

Acronyms

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training

Glossary

Sector	Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
Sub-sector	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
Occupation	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
Occupational Standards (OS)	OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the Knowledge and Understanding (KU) they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria (PC)	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
National Occupational Standards (NOS)	NOS are occupational standards which apply uniquely in the Indian context.
Qualifications Pack (QP)	QP comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.
Unit Code	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
Unit Title	Unit title gives a clear overall statement about what the incumbent should be able to do.
Description	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
Scope	Scope is a set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on quality of performance required.

Knowledge and Understanding (KU)	Knowledge and Understanding (KU) are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard.
Organisational Context	Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Technical Knowledge	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Core Skills/ Generic Skills (GS)	Core skills or Generic Skills (GS) are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles.
Electives	Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.
Options	Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.