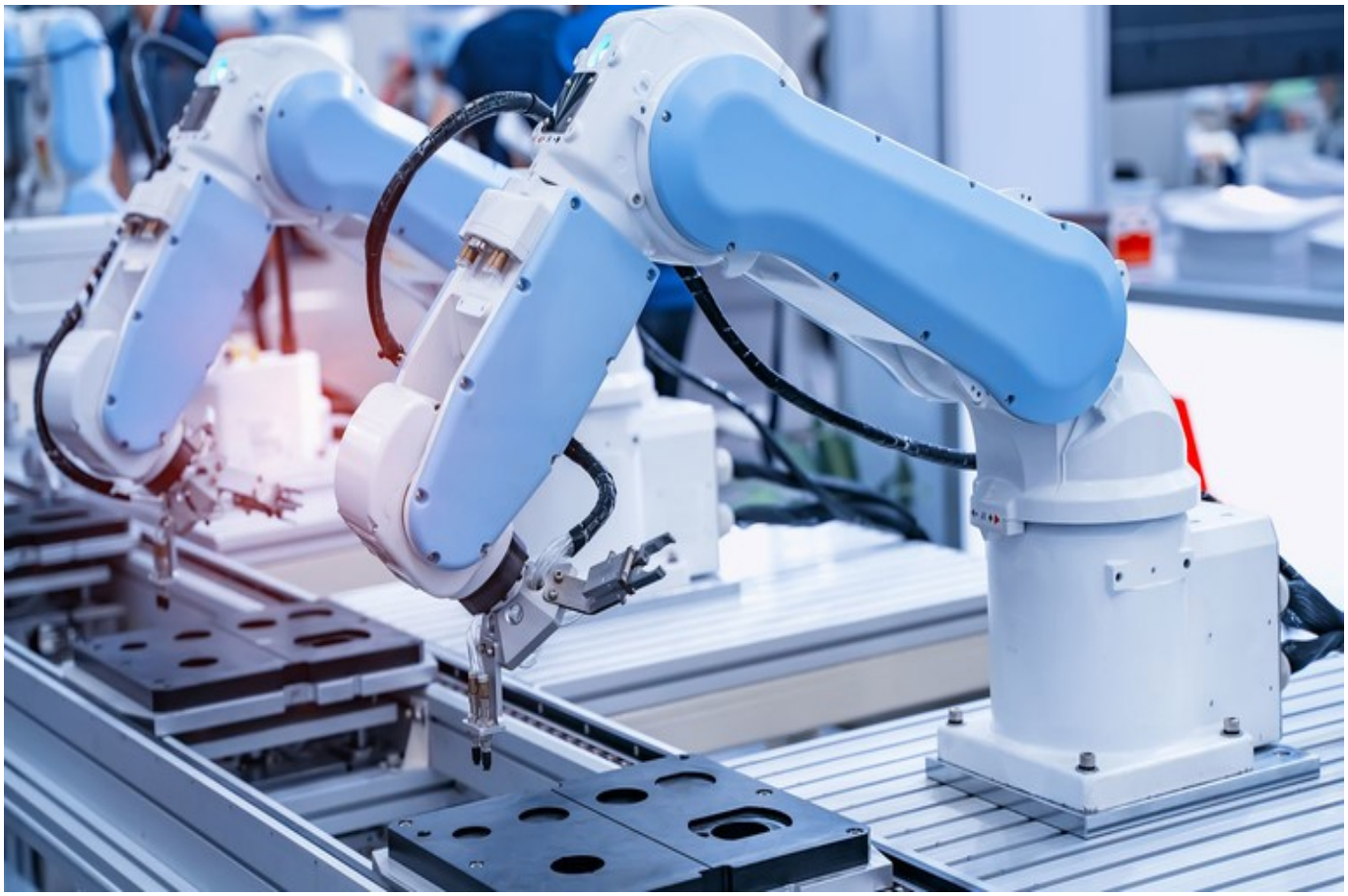
Qualification Pack



Robotics Automation Lead

QP Code: ELE/Q7106

Version: 1.0

NSQF Level: 7

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Qualification Pack

ELE/Q7106: Robotics Automation Lead

Brief Job Description

A Robotics Automation Lead designs and monitors all the computer-controlled systems and robotic devices used within industrial and commercial facilities to reduce human intervention and maximise efficiency. The individual assists manufacturing, mechanical, and electronics engineers in all phases of process design, development, production, testing, installation of the robot and operations.

Personal Attributes

The individual must have attention to detail, problem-solving skills and the ability to work in coordination with others. The person must also have managerial skills to manage and lead a team of engineers.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. ELE/N7117: Use the appropriate Robotic Process Automation (RPA) software
2. ELE/N7118: Integrate robot manipulators with process components
3. ELE/N7119: Perform source control integration in the RPA software
4. ELE/N7120: Use REFramework in the RPA software
5. ELE/N7121: Use the robot sensing and machine vision technologies
6. ELE/N9905: Work effectively at the workplace
7. ELE/N1002: Apply health and safety practices at the workplace

Qualification Pack (QP) Parameters

Sector	Electronics
Sub-Sector	Industrial Automation
Occupation	Engineering-I&A
Country	India
NSQF Level	7

Qualification Pack

Credits	NA
Aligned to NCO/ISCO/ISIC Code	NCO-2015/NA
Minimum Educational Qualification & Experience	Diploma (after 12th in relevant trade) with 6 Years of experience in the relevant field OR B.E./B.Tech ((Degree in Electrical or Electronics or Mechanical Engineering) with 04 Year of relevant Experience) OR (M.E/M.Tech in Electrical or Electronics or Mechanical Engineering with 02 years of relevant Experience)) OR Certificate-NSQF (Level-6 in Building Management System Project Manager) with 2 Years of experience in the relevant field
Minimum Level of Education for Training in School	Not Applicable
Pre-Requisite License or Training	NA
Minimum Job Entry Age	21 Years
Last Reviewed On	24/02/2022
Next Review Date	02/06/2025
Deactivation Date	02/06/2025
NSQC Approval Date	24/02/2022
Version	1.0
Reference code on NQR	2022/EHW/ESSC/05393
NQR Version	1.0

ELE/N7117: Use the appropriate Robotic Process Automation (RPA) software

Description

This OS unit is about implementing RPA, setting up the RPA software for use and dealing with cybersecurity attacks in robotics.

Scope

The scope covers the following :

- Implement RPA
- Set up the RPA software for use
- Deal with cybersecurity attacks in robotics

Elements and Performance Criteria

Implement RPA

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

PC1. determine how RPA can handle the front end of the system

PC2. integrate RPA with the existing systems

PC3. use RPA to improve the efficiency of digitizing, auditing and processing data

PC4. determine how RPA bots will work at the level of the UI and interact with the relevant systems

PC5. automate the repetitive tasks and manual processes using RPA

PC6. improve the accuracy of data and its processing speed with a reduction in manual errors using the relevant RPA technique

PC7. select the appropriate robotics process automation tool according to the size of the client organisation

PC8. set up software libraries and tools to build robot applications using the ROS system

Set up the RPA software for use

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

PC9. use the RPA software to design automation processes

PC10. view all available project templates, search and filter them by source and create a new project based on a template

PC11. apply necessary changes to the template to provides quick access to variables, arguments and imports

PC12. build automation by managing the activities added to the workflow file

PC13. debug workflow using debugging tools to set breakpoints

PC14. monitor the execution of debugging activities step by step and adjust the debugging speed

Deal with cybersecurity attacks in robotics

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

PC15. identify the field of possible cybersecurity attacks in robotics programming

PC16. select the appropriate control system
PC17. determine different types of threats and vulnerabilities in the cloud
PC18. set up the authentication process to access the robotics program

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. the importance and use of debugging tools in RPA
KU2. the benefits and applications of RPA
KU3. the difference between RPA and traditional automation
KU4. different types of bots
KU5. RPA development methodology and key considerations
KU6. use of various RPA tools
KU7. different types of RPA software and its components
KU8. how to install an RPA software
KU9. different workflow files in the RPA software
KU10. the concept of control system and its process
KU11. the concept of control system and its process
KU12. the authentication process for accessing the robotics program
KU13. intelligent autonomous robots
KU14. how to mitigate cybersecurity attacks on robotic systems
KU15. the importance and need of robotics in the automation process
KU16. use of artificial intelligence, screen scraping, and workflow automation in the RPA process
KU17. how the combination of RPA solutions are used with intelligent technologies in different industries
KU18. functioning of intelligent agents and autonomous robots
KU19. the process of integrating RPA with existing systems
KU20. the process of digitizing, auditing and processing data using RPA
KU21. how to identify cybersecurity attacks in robotics programming

Generic Skills (GS)

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

GS1. write work-related notes
GS2. read the relevant guides, manuals and literature to get the latest information about the field of work
GS3. communicate politely and professionally
GS4. listen attentively to understand the instructions being given
GS5. identify solutions to work-related issues
GS6. plan and prioritise tasks to ensure timely completion

GS7. take quick decisions to deal with any emergencies or accidents

GS8. coordinate with the co-workers to achieve the work objectives

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Implement RPA	**10**	**15**	**-**	**4**
PC1. determine how RPA can handle the front end of the system	-	-	-	-
PC2. integrate RPA with the existing systems	-	-	-	-
PC3. use RPA to improve the efficiency of digitizing, auditing and processing data	-	-	-	-
PC4. determine how RPA bots will work at the level of the UI and interact with the relevant systems	-	-	-	-
PC5. automate the repetitive tasks and manual processes using RPA	-	-	-	-
PC6. improve the accuracy of data and its processing speed with a reduction in manual errors using the relevant RPA technique	-	-	-	-
PC7. select the appropriate robotics process automation tool according to the size of the client organisation	-	-	-	-
PC8. set up software libraries and tools to build robot applications using the ROS system	-	-	-	-
Set up the RPA software for use	**10**	**25**	**-**	**7**
PC9. use the RPA software to design automation processes	-	-	-	-
PC10. view all available project templates, search and filter them by source and create a new project based on a template	-	-	-	-
PC11. apply necessary changes to the template to provides quick access to variables, arguments and imports	-	-	-	-
PC12. build automation by managing the activities added to the workflow file	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. debug workflow using debugging tools to set breakpoints	-	-	-	-
PC14. monitor the execution of debugging activities step by step and adjust the debugging speed	-	-	-	-
Deal with cybersecurity attacks in robotics	**10**	**15**	**-**	**4**
PC15. identify the field of possible cybersecurity attacks in robotics programming	-	-	-	-
PC16. select the appropriate control system	-	-	-	-
PC17. determine different types of threats and vulnerabilities in the cloud	-	-	-	-
PC18. set up the authentication process to access the robotics program	-	-	-	-
NOS Total	**30**	**55**	**-**	**15**

National Occupational Standards (NOS) Parameters

NOS Code	ELE/N7117
NOS Name	Use the appropriate Robotic Process Automation (RPA) software
Sector	Electronics
Sub-Sector	Industrial Automation
Occupation	Engineering-I&A
NSQF Level	7
Credits	TBD
Version	1.0
Last Reviewed Date	24/02/2022
Next Review Date	02/06/2025
NSQC Clearance Date	24/02/2022

ELE/N7118: Integrate robot manipulators with process components

Description

This OS unit is about integrating robot manipulators with process components.

Scope

The scope covers the following :

- Set up process components
- Integrate robot manipulators

Elements and Performance Criteria

Set up process components

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

PC1. use the RPA software to create standalone automation projects such as a process or library

PC2. configure a set of changes at the project level and apply them to all the activities of project dependencies

PC3. use the relevant variables in the User Interface (UI) to enable the functionality of the panel

PC4. use the relevant argument in automation with an Invoke Workflow File activity

PC5. create arguments and make changes to them in the Arguments panel

PC6. use the renaming feature in an argument in the panel to automatically updates all occurrences in the current file

PC7. integrate the technology behind the application to identify elements, trigger events and get data behind the scenes

PC8. check all the imported namespaces are displayed correctly in the import panel

PC9. formulate the various user events related activities found in the RPA

Integrate robot manipulators

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

PC10. modify the variation of gravity torque and inertia with robot configuration

PC11. examine the multi-finger grasping, walking mechanisms, motion planning in robotics

PC12. evaluate the application of the robotics system

PC13. integrate all the data collected by robot for map building

PC14. inspect how the geometric robot model describes the orientation of a coordinate frame attached to the gripper

PC15. measure the angles of rotation and the distances of the displacements of translational joints using a robot manipulator

PC16. estimate the shortest path between a moving part and an obstacle at the given location and use an appropriate approach to detect whether two objects intervene

PC17. use rigid manipulators and specialised grippers for object manipulation and grasping

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. the User Interface (UI) automation process
KU2. applicable system activities and variables
KU3. how to import panel data
KU4. the application of robotics system in the automation industry
KU5. the working of forward and inverse kinematics
KU6. the function of manipulators
KU7. how to control flexible joint robotic systems, feedback, force control, and stability, and drive train dynamics
KU8. multi-finger grasping, walking mechanisms, motion planning
KU9. optimisation in robotic systems and industrial applications
KU10. the process of geometrical modelling and map building
KU11. the process of path planning and avoiding obstacles in robotics by frequently detecting whether two objects will intervene
KU12. the process of object manipulation and grasping
KU13. how to create standalone automation projects
KU14. different types of variables used in UI
KU15. how to use an argument in automation with an invoke workflow file activity
KU16. the process of creating arguments and making changes to them in the arguments panel
KU17. how to rename an argument in panel
KU18. user events related activities found in the RPA software
KU19. joint torque and recursive Newton-Euler formulation
KU20. gravity torque and inertia with robot configuration multi-finger grasping, walking mechanisms, motion planning in robotics
KU21. how to integrate all the data collected by robot for map building
KU22. how a robot manipulator measures the angles of rotation and the distances
KU23. how to estimate the shortest path between a moving part and an obstacle at the given location
KU24. use of rigid manipulators and specialised grippers for object manipulation and grasping

Generic Skills (GS)

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

GS1. maintain work-related notes and records
GS2. read the relevant guides and literature to get the latest information about the field of work
GS3. communicate clearly and politely
GS4. perform basic calculations
GS5. listen attentively to understand the instructions being given
GS6. identify solutions to work-related issues
GS7. plan and prioritise tasks to ensure timely completion

GS8. take quick decision in case of an emergency/ accident

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Set up process components	**15**	**34**	**-**	**8**
PC1. use the RPA software to create standalone automation projects such as a process or library	-	-	-	-
PC2. configure a set of changes at the project level and apply them to all the activities of project dependencies	-	-	-	-
PC3. use the relevant variables in the User Interface (UI) to enable the functionality of the panel	-	-	-	-
PC4. use the relevant argument in automation with an Invoke Workflow File activity	-	-	-	-
PC5. create arguments and make changes to them in the Arguments panel	-	-	-	-
PC6. use the renaming feature in an argument in the panel to automatically updates all occurrences in the current file	-	-	-	-
PC7. integrate the technology behind the application to identify elements, trigger events and get data behind the scenes	-	-	-	-
PC8. check all the imported namespaces are displayed correctly in the import panel	-	-	-	-
PC9. formulate the various user events related activities found in the RPA	-	-	-	-
Integrate robot manipulators	**15**	**21**	**-**	**7**
PC10. modify the variation of gravity torque and inertia with robot configuration	-	-	-	-
PC11. examine the multi-finger grasping, walking mechanisms, motion planning in robotics	-	-	-	-
PC12. evaluate the application of the robotics system	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. integrate all the data collected by robot for map building	-	-	-	-
PC14. inspect how the geometric robot model describes the orientation of a coordinate frame attached to the gripper	-	-	-	-
PC15. measure the angles of rotation and the distances of the displacements of translational joints using a robot manipulator	-	-	-	-
PC16. estimate the shortest path between a moving part and an obstacle at the given location and use an appropriate approach to detect whether two objects intervene	-	-	-	-
PC17. use rigid manipulators and specialised grippers for object manipulation and grasping	-	-	-	-
NOS Total	**30**	**55**	**-**	**15**

National Occupational Standards (NOS) Parameters

NOS Code	ELE/N7118
NOS Name	Integrate robot manipulators with process components
Sector	Electronics
Sub-Sector	Industrial Automation
Occupation	Engineering-I&A
NSQF Level	7
Credits	TBD
Version	1.0
Last Reviewed Date	24/02/2022
Next Review Date	02/06/2025
NSQC Clearance Date	24/02/2022

ELE/N7119: Perform source control integration in the RPA software

Description

This OS unit is about performing source control integration in the RPA software which includes app integration, recording and scraping. It also covers data manipulation, PDF automation, programming, debugging and logging.

Scope

The scope covers the following :

- Carry out app integration, recording and scraping
- Carry out data manipulation and PDF automation
- Carry out programming, debugging and logging

Elements and Performance Criteria

Carry out app Integration, recording and scraping

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

PC1. integrate all the data in the RPA software

PC2. use the recording function to detect the fault in jobs

PC3. determine the robotic failure and extract text from it using screen scraping wizard

PC4. extract data from specific UI elements or documents such as a PDF file

PC5. automate the relevant actions in the user interface

PC6. use various windows, buttons and drop-down lists as per the requirement

PC7. store the attributes of a graphical user interface element and its parents in the shape of an XML fragment

Carry out data manipulation and PDF automation

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

PC8. automate the appropriate sequence to extract information from an input text and output it in a different format

PC9. read the text from a Word file, write it into another document, add a picture, and convert it from Word to PDF by using Word Application Scope in the RPA software

PC10. summarise the collected data and program it in the robotics software

PC11. emulate different computers with different OSs on a single computer or create a virtual lab with several differently configured virtual machines

PC12. use the relevant Virtual Machine (VM) software to connect virtually and remotely to the client's applications and networks

PC13. enable image and text-based process automation such as keyboard and mouse input simulation in the RPA software

Carry out programming, debugging and logging

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

PC14. select an appropriate integrated development environment for programming

PC15. select the appropriate error handling method in the RPA software

PC16. examine the logging method and enable the correct extension method to be used in the RPA software

PC17. select the appropriate self-testing method for checking errors in the RPA software

PC18. analyse information about all the Robots on an aggregate basis, and check the overall health of the Robots in the system

PC19. use the self-diagnosing tool appropriately as per the standard procedure

PC20. ensure the separation of Orchestrator components within tenants for assigned users

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. the process of app integration

KU2. the process of data manipulation

KU3. the process of automating virtual machines

KU4. the process of text, image and PDF automation in RPA

KU5. the basics of programming

KU6. the process of auto-health checking

KU7. the power-on self-diagnosing

KU8. project organisation process

KU9. how to integrate data in RPA

KU10. the functions of recording in RPA

KU11. how to extract data from a specific UI element or document

KU12. how to automate specific actions in the user interface

KU13. the process of storing the attributes of a graphical user interface element

KU14. how to automate a sequence and summarise the collected data

KU15. how to manipulate data in robotics software

KU16. the process of using a VM software to connect virtually and remotely to the client's applications and networks

KU17. how to enable image and text-based process automation

KU18. the process of using computers to gain high-level understanding from digital images or videos

KU19. the importance of ensuring an integrated development environment for developers

KU20. the process of debugging and its functionality in various projects

KU21. different methods of error handling in the RPA software

KU22. how self-testing takes place and the steps involved in error checking

KU23. the process of separation of Orchestrator components within tenants for assigned users

KU24. how the workflow activity of the RPA path runs in the system

KU25. how a modular server product provides a rich set of PDF processing functions for different environments

Generic Skills (GS)

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

GS1. maintain work-related documents
GS2. read the relevant guides, manuals and literature to get the latest information about the field of work
GS3. communicate politely and professionally
GS4. listen attentively to understand the instructions being given
GS5. identify solutions to work-related issues
GS6. plan and prioritise tasks to ensure timely completion
GS7. take quick decisions to deal with any emergencies or accidents
GS8. coordinate with the co-workers to achieve the work objectives

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Carry out app Integration, recording and scraping	**10**	**15**	**-**	**4**
PC1. integrate all the data in the RPA software	-	-	-	-
PC2. use the recording function to detect the fault in jobs	-	-	-	-
PC3. determine the robotic failure and extract text from it using screen scraping wizard	-	-	-	-
PC4. extract data from specific UI elements or documents such as a PDF file	-	-	-	-
PC5. automate the relevant actions in the user interface	-	-	-	-
PC6. use various windows, buttons and drop-down lists as per the requirement	-	-	-	-
PC7. store the attributes of a graphical user interface element and its parents in the shape of an XML fragment	-	-	-	-
Carry out data manipulation and PDF automation	**10**	**25**	**-**	**7**
PC8. automate the appropriate sequence to extract information from an input text and output it in a different format	-	-	-	-
PC9. read the text from a Word file, write it into another document, add a picture, and convert it from Word to PDF by using Word Application Scope in the RPA software	-	-	-	-
PC10. summarise the collected data and program it in the robotics software	-	-	-	-
PC11. emulate different computers with different OSs on a single computer or create a virtual lab with several differently configured virtual machines	-	-	-	-
PC12. use the relevant Virtual Machine (VM) software to connect virtually and remotely to the client's applications and networks	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. enable image and text-based process automation such as keyboard and mouse input simulation in the RPA software	-	-	-	-
Carry out programming, debugging and logging	**10**	**15**	**-**	**4**
PC14. select an appropriate integrated development environment for programming	-	-	-	-
PC15. select the appropriate error handling method in the RPA software	-	-	-	-
PC16. examine the logging method and enable the correct extension method to be used in the RPA software	-	-	-	-
PC17. select the appropriate self-testing method for checking errors in the RPA software	-	-	-	-
PC18. analyse information about all the Robots on an aggregate basis, and check the overall health of the Robots in the system	-	-	-	-
PC19. use the self-diagnosing tool appropriately as per the standard procedure	-	-	-	-
PC20. ensure the separation of Orchestrator components within tenants for assigned users	-	-	-	-
NOS Total	**30**	**55**	**-**	**15**

National Occupational Standards (NOS) Parameters

NOS Code	ELE/N7119
NOS Name	Perform source control integration in the RPA software
Sector	Electronics
Sub-Sector	Industrial Automation
Occupation	Engineering-I&A
NSQF Level	7
Credits	TBD
Version	1.0
Last Reviewed Date	24/02/2022
Next Review Date	02/06/2025
NSQC Clearance Date	24/02/2022

ELE/N7120: Use REFramework in the RPA software

Description

This OS unit is about using the relevant RPA tools. It also covers the implementation of the Robotic Enterprise (RE) Framework.

Scope

The scope covers the following :

- Use the relevant RPA tools
- Implement the Robotic Enterprise Framework

Elements and Performance Criteria

Use the relevant RPA tools

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

PC1. select an appropriate method to orchestrate the activities in the RPA software

PC2. use the relevant RPA tool to manage the creation, monitoring, and deployment of resources in the life cycle of the network

PC3. manage the centralised bot management hub using the RPA software

PC4. create automated email login and remote data entry applications

PC5. select and use other appropriate RPA tools as per the specific requirements

Implement the Robotic Enterprise Framework

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

PC6. create Robotic Enterprise Framework (RE Framework) for logging in, exception handling, application and initialisation

PC7. use different REFramework workflows as per the requirement

PC8. develop the business process of REFramework

PC9. use REFramework to tackle complex business scenarios

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. the benefits and uses of different RPA tools

KU2. use of REFramework and its architecture

KU3. different workflows available in REFramework

KU4. the process of exception handling and logging

KU5. applicable rules for developing a process using REFramework

KU6. the three components of the business process

KU7. the use of relevant RPA tool for centralised bot management hub for learning and testing purposes

KU8. how to create automated email login and remote data entry applications

Generic Skills (GS)

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

GS1. maintain work-related records
GS2. read the relevant literature to get the latest updates about the field of work
GS3. perform basic calculations
GS4. listen attentively to understand the information/ instructions being shared by the speaker
GS5. communicate clearly and politely with co-workers and clients
GS6. plan and prioritise tasks to ensure timely completion
GS7. evaluate all possible solutions to a problem to select the best one
GS8. co-ordinate with the co-workers to achieve the work objectives
GS9. identify possible disruptions to work and take appropriate preventive measures

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Use the relevant RPA tools	**15**	**36**	**-**	**8**
PC1. select an appropriate method to orchestrate the activities in the RPA software	-	-	-	-
PC2. use the relevant RPA tool to manage the creation, monitoring, and deployment of resources in the life cycle of the network	-	-	-	-
PC3. manage the centralised bot management hub using the RPA software	-	-	-	-
PC4. create automated email login and remote data entry applications	-	-	-	-
PC5. select and use other appropriate RPA tools as per the specific requirements	-	-	-	-
Implement the Robotic Enterprise Framework	**15**	**19**	**-**	**7**
PC6. create Robotic Enterprise Framework (RE Framework) for logging in, exception handling, application and initialisation	-	-	-	-
PC7. use different REFramework workflows as per the requirement	-	-	-	-
PC8. develop the business process of REFramework	-	-	-	-
PC9. use REFramework to tackle complex business scenarios	-	-	-	-
NOS Total	**30**	**55**	**-**	**15**

National Occupational Standards (NOS) Parameters

NOS Code	ELE/N7120
NOS Name	Use REFramework in the RPA software
Sector	Electronics
Sub-Sector	Industrial Automation
Occupation	Engineering-I&A
NSQF Level	7
Credits	TBD
Version	1.0
Last Reviewed Date	24/02/2022
Next Review Date	02/06/2025
NSQC Clearance Date	24/02/2022

ELE/N7121: Use the robot sensing and machine vision technologies

Description

This OS unit is about using robot sensing and machine vision technologies.

Scope

The scope covers the following :

- Use robot sensing and machine vision system

Elements and Performance Criteria

Use robot sensing and machine vision system

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

PC1. use the appropriate types of sensors in robotics such as active and passive sensors as per the requirement

PC2. measure distance using the suitable sensors

PC3. detect the change in position, acceleration, force and torque using a contact sensor

PC4. detect the presence, distance, and features of the workpiece using a non-contact sensor

PC5. use Machine Vision System (MVS) to enable a computing device to inspect, evaluate and identify still or moving images

PC6. use the appropriate image processing techniques in the machine vision system

PC7. transfer high-resolution pixel arrays to the robot's computer after image processing and analysis

PC8. use the sensing, digitisation and windowing techniques in robot sensing

PC9. use the binary morphological operations as per the requirement

PC10. use camera as per the standard procedure for machine vision

PC11. examine the lighting during image processing using the specialised lighting techniques

PC12. carry out segmentation following an appropriate method

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. the use of sensors and sensor-based systems in robotics

KU2. the architecture and use of machine vision system in robotics

KU3. sensing, digitising, image processing and analysis

KU4. the use of robotic assembly sensors and intelligent sensors

KU5. visual servo-control

KU6. difference between the contact and non-contact sensors

KU7. different types of sensors used in robotics such as active, passive, contact and non-contact sensors

KU8. various image processing techniques
KU9. the binary morphological operations
KU10. different types of cameras used for machine vision
KU11. different specialised lighting techniques
KU12. different methods of segmentation

Generic Skills (GS)

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

GS1. maintain work-related notes and records
GS2. read the relevant guides and literature to get the latest information about the field of work
GS3. communicate clearly and politely
GS4. perform basic calculations
GS5. listen attentively to understand the instructions being given
GS6. identify appropriate solutions to work-related issues
GS7. plan and prioritise tasks to ensure timely completion
GS8. take quick decision to deal with workplace emergencies and accidents

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Use robot sensing and machine vision system	**30**	**55**	**-**	**15**
PC1. use the appropriate types of sensors in robotics such as active and passive sensors as per the requirement	-	-	-	-
PC2. measure distance using the suitable sensors	-	-	-	-
PC3. detect the change in position, acceleration, force and torque using a contact sensor	-	-	-	-
PC4. detect the presence, distance, and features of the workpiece using a non-contact sensor	-	-	-	-
PC5. use Machine Vision System (MVS) to enable a computing device to inspect, evaluate and identify still or moving images	-	-	-	-
PC6. use the appropriate image processing techniques in the machine vision system	-	-	-	-
PC7. transfer high-resolution pixel arrays to the robot's computer after image processing and analysis	-	-	-	-
PC8. use the sensing, digitisation and windowing techniques in robot sensing	-	-	-	-
PC9. use the binary morphological operations as per the requirement	-	-	-	-
PC10. use camera as per the standard procedure for machine vision	-	-	-	-
PC11. examine the lighting during image processing using the specialised lighting techniques	-	-	-	-
PC12. carry out segmentation following an appropriate method	-	-	-	-
NOS Total	**30**	**55**	**-**	**15**

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	ELE/N7121
NOS Name	Use the robot sensing and machine vision technologies
Sector	Electronics
Sub-Sector	Industrial Automation
Occupation	Engineering-I&A
NSQF Level	7
Credits	TBD
Version	1.0
Last Reviewed Date	24/02/2022
Next Review Date	02/06/2025
NSQC Clearance Date	24/02/2022

ELE/N9905: Work effectively at the workplace

Description

This unit is about the communicating and managing work effectively at the workplace as well as taking measures to enhance own competence and working in a disciplined and ethical manner.

Scope

The scope covers the following :

- Communicate effectively at the workplace
- Work effectively
- Maintain and enhance professional competence
- Work in a disciplined and ethical manner
- Uphold social diversity at the workplace

Elements and Performance Criteria

Communicate effectively at the workplace

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

PC1. exchange information and instruction with colleagues, and seek clarifications and feedback as necessary

PC2. assist colleagues where required

PC3. follow business communication etiquette in all interactions and communicative formats (online, digital, and in-person)

PC4. document and share all relevant information with stakeholders in agreed formats and as per agreed timelines

Work effectively

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

PC5. identify and obtain clarity regarding organisational, team and own goals and targets

PC6. prioritise and plan work in order to achieve goals and targets

PC7. monitor own and team performance as per agreed plan

PC8. complete duties accurately, systematically and within required timeframes

PC9. express emotions appropriately at the workplace and manage own response to heightened emotions

PC10. maintain orderliness and cleanliness in the work area

Maintain and enhance professional competence

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

PC11. identify own strengths and weaknesses in relation to goals and targets

PC12. adapt self, service, or product to meet success criteria

PC13. seek and select opportunities for continuous professional development

PC14. formulate a professional development plan to enhance capabilities

PC15. build or contribute to the organizational knowledge base of cases, clients, issues, solutions, and innovations

PC16. examine developments and trends in field of work and their potential impact on work

PC17. take feedback from peers, supervisors and clients to improve own performance and practices

Work in a disciplined and ethical manner

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

PC18. perform tasks as per workplace standards, organisational policies and legislative requirements

PC19. display appropriate professional appearance at the workplace and adhere to the organisational dress code

PC20. demonstrate responsible and disciplined behaviour at the workplace such as punctuality; completing tasks as per given time and standards; demonstrating professional behaviour at all times, adopting environment- friendly practices, etc.

PC21. identify the cause of conflict and options for resolution with peers or escalate grievances and problems to appropriate authority as per procedure for conflict resolution

PC22. protect the rights of the client and organisation when delivering services

PC23. ensure services are delivered equally to all clients regardless of personal and cultural beliefs

PC24. operate within an agreed ethical code of practice and report unethical conduct to the appropriate authorities

PC25. follow organisational guidelines and legal requirements on disclosure and confidentiality

Uphold social diversity at the workplace

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

PC26. recognize and evaluate biased practices against underrepresented groups like women and persons with disabilities, in workplace systems and processes

PC27. identify and report discrimination and harassment based on gender, disability, or cultural difference at the workplace

PC28. use inclusive or neutral language and gestures in all interactions

PC29. respect the personal and professional space of others

PC30. access grievance redressal mechanisms as per legislations

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. organisation's policies on dress code, workplace timings, workplace behaviour, performance management, incentives, delivery standards, information security, etc.

KU2. organizational hierarchy and escalation matrix

KU3. importance of the individual's role in the workflow

KU4. organisational norms on health, safety and sustainability

KU5. work area inspection procedures and practices

KU6. professional etiquette and grooming

KU7. communication etiquette across communicative mediums (online, digital, and in-person) including strategies/methods for sharing information, documentation, and providing and receiving feedback

KU8. importance of self-evaluations and developing a continuous learning and professional development plan

KU9. developments and trends impacting professional practice

KU10. importance of taking and using feedback from colleagues and clients to identify and introduce improvements in work performance

KU11. professional ethics and workplace norms on reporting and/or penalizing unethical behaviour and practices.

KU12. guidelines and legal requirements on disclosure, confidentiality, and conflicts of interest

KU13. strategies for collaboration with colleagues and clients.

KU14. professional responses and strategies against inappropriate language or behaviour toward self and others

KU15. Implicit bias (based on gender, disability, class, caste, colour, race, culture, religion, etc.) and its consequences in the workplace

KU16. organizational guidelines, prevalent legislations and accessibility norms and processes to support PwDs at the workplace

KU17. strategies for time, effort and resource allocation towards the goals.

KU18. basic concepts of work productivity including waste reduction, efficient material usage and optimization of time

Generic Skills (GS)

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

GS1. complete documentation and forms such as work orders, invoices maintenance records activity logs, attendance sheets as per organizational format in English and/or local language

GS2. write basic accident or incident report accurately in an appropriate format

GS3. read warnings, instructions and other text material on product labels, components, etc. and relevant signages, warnings, labels or descriptions on equipment, etc. while carrying out work activities

GS4. convey and share technical information clearly using appropriate language

GS5. clarify task-related information

GS6. liaise with authorities and supervisors as per organizational protocol

GS7. listen, speak, and write in an inclusive, respectful manner in line with organizational protocol

GS8. seek clarification from immediate supervisor or responsible authority or exercise most appropriate solutions to safety breaches at work

GS9. report to the supervisor and when to deal with a colleague depending on the type of concern

GS10. deliver product to next work process on time

GS11. improve work process and report potential areas of delays and disruptions

GS12. communicate problems appropriately to others

GS13. identify symptoms of the fault to the cause of the problem and resolve, otherwise seek assistance and support from other sources to solve the problem

GS14. anticipate and avoid hazards that may occur during repairs because of tools, materials used or repair processes

GS15. complete tasks efficiently and accurately within stipulated time

GS16. appreciate and respect social diversity in all professional settings

GS17. develop awareness and accountability for perspectives on gender, disabilities, and socio-cultural issues leading to discrimination, bias, or harassment at the workplace

GS18. maintain positive and effective relationships with colleagues and customers

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Communicate effectively at the workplace	**5**	**13**	**-**	**-**
PC1. exchange information and instruction with colleagues, and seek clarifications and feedback as necessary	1	3	-	-
PC2. assist colleagues where required	1	3	-	-
PC3. follow business communication etiquette in all interactions and communicative formats (online, digital, and in-person)	1	4	-	-
PC4. document and share all relevant information with stakeholders in agreed formats and as per agreed timelines	2	3	-	-
Work effectively	**6**	**13**	**-**	**-**
PC5. identify and obtain clarity regarding organisational, team and own goals and targets	1	2	-	-
PC6. prioritise and plan work in order to achieve goals and targets	1	2	-	-
PC7. monitor own and team performance as per agreed plan	1	2	-	-
PC8. complete duties accurately, systematically and within required timeframes	1	2	-	-
PC9. express emotions appropriately at the workplace and manage own response to heightened emotions	1	2	-	-
PC10. maintain orderliness and cleanliness in the work area	1	3	-	-
Maintain and enhance professional competence	**8**	**7**	**-**	**-**
PC11. identify own strengths and weaknesses in relation to goals and targets	1	1	-	-
PC12. adapt self, service, or product to meet success criteria	1	1	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. seek and select opportunities for continuous professional development	1	1	-	-
PC14. formulate a professional development plan to enhance capabilities	2	1	-	-
PC15. build or contribute to the organizational knowledge base of cases, clients, issues, solutions, and innovations	1	1	-	-
PC16. examine developments and trends in field of work and their potential impact on work	1	1	-	-
PC17. take feedback from peers, supervisors and clients to improve own performance and practices	1	1	-	-
Work in a disciplined and ethical manner	**11**	**16**	**-**	**-**
PC18. perform tasks as per workplace standards, organisational policies and legislative requirements	2	2	-	-
PC19. display appropriate professional appearance at the workplace and adhere to the organisational dress code	1	2	-	-
PC20. demonstrate responsible and disciplined behaviour at the workplace such as punctuality; completing tasks as per given time and standards; demonstrating professional behaviour at all times, adopting environment- friendly practices, etc.	1	2	-	-
PC21. identify the cause of conflict and options for resolution with peers or escalate grievances and problems to appropriate authority as per procedure for conflict resolution	2	2	-	-
PC22. protect the rights of the client and organisation when delivering services	1	2	-	-
PC23. ensure services are delivered equally to all clients regardless of personal and cultural beliefs	1	2	-	-
PC24. operate within an agreed ethical code of practice and report unethical conduct to the appropriate authorities	2	2	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC25. follow organisational guidelines and legal requirements on disclosure and confidentiality	1	2	-	-
Uphold social diversity at the workplace	**10**	**11**	**-**	**-**
PC26. recognize and evaluate biased practices against underrepresented groups like women and persons with disabilities, in workplace systems and processes	2	2	-	-
PC27. identify and report discrimination and harassment based on gender, disability, or cultural difference at the workplace	2	2	-	-
PC28. use inclusive or neutral language and gestures in all interactions	2	2	-	-
PC29. respect the personal and professional space of others	2	2	-	-
PC30. access grievance redressal mechanisms as per legislations	2	3	-	-
NOS Total	**40**	**60**	**-**	**-**

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	ELE/N9905
NOS Name	Work effectively at the workplace
Sector	Electronics
Sub-Sector	Generic
Occupation	Generic - Organizational Behaviour
NSQF Level	4
Credits	TBD
Version	2.0
Last Reviewed Date	24/02/2022
Next Review Date	30/12/2026
NSQC Clearance Date	30/12/2021

ELE/N1002: Apply health and safety practices at the workplace

Description

This OS unit is about knowledge and practices relating to health, safety and security that candidates need to use in the workplace.

Scope

The scope covers the following :

- Deal with workplace hazards
- Apply fire safety practices
- Follow emergencies, rescue and first-aid procedures
- Effective waste management/recycling practices

Elements and Performance Criteria

Deal with workplace hazards

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

PC1. identify job-site hazards and possible causes of accident in the workplace

PC2. perform work complying to organizational safe working practices and observing hazard signs displayed on containers, equipment and in various work areas such as inside buildings, in open areas and public spaces, etc.

PC3. use appropriate personal protective equipment (PPE) for specific tasks and work conditions, contaminant (concentration w.r.t air) requirements and severity of hazard while conforming to the Indian/International standards

PC4. follow standard safety procedures while handling tool/ ,equipment, hazardous substances and while working in hazardous environments

PC5. dispose electronic waste (such as toxins; metals such as lead, cadmium, barium; flame retardant plastics, welding slag etc.) as per industry approved techniques

PC6. avoid damage of components due to negligence in electrostatic discharge (ESD) procedures

PC7. locate general health and safety equipment in the workplace such as fire extinguishers; first aid equipment; safety instruments, clothing and installations (fire exits, exhaust fans)

PC8. maintain appropriate posture while handling heavy objects

PC9. apply good housekeeping practices at all times

Apply fire safety practices

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

PC10. take preventive measures to prevent fire hazards

PC11. • use appropriate fire extinguishers for different types of fires
• Types of fires: Class A: e.g. ordinary solid combustibles, such as wood, paper, cloth, plastic, charcoal, etc.; Class B: flammable liquids and gases, such as gasoline, propane, diesel fuel, tar, cooking oil, and similar substances; Class C: e.g. electrical equipment such as appliances, wiring, breaker panels, etc. (These categories of fires become Class A, B, and D fires when the electrical equipment that initiated the fire is no l

PC12. exhibit rescue and first-aid techniques in case of fire or electrocution

Follow emergencies, rescue and first-aid procedures

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

PC13. administer appropriate first aid to victims in case of bleeding, burns, choking, electric shock, poisoning etc.

PC14. administer first aid to victims in case of a heart attack or cardiac arrest due to electric shock,

PC15. participate regularly in emergency procedures such as raising alarm, safe/efficient, evacuation, correct means of taking shelter and escaping, correct assembly point, roll call, correct return to work

PC16. use correct method to move injured people and others during an emergency

Effective waste management/recycling practices

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

PC17. identify recyclable and non-recyclable, and hazardous waste generated

PC18. segregate waste into different categories

PC19. ensure disposal of non-recyclable waste appropriately

PC20. deposit non-recyclable and reusable material at identified location

PC21. follow processes specified for disposal of hazardous waste

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. importance of working in clean and safe work environment following safety practices and procedures

KU2. health and safety roles and responsibilities of relevant personnel within and outside the organisation

KU3. key internal and external sources of health and safety information

KU4. basic knowledge of electronic devices and related health risks

KU5. meaning of hazards and risks

KU6. various types of health and safety hazards commonly present in the work environment such as physical hazards, electrical hazards, chemical hazards, fire hazards, equipment related hazards, health hazards, etc.

KU7. methods of accident prevention

KU8. importance of using protective clothing/equipment while working

KU9. general principles for identifying and controlling health and safety risks

KU10. main hazards and preventive as well as control measures while working with different types of equipment

KU11. importance of carrying out electrical and non-electrical isolation to prevent hazards from loss of machine/system/process control

KU12. main hazards and preventive as well as control measures when working with electrical systems or using electrical equipment

KU13. forms and classifications of hazardous substances

KU14. safe working practices while working at various hazardous sites

KU15. prevention and control measures to reduce risks from exposure to hazardous substances

KU16. health effects associated with exposure to noise and vibration and the appropriate control measures

KU17. precautionary activities to prevent the fire accident

KU18. various causes of fire such as heating of metal, spontaneous ignition, sparking, electrical eating, loose fires (smoking, welding, etc.) chemical fires etc.

KU19. techniques of using the different fire extinguishers

KU20. different methods and material to extinguish fires

KU21. different materials used for extinguishing fire such as sand, water, foam, CO2, dry powder

KU22. rescue techniques used during a fire hazard

KU23. various types of safety signs and their meaning

KU24. basic first aid treatment relevant to the common work place injuries e.g. shock, electrical shock, bleeding, breaks to bones, minor burns, resuscitation, poisoning, eye injuries

KU25. contents of written accident report

KU26. potential injuries and ill health associated with incorrect handing of tools and equipment

KU27. safe lifting and carrying practices

KU28. potential impact to a person who is moved incorrectly

KU29. personal safety, health and dignity issues relating to the movement of a person by others

KU30. ESD measures and 5S

KU31. efficient utilization and management of material and water

KU32. ways to recognize common electrical problems and practices of conserving electricity

KU33. usage of different colours of dustbins, categorization of waste into dry, wet, recyclable, nonrecyclable and items of single-use plastics

KU34. organization's procedure for minimizing waste

KU35. waste management and methods of waste disposal

KU36. common sources of pollution and ways to minimize it

KU37. names, contact information and location of people responsible for health and safety in the workplace

KU38. location of documents and equipment for health and safety compliance/practices in the workplace

KU39. safety notices, signs and instructions at workplace

Generic Skills (GS)

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

GS1. interpret general health and safety guidelines labels, charts, signages

GS2. read operation manuals

GS3. write health and safety compliance report

GS4. write an accident/incident report in local language or English

GS5. provide an emergency or safety incident brief to seniors or relevant authorities in a calm, clear and to-the-point manner

GS6. communicate general health and safety guidelines to colleagues/co-workers

GS7. communicate appropriately with co-workers in order to clarify instructions and other issues

GS8. act in case of any potential hazards observed in the work place

GS9. plan and organize their own work schedule, work area, tools, equipment in compliance with organizational policies for health, safety and security

GS10. take adequate measures to ensure the safety of clients and visitors at the workplace

GS11. identify immediate or temporary solutions to resolve delays

GS12. evaluate the work area for health and safety risks or hazards

GS13. use cause and effect relations to anticipate potential issues, problems and their solution in the work area related to safety

GS14. recognise emergency and potential emergency situations

GS15. protect self and others from a health and safety risk or hazard

GS16. communicate and collaborate to incorporate sustainable practices (greening) in workplace processes

GS17. record data on waste disposal at workplace

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Deal with workplace hazards	**20**	**31**	**-**	**-**
PC1. identify job-site hazards and possible causes of accident in the workplace	2	3	-	-
PC2. perform work complying to organizational safe working practices and observing hazard signs displayed on containers, equipment and in various work areas such as inside buildings, in open areas and public spaces, etc.	3	4	-	-
PC3. use appropriate personal protective equipment (PPE) for specific tasks and work conditions, contaminant (concentration w.r.t air) requirements and severity of hazard while conforming to the Indian/International standards	3	4	-	-
PC4. follow standard safety procedures while handling tool/ ,equipment, hazardous substances and while working in hazardous environments	3	4	-	-
PC5. dispose electronic waste (such as toxins; metals such as lead, cadmium, barium; flame retardant plastics, welding slag etc.) as per industry approved techniques	2	4	-	-
PC6. avoid damage of components due to negligence in electrostatic discharge (ESD) procedures	2	3	-	-
PC7. locate general health and safety equipment in the workplace such as fire extinguishers; first aid equipment; safety instruments, clothing and installations (fire exits, exhaust fans)	2	3	-	-
PC8. maintain appropriate posture while handling heavy objects	1	3	-	-
PC9. apply good housekeeping practices at all times	2	3	-	-
Apply fire safety practices	**4**	**9**	**-**	**-**
PC10. take preventive measures to prevent fire hazards	2	3	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. • use appropriate fire extinguishers for different types of fires • Types of fires: Class A: e.g. ordinary solid combustibles, such as wood, paper, cloth, plastic, charcoal, etc.; Class B: flammable liquids and gases, such as gasoline, propane, diesel fuel, tar, cooking oil, and similar substances; Class C: e.g. electrical equipment such as appliances, wiring, breaker panels, etc. (These categories of fires become Class A, B, and D fires when the electrical equipment that initiated the fire is no l	1	3	-	-
PC12. exhibit rescue and first-aid techniques in case of fire or electrocution	1	3	-	-
Follow emergencies, rescue and first-aid procedures	**6**	**13**	**-**	**-**
PC13. administer appropriate first aid to victims in case of bleeding, burns, choking, electric shock, poisoning etc.	1	3	-	-
PC14. administer first aid to victims in case of a heart attack or cardiac arrest due to electric shock,	1	2	-	-
PC15. participate regularly in emergency procedures such as raising alarm, safe/efficient, evacuation, correct means of taking shelter and escaping, correct assembly point, roll call, correct return to work	2	4	-	-
PC16. use correct method to move injured people and others during an emergency	2	4	-	-
Effective waste management/recycling practices	**5**	**12**	**-**	**-**
PC17. identify recyclable and non-recyclable, and hazardous waste generated	1	3	-	-
PC18. segregate waste into different categories	1	2	-	-
PC19. ensure disposal of non-recyclable waste appropriately	1	2	-	-
PC20. deposit non-recyclable and reusable material at identified location	1	3	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC21. follow processes specified for disposal of hazardous waste	1	2	-	-
NOS Total	**35**	**65**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	ELE/N1002
NOS Name	Apply health and safety practices at the workplace
Sector	Electronics
Sub-Sector	Generic
Occupation	Generic - Health Safety
NSQF Level	4
Credits	TBD
Version	3.0
Last Reviewed Date	24/02/2022
Next Review Date	03/05/2026
NSQC Clearance Date	03/05/2023

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/optional /set of NOS.
4. Individual assessment agencies will create unique question papers for the theory part for each candidate at each examination/training centre (as per assessment criteria below).
5. Individual assessment agencies will create unique evaluations for skill practical for every student

at each examination/ training centre 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/N7117.Use the appropriate Robotic Process Automation (RPA) software	30	55	-	15	100	15
ELE/N7118.Integrate robot manipulators with process components	30	55	-	15	100	15
ELE/N7119.Perform source control integration in the RPA software	30	55	-	15	100	20
ELE/N7120.Use Orchestrator and REFramework in UiPath	30	55	-	15	100	15
ELE/N7121.Use the robot sensing and machine vision technologies	30	55	-	15	100	15
ELE/N9905.Work effectively at the workplace	40	60	-	-	100	10
ELE/N1002.Apply health and safety practices at the workplace	35	65	-	-	100	10
Total	**225**	**400**	**-**	**75**	**700**	**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.