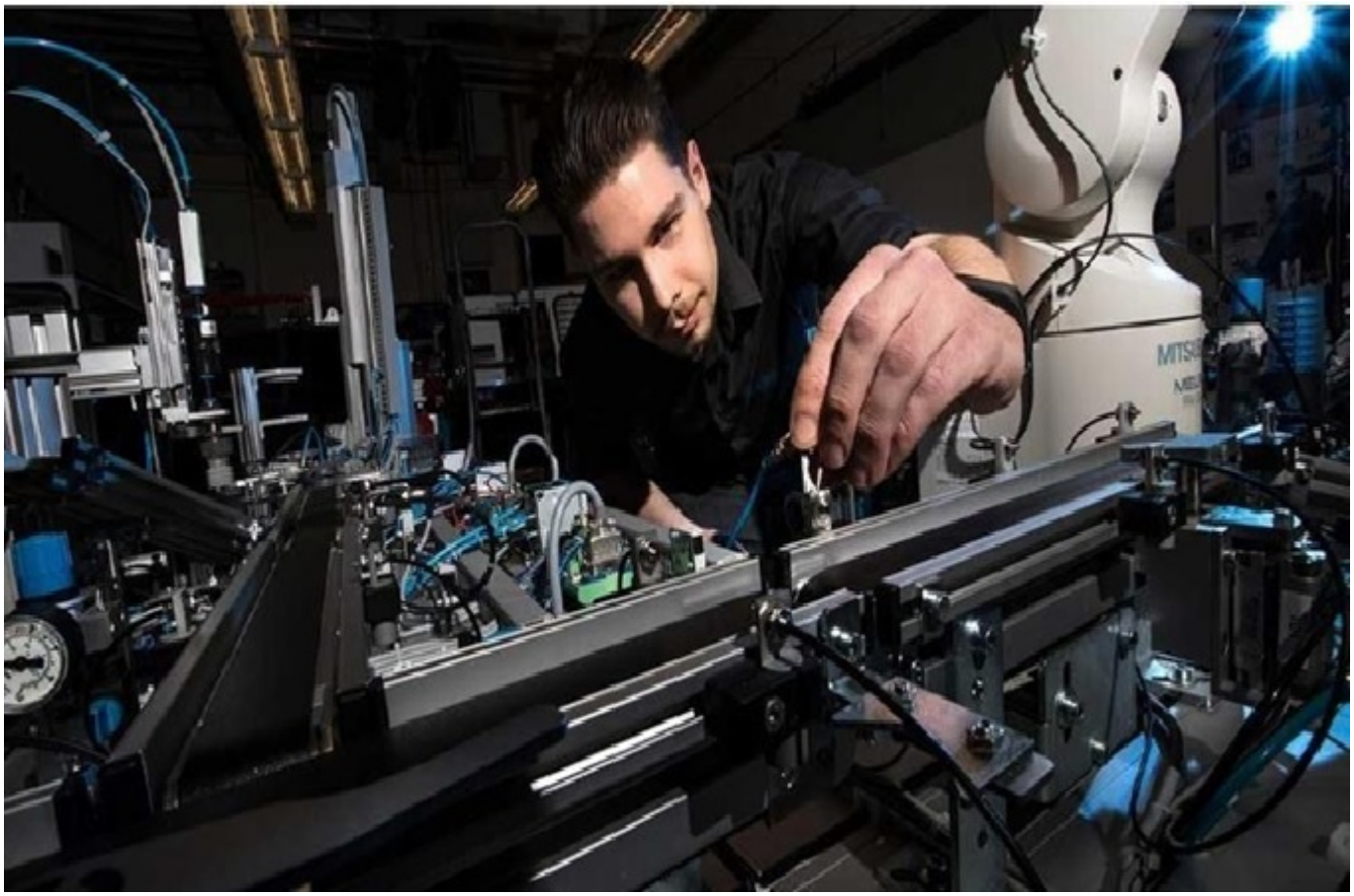
Qualification Pack



Mechatronics Maintenance Specialist

QP Code: ELE/Q7105

Version: 3.0

NSQF Level: 5

Electronics Sector Skills Council of India || 155, 2nd Floor, ESC House Okhla Industrial Area-Phase 3
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ELE/Q7105: Mechatronics Maintenance Specialist

Brief Job Description

A Mechatronics Maintenance Specialist is responsible for installing, testing, and using sensors, actuators, and microcontrollers in the mechatronics system. The individual is also responsible for carrying out the repair and maintenance of the mechatronics system.

Personal Attributes

The individual must have attention to detail, problem-solving skills and the ability to work in coordination with others. The individual must be able to work for long durations with concentration.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. ELE/N7109: Set up circuits and electrical components in the mechatronics system
2. ELE/N7110: Install, test and use the sensors and actuators in the mechatronics system
3. ELE/N7111: Install, test and use microcontroller in the mechatronics system
4. DGT/VSQ/N0102: Employability Skills (60 Hours)

Qualification Pack (QP) Parameters

Sector	Electronics
Sub-Sector	Industrial Automation
Occupation	Engineering-I&A
Country	India
NSQF Level	5
Credits	19
Aligned to NCO/ISCO/ISIC Code	NCO-2015/7412.0101

Minimum Educational Qualification & Experience	Completed 2nd year of UG (UG Diploma) (Physics/Electronics/Electrical/Mechanical) with 1.5 years of experience Relevant Experience in Industrial Automation OR Completed 3 year diploma after 10th (Electronics/Electrical/Mechanical) with 3 Years of experience Relevant Experience in Industrial Automation OR Previous relevant Qualification of NSQF Level (4.5) with 1.5 years of experience Relevant Experience in Industrial Automation
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	3.0
Reference code on NQR	QG-05-EH-03974-2025-V3-ESSCI
NQR Version	3.0

Remarks:

NA

Qualification Pack

ELE/N7109: Set up circuits and electrical components in the mechatronics system

Description

This NOS unit is about install, program, and maintain microcontroller-based mechatronics systems, including electrical circuits and pneumatic components, to support automation and enhance industrial productivity.

Scope

The scope covers the following :

- Set up microcontrollers
- Set up circuits, electrical components and pneumatic system

Elements and Performance Criteria

Set up microcontrollers

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

PC1. Select an appropriate mechatronics system to solve the given industrial problem(s) and improve productivity

PC2. Select the appropriate mechatronics components for the installation of the mechatronics system

PC3. Test the mechatronics components to ensure they are functioning correctly

PC4. Install the mechatronics control system

PC5. Program the microprocessor and microcontroller

PC6. Install the hardware interfacing units of microcontrollers

PC7. Test the microcontrollers for the correct functioning and carry out troubleshooting for any issues identified

Set up circuits, electrical components and pneumatic system

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

PC8. Select the appropriate power converter circuits and electrical drives for installation

PC9. Test the electrical components and circuits for correct functioning and compatibility with the mechatronics system

PC10. Select the appropriate pneumatic values according to the need

PC11. Perform sequence control and use the logic functions for operating the pneumatic system

PC12. Use relays in the pneumatic system

PC13. Monitor the pneumatic fluid by analyzing the speed and pressure control sensors

PC14. Carry out troubleshooting for any issues encountered with the pneumatic system

PC15. Design the cascade circuits

PC16. Use the appropriate techniques for programming PLC with the help of Ladder diagram

PC17. Install the pneumatic power system

PC18. Follow the relevant case studies for implementing the pneumatic system in the automatic production line

PC19. Carry out maintenance of the circuits, electrical components and pneumatic system

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. Understanding of microcontroller and microprocessor architecture and programming techniques.

KU2. Knowledge of mechatronics systems and their role in solving industrial automation problems.

KU3. Familiarity with mechatronics components such as sensors, actuators, and control systems.

KU4. Understanding of electrical circuits, drives, and power converters used in automation.

KU5. Knowledge of pneumatic systems, including valves, relays, and fluid control sensors.

KU6. Proficiency in PLC programming, particularly using ladder logic diagrams.

KU7. Awareness of testing and troubleshooting techniques for microcontrollers and electronic circuits.

KU8. Understanding of hardware interfacing between microcontrollers and peripheral devices.

KU9. Knowledge of designing and maintaining cascade circuits and pneumatic power systems.

KU10. Familiarity with industry case studies and applications of automation in production lines.

Generic Skills (GS)

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

GS1. Problem-solving skills to identify and resolve issues in mechatronics, electrical, and pneumatic systems.

GS2. Analytical thinking for evaluating component compatibility and system performance.

GS3. Technical communication to document processes and explain setup procedures to teams or clients.

GS4. Manual dexterity and precision for installing and testing hardware components.

GS5. Time management to complete system installations and maintenance within deadlines.

GS6. Adaptability to work with emerging technologies and various microcontroller platforms.

GS7. Team collaboration skills for working with engineers, technicians, and production staff.

GS8. Attention to detail in programming, wiring, and assembling control systems.

GS9. Safety awareness in handling electrical and pneumatic components during installation and maintenance.

GS10. Continuous learning mindset to stay updated with the latest automation technologies and practices.

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Set up microcontrollers	**15**	**35**	**-**	**7**
PC1. Select an appropriate mechatronics system to solve the given industrial problem(s) and improve productivity	-	-	-	-
PC2. Select the appropriate mechatronics components for the installation of the mechatronics system	-	-	-	-
PC3. Test the mechatronics components to ensure they are functioning correctly	-	-	-	-
PC4. Install the mechatronics control system	-	-	-	-
PC5. Program the microprocessor and microcontroller	-	-	-	-
PC6. Install the hardware interfacing units of microcontrollers	-	-	-	-
PC7. Test the microcontrollers for the correct functioning and carry out troubleshooting for any issues identified	-	-	-	-
Set up circuits, electrical components and pneumatic system	**15**	**20**	**-**	**8**
PC8. Select the appropriate power converter circuits and electrical drives for installation	-	-	-	-
PC9. Test the electrical components and circuits for correct functioning and compatibility with the mechatronics system	-	-	-	-
PC10. Select the appropriate pneumatic values according to the need	-	-	-	-
PC11. Perform sequence control and use the logic functions for operating the pneumatic system	-	-	-	-
PC12. Use relays in the pneumatic system	-	-	-	-
PC13. Monitor the pneumatic fluid by analyzing the speed and pressure control sensors	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC14. Carry out troubleshooting for any issues encountered with the pneumatic system	-	-	-	-
PC15. Design the cascade circuits	-	-	-	-
PC16. Use the appropriate techniques for programming PLC with the help of Ladder diagram	-	-	-	-
PC17. Install the pneumatic power system	-	-	-	-
PC18. Follow the relevant case studies for implementing the pneumatic system in the automatic production line	-	-	-	-
PC19. Carry out maintenance of the circuits, electrical components and pneumatic system	-	-	-	-
NOS Total	**30**	**55**	**-**	**15**

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	ELE/N7109
NOS Name	Set up circuits and electrical components in the mechatronics system
Sector	Electronics
Sub-Sector	Industrial Automation
Occupation	Engineering-I&A
NSQF Level	5
Credits	7
Version	2.0
Last Reviewed Date	08/05/2025
Next Review Date	30/04/2028
NSQC Clearance Date	08/05/2025

ELE/N7110: Install, test and use the sensors and actuators in the mechatronics system

Description

This NOS unit is about install, test, operate, and maintain various industrial sensors and actuators to enable accurate measurement, control, and automation across electrical, hydraulic, and pneumatic systems.

Scope

The scope covers the following :

- Install, test and use sensors
- Install, test and use actuators

Elements and Performance Criteria

Install, test and use sensors

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

PC1. Select the appropriate contact or contactless sensors for installation as appropriate

PC2. Install the selected sensors such as potentiometer sensor following the standard procedure

PC3. Test the sensors for correct functioning after installation

PC4. Check the working of the strain gauge sensor and measure the torque applied by the motor

PC5. Determine the measurement of position and displacement using the eddy current sensor

PC6. Use the capacitive element by replacing the mechanical buttons

PC7. Use the inductive sensor to measure high precision measurements of displacement, distance, oscillation in harsh industrial environments

PC8. Check the position of the piston in the cylinder by using the pneumatic sensor

PC9. Detect weak infrared irradiation caused by temperature fluctuation by using a pyro-electric sensor

PC10. Measure the electrical potential caused by applying mechanical force to a piezoelectric material by using a piezoelectric sensor

PC11. Carry out repair and maintenance of sensors

Install, test and use actuators

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

PC12. Select the appropriate analogue or digital actuators to install in electrical and hydraulic systems to control various physical quantities

PC13. Install an actuator with the appropriate properties according to the need

PC14. Use the appropriate interface circuitry to match the actuator to the system driving it

PC15. Test the actuator for correct functioning after installation

PC16. Carry out troubleshooting for any issues identified with the installed hydraulic and pneumatic actuator as per the sketches and block diagrams

PC17. Debounce the keypads to use the mechanical switches as required

PC18. Install and use the vane motor as per the standard procedure

PC19. Control high-powered circuit using a lower power signal through electro-mechanical and solid- state relays

PC20. Use the stepper motor to convert electrical power into mechanical power

PC21. Create analytical design and development solutions for actuators for different applications

PC22. Carry out repair and maintenance of actuators

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. Understanding the working principles and applications of contact and contactless sensors (e.g., potentiometers, eddy current, piezoelectric).

KU2. Knowledge of proper installation procedures and testing protocols for various industrial sensors.

KU3. Awareness of torque measurement using strain gauge sensors and their calibration techniques.

KU4. Familiarity with environmental sensors such as pyro-electric and capacitive sensors for detecting temperature or replacing mechanical buttons.

KU5. Understanding of inductive sensors used in high-precision and harsh industrial environments.

KU6. Knowledge of actuator types (analog/digital) and their application in electrical, hydraulic, and pneumatic systems.

KU7. Awareness of interface circuits for connecting actuators to control systems, including relays and keypads.

KU8. Understanding of stepper and vane motors for mechanical power conversion and motion control.

KU9. Ability to analyze actuator designs and develop solutions for varying operational requirements.

KU10. Knowledge of maintenance, repair, and troubleshooting techniques for both sensors and actuators.

Generic Skills (GS)

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

GS1. Analytical thinking to interpret sensor data and actuator responses in system diagnostics.

GS2. Problem-solving skills for identifying and rectifying malfunctions in sensors and actuators.

GS3. Technical skills to install, test, and calibrate electro-mechanical components effectively.

GS4. Attention to detail in interpreting diagrams, block sketches, and following standard operating procedures.

GS5. Manual dexterity and precision in handling and integrating delicate sensor and actuator hardware.

GS6. Communication skills for documenting maintenance activities and reporting system performance.

GS7. Teamwork and collaboration with electrical, mechanical, and automation teams during system integration.

GS8. Time management to complete installation, testing, and maintenance tasks within defined project schedules

GS9. Learning agility to adapt to new sensor technologies, actuator models, and interfacing techniques.

GS10. Adherence to safety protocols during installation and testing of electrical and mechanical systems.

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Install, test and use sensors	**15**	**30**	**-**	**8**
PC1. Select the appropriate contact or contactless sensors for installation as appropriate	-	-	-	-
PC2. Install the selected sensors such as potentiometer sensor following the standard procedure	-	-	-	-
PC3. Test the sensors for correct functioning after installation	-	-	-	-
PC4. Check the working of the strain gauge sensor and measure the torque applied by the motor	-	-	-	-
PC5. Determine the measurement of position and displacement using the eddy current sensor	-	-	-	-
PC6. Use the capacitive element by replacing the mechanical buttons	-	-	-	-
PC7. Use the inductive sensor to measure high precision measurements of displacement, distance, oscillation in harsh industrial environments	-	-	-	-
PC8. Check the position of the piston in the cylinder by using the pneumatic sensor	-	-	-	-
PC9. Detect weak infrared irradiation caused by temperature fluctuation by using a pyro-electric sensor	-	-	-	-
PC10. Measure the electrical potential caused by applying mechanical force to a piezoelectric material by using a piezoelectric sensor	-	-	-	-
PC11. Carry out repair and maintenance of sensors	-	-	-	-
Install, test and use actuators	**15**	**25**	**-**	**7**
PC12. Select the appropriate analogue or digital actuators to install in electrical and hydraulic systems to control various physical quantities	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. Install an actuator with the appropriate properties according to the need	-	-	-	-
PC14. Use the appropriate interface circuitry to match the actuator to the system driving it	-	-	-	-
PC15. Test the actuator for correct functioning after installation	-	-	-	-
PC16. Carry out troubleshooting for any issues identified with the installed hydraulic and pneumatic actuator as per the sketches and block diagrams	-	-	-	-
PC17. Debounce the keypads to use the mechanical switches as required	-	-	-	-
PC18. Install and use the vane motor as per the standard procedure	-	-	-	-
PC19. Control high-powered circuit using a lower power signal through electro-mechanical and solid- state relays	-	-	-	-
PC20. Use the stepper motor to convert electrical power into mechanical power	-	-	-	-
PC21. Create analytical design and development solutions for actuators for different applications	-	-	-	-
PC22. Carry out repair and maintenance of actuators	-	-	-	-
NOS Total	**30**	**55**	**-**	**15**

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	ELE/N7110
NOS Name	Install, test and use the sensors and actuators in the mechatronics system
Sector	Electronics
Sub-Sector	Industrial Automation
Occupation	Engineering-I&A
NSQF Level	5
Credits	5
Version	2.0
Last Reviewed Date	08/05/2025
Next Review Date	30/04/2028
NSQC Clearance Date	08/05/2025

ELE/N7111: Install, test and use microcontroller in the mechatronics system

Description

This NOS unit is about install, program, test, and maintain microcontrollers for mechatronics systems, ensuring proper hardware interfacing and control of components such as A/D converters and stepper motors.

Scope

The scope covers the following :

- Install, test and use microcontroller

Elements and Performance Criteria

Install, test and use microcontroller

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

PC1. Select an appropriate microcontroller to install according to the intended application in the mechatronics system

PC2. Install the microcontroller as per the standard procedure and link the function of microcontroller structure in hardware interfacing units of the mechatronics system

PC3. Test the microcontroller after installation to ensure it functions as expected

PC4. Program the microcontroller to execute a specific set of instructions

PC5. Test the functioning of the machine using the mechatronics system

PC6. Carry out interfacing of Analog-To-Digital (A/D) and Digital-To-Analog (D/A) convertors using the appropriate type of microcontroller

PC7. Compose and program stepper motor using the appropriate type of microcontroller

PC8. Compose and program Advanced RISC Machine (ARM) and microprocessor with stepper motor

PC9. Carry out repair and maintenance of microcontrollers

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. Understanding of microcontroller architecture and its role in mechatronics systems.

KU2. Knowledge of selecting appropriate microcontrollers based on application requirements (e.g., ARM, AVR, PIC).

KU3. Familiarity with standard procedures for installing microcontrollers and hardware interfacing.

KU4. Understanding of microcontroller programming languages and tools (e.g., C, Assembly, IDEs).

KU5. Knowledge of how to interface A/D and D/A converters with microcontrollers.

KU6. Awareness of communication protocols (e.g., I2C, SPI, UART) for peripheral interfacing.

KU7. Proficiency in programming stepper motors using microcontrollers.

KU8. Understanding of ARM-based microcontroller systems and how they differ from other microcontrollers.

KU9. Familiarity with methods for testing microcontroller functionality and system response.

KU10. Knowledge of diagnostic, repair, and maintenance practices for microcontroller-based systems.

Generic Skills (GS)

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

GS1. Problem-solving skills for identifying and troubleshooting microcontroller-related issues.

GS2. Analytical thinking for programming logic and system testing in real-time applications.

GS3. Attention to detail in wiring, programming, and interfacing microcontrollers with hardware.

GS4. Technical communication skills for reporting test results and documenting code/hardware configuration.

GS5. Collaboration skills to work effectively with electronics, software, and mechanical teams.

GS6. Time management skills to complete programming and installation tasks within deadlines.

GS7. Ability to read and interpret datasheets, circuit diagrams, and technical manuals.

GS8. Manual dexterity for handling microcontrollers and connecting delicate hardware components.

GS9. Continuous learning and adaptability to keep up with evolving microcontroller technologies.

GS10. Awareness of safety procedures when working with electrical components in embedded systems.

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Install, test and use microcontroller	**30**	**55**	**-**	**15**
PC1. Select an appropriate microcontroller to install according to the intended application in the mechatronics system	-	-	-	-
PC2. Install the microcontroller as per the standard procedure and link the function of microcontroller structure in hardware interfacing units of the mechatronics system	-	-	-	-
PC3. Test the microcontroller after installation to ensure it functions as expected	-	-	-	-
PC4. Program the microcontroller to execute a specific set of instructions	-	-	-	-
PC5. Test the functioning of the machine using the mechatronics system	-	-	-	-
PC6. Carry out interfacing of Analog-To-Digital (A/D) and Digital-To-Analog (D/A) convertors using the appropriate type of microcontroller	-	-	-	-
PC7. Compose and program stepper motor using the appropriate type of microcontroller	-	-	-	-
PC8. Compose and program Advanced RISC Machine (ARM) and microprocessor with stepper motor	-	-	-	-
PC9. Carry out repair and maintenance of microcontrollers	-	-	-	-
NOS Total	**30**	**55**	**-**	**15**

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	ELE/N7111
NOS Name	Install, test and use microcontroller in the mechatronics system
Sector	Electronics
Sub-Sector	Industrial Automation
Occupation	Engineering-I&A
NSQF Level	5
Credits	5
Version	2.0
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 marsks 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 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/N7109.Set up circuits and electrical components in the mechatronics system	30	55	-	15	100	30
ELE/N7110.Install, test and use the sensors and actuators in the mechatronics system	30	55	-	15	100	30
ELE/N7111.Install, test and use microcontroller in the mechatronics system	30	55	-	15	100	30
DGT/VSQ/N0102.Employability Skills (60 Hours)	20	30	-	-	50	10
Total	**110**	**195**	**-**	**45**	**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.