Qualification Pack

Quality Engineer

QP Code: ELE/Q7901

Version: 4.0

NSQF Level: 5

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

Contents

Qualification Pack

ELE/Q7901: Quality Engineer

Brief Job Description

The individual at work is responsible for ensuring compliance to quality regulations during product design, identifying and implementing system evaluation and product assessment procedures in order to ensure conformance to standards and specifications

Personal Attributes

The job requires the individual to have excellent vision, stamina to lift weight, critical and analytical thinking and, safety and hazards orientation

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. ELE/N7901: Provide quality support for product development
2. ELE/N7902: Perform quality tests and root-cause analysis
3. ELE/N7903: Perform incoming and outgoing material testing
4. ELE/N1002: Apply health and safety practices at the workplace
5. DGT/VSQ/N0102: Employability Skills (60 Hours)

Qualification Pack (QP) Parameters

Sector	Electronics
Sub-Sector	Consumer Electronics & IT Hardware
Occupation	Quality Assurance
Country	India
NSQF Level	5
Credits	26
Aligned to NCO/ISCO/ISIC Code	NCO-2015/1213.0101

Minimum Educational Qualification & Experience	Diploma (After 10 (Electronics/Electrical/Mechanical)) with 1 Year of experience Relevant Experience OR 12th grade pass with 1 year NTC/ NAC with 1 Year of experience Relevant Experience OR 12th grade Pass with 2 Years of experience Relevant Experience OR Previous relevant Qualification of NSQF Level (4) with 3 Years of experience Relevant Experience OR 10th grade pass with 4 Years of experience Relevant Experience
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	24/02/2025
NSQC Approval Date	24/02/2022
Version	4.0
Reference code on NQR	QG-05-EH-01341-2023-V1.1-ESSC
NQR Version	1.0

Remarks:

NA

Qualification Pack

ELE/N7901: Provide quality support for product development

Description

This OS unit is about interpreting quality standards and regulations for medical device under development, designing its quality test procedures, improving existing products by making their production process more efficient and training functional testers

Elements and Performance Criteria

Interpreting quality standards and regulations

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

PC1. receive specifications and design details of the medical device under development from the R&D team

PC2. check and interpret quality standards and regulations governing the medical device under development

PC3. interact with the design team and give inputs on selection of right components and parts for the new medical device

PC4. complete the documentation as per the SOP

Designing quality test procedures for new medical device

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

PC5. design inspection and functional requirement specifications for newly developed medical device

PC6. design functional and electrical safety test procedures for newly developed medical device

PC7. design and develop medical device test software with the help of design team

PC8. complete the documentation as per the SOP

Improving existing processes and products

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

PC9. monitor the existing production processes by capturing data at various levels of production

PC10. perform internal audits against applicable quality standards

PC11. Identify gaps between existing processes against applicable quality standards

PC12. Design improvement in existing processes for manufacturing medical devices using improvement methodologies like Lean, Six Sigma etc.

PC13. Implement improvement methodologies to reduce process variance and enhance product quality

PC14. do continual quality improvement by eliminating non-value adding activities& sources of resource losses and identifying improvement opportunities in quality system compliance

PC15. complete the documentation as per the SOP

Train functional tester

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

PC16. arrange necessary tools and equipment required for performing functional and electrical safety tests on newly developed medical device

PC17. give theoretical and practical training to functional testers for performing functional tests on newly developed medical device at different stages of its production

PC18. give practical training on usages of tools, equipment and test software for performing functional tests

PC19. complete the documentation as per the SOP

Achieve productivity and quality standards

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

PC20. interpret the quality standards applicable to medical device correctly

PC21. design quality tests for medical device to capture all its functional parameters

PC22. train functional testers to get zero or minimum rejections of final products

PC23. design and implement process improvement initiatives to reduce errors and unit cost of medical device

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. companys policies on: materials purchase; vendor selection and inventory management

KU2. companys quality policy

KU3. companys policies on customer management

KU4. organisation culture and typical customer profile

KU5. companys reporting structure

KU6. companys documentation policy

KU7. companys line of business and product portfolio

KU8. how to translate customer quality requirements into executable plans

KU9. different quality management systems like ISO13485, FDA, GMP, ISO 14971 etc

KU10. standard quality statistical tools like Six Sigma, Lean etc.

KU11. different validation processes for components, process and design

KU12. concepts of strategic planning, motivation and implementation of quality culture in the organization

KU13. basic principles of how the medical equipment functions, its operating sequence, the function of individual unit or components and how they interact

KU14. different types of electrical, electronic & mechanical components and their functionalities

KU15. companys products and their different models

KU16. general health and safety procedures to be followed during production

KU17. specific safety precautions to be taken during production of medical devices

KU18. Electrostatic Discharge (ESD) precautions

Generic Skills (GS)

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

GS1. to read different quality standards and statistical tools

GS2. to read best practices in quality implementation

GS3. to create SOPs and other quality documents like Quality manual etc.

GS4. to document medical device inspection, testing, validation and verification activities

GS5. communicate R&D team about quality standards and regulations applicable on medical devices

GS6. explain functional testers and production team about quality implementation requirements

GS7. to work in coordination with R&D and production team for improving products and implementing quality culture in the organisation

GS8. what data to be captured at different levels of production of medical device

GS9. what statistical tools to be used for process improvement

GS10. to find solutions to problems of process variance

GS11. to find solutions for non-conformities found in the internal and external quality audits

GS12. to analyse data to make meaningful interpretation for process improvement

GS13. to analyse audit findings and recommend corrective and preventive actions

GS14. to operate computer and laptop

GS15. to operate the different test software

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Interpreting quality standards and regulations	**8**	**8**	**-**	**-**
PC1. receive specifications and design details of the medical device under development from the R&D team	2	2	-	-
PC2. check and interpret quality standards and regulations governing the medical device under development	2	2	-	-
PC3. interact with the design team and give inputs on selection of right components and parts for the new medical device	2	2	-	-
PC4. complete the documentation as per the SOP	2	2	-	-
Designing quality test procedures for new medical device	**8**	**8**	**-**	**-**
PC5. design inspection and functional requirement specifications for newly developed medical device	2	2	-	-
PC6. design functional and electrical safety test procedures for newly developed medical device	2	2	-	-
PC7. design and develop medical device test software with the help of design team	2	2	-	-
PC8. complete the documentation as per the SOP	2	2	-	-
Improving existing processes and products	**15**	**23**	**-**	**-**
PC9. monitor the existing production processes by capturing data at various levels of production	2	3	-	-
PC10. perform internal audits against applicable quality standards	2	3	-	-
PC11. Identify gaps between existing processes against applicable quality standards	2	3	-	-
PC12. Design improvement in existing processes for manufacturing medical devices using improvement methodologies like Lean, Six Sigma etc.	3	5	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. Implement improvement methodologies to reduce process variance and enhance product quality	2	3	-	-
PC14. do continual quality improvement by eliminating non-value adding activities& sources of resource losses and identifying improvement opportunities in quality system compliance	2	3	-	-
PC15. complete the documentation as per the SOP	2	3	-	-
Train functional tester	**5**	**11**	**-**	**-**
PC16. arrange necessary tools and equipment required for performing functional and electrical safety tests on newly developed medical device	2	2	-	-
PC17. give theoretical and practical training to functional testers for performing functional tests on newly developed medical device at different stages of its production	1	3	-	-
PC18. give practical training on usages of tools, equipment and test software for performing functional tests	1	3	-	-
PC19. complete the documentation as per the SOP	1	3	-	-
Achieve productivity and quality standards	**4**	**10**	**-**	**-**
PC20. interpret the quality standards applicable to medical device correctly	1	3	-	-
PC21. design quality tests for medical device to capture all its functional parameters	1	3	-	-
PC22. train functional testers to get zero or minimum rejections of final products	1	2	-	-
PC23. design and implement process improvement initiatives to reduce errors and unit cost of medical device	1	2	-	-
NOS Total	**40**	**60**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	ELE/N7901
NOS Name	Provide quality support for product development
Sector	Electronics
Sub-Sector	Medical Electronics
Occupation	Quality Maintenance
NSQF Level	5
Credits	TBD
Version	1.0
Last Reviewed Date	24/02/2022
Next Review Date	24/02/2025
NSQC Clearance Date	24/02/2022

ELE/N7902: Perform quality tests and root-cause analysis

Description

This OS unit is about performing functional and electrical safety tests on finished products and doing the root-cause analysis on failed medical device

Elements and Performance Criteria

Performing functional tests on Xray device

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

PC1. receive X-ray device from box assembly operators

PC2. complete the documentation as per companys policy / SOP

PC3. perform Tube Seasoning test, Over KV test and Calibration with different ranges of mA using digital multi-meter and Digital Storage Oscilloscope

PC4. perform Dose-kVp Linearity test, Dose-mAs Linearity test, kVp Accuracy and repeatability test, HVL (Half Value Layer) test, Radiation output test, reproducibility test and reciprocity test using test software, Digital multimeter and Digital Storage Oscilloscope (DSO)

PC5. if test readings are within the specified limits mentioned in the SOP, send the device for electrical safety testing

Performing functional tests on Ultrasound device

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

PC6. receive ultrasound device from box assembly operators

PC7. complete the documentation as per companys policy / SOP

PC8. put ultrasound machine on operation mode and conduct Monitor resolution test, Spatial distortion test, Grey scale uniformity test, Depth of visualization test, Low contrast visibility test, Display artefacts, Distance measurement test, Area estimation test and String object test as per the model specific SOP using Tissue Mimicking Phantoms

PC9. if test readings are within the specified limits mentioned in the SOP, send the device for electrical safety testing

Perform functional tests on Patient Monitoring device

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

PC10. receive patient monitoring device from box assembly operators

PC11. complete the documentation as per companys policy / SOP

PC12. plug in the power supply, turn it on and connect the Patient Monitoring Device to simulator(s) and Digital Storage Oscilloscope

PC13. take Patient Monitoring Devices graph measurements, parameters and Digital Storage Oscilloscopes readings

PC14. compare PMDs readings with simulators readings

PC15. if readings are within the specified limits mentioned in the SOP, send the device for electrical safety testing

Performing electrical safety tests on medical device

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

PC16. perform Dielectric withstand (Hi-potential) test, Insulation resistance test, Leakage current test and Ground continuity test for electrical safety of the medical device as per the SOP

Performing rootcause analysis

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

PC17. separate medical devices which failed functional or / and electrical testing

PC18. perform root-cause analysis on the failed medical devices as per the SOP

PC19. send the failed medical devices back to assembly line for reassembly along with reassembly / repair specific suggestions

PC20. complete the documentation as per the SOP

Achieving productivity and quality standards

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

PC21. achieve 100% daily target of number of medical devices tested

PC22. ensure thorough root-cause analysis to avoid failed medical devices and their reassembly

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. companys policies on: materials purchase; vendor selection and inventory management

KU2. companys quality policy

KU3. companys policies on customer management

KU4. organisation culture and typical customer profile

KU5. companys reporting structure

KU6. companys documentation policy

KU7. companys line of business and product portfolio

KU8. different quality management systems like ISO13485, FDA, GMP, ISO 14971 etc

KU9. different validation processes for components, process and design

KU10. basic principles of how the medical equipment functions, its operating sequence, the function of individual unit or components and how they interact

KU11. different types of electrical, electronic & mechanical components and their functionalities

KU12. companys products and their different models

KU13. general health and safety procedures to be followed during production

KU14. specific safety precautions to be taken during production of medical devices

KU15. Electrostatic Discharge (ESD) precautions

Generic Skills (GS)

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

GS1. to read different testing techniques for medical devices

GS2. to read best practices in quality testing and root-cause analysis

GS3. to document medical device inspection, testing, validation and verification activities

GS4. to document root-cause analysis of failed medical devices as per the SOP

GS5. communicate assembly operator about the findings of root-cause analysis of failed medical devices

GS6. communicate customers about quality testing methods and their specifications

GS7. to work in coordination with co-workers for achieving medical device testing targets

GS8. to work with design and production team for performing the root-cause analysis of failed medical devices

GS9. whether the medical device under test is fail or pass

GS10. whether to send failed medical device for repair or reassembly after the rootcause analysis

GS11. to find solutions to problem of non-working test software

GS12. to handle customers demands of specific testing of medical devices

GS13. to analyse measurements taken during testing of medical devices

GS14. to find out the cause of failure of medical device during the tests

GS15. operate the different test software

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Performing functional tests on Xray device	**6**	**14**	**-**	**-**
PC1. receive X-ray device from box assembly operators	1	3	-	-
PC2. complete the documentation as per companys policy / SOP	1	3	-	-
PC3. perform Tube Seasoning test, Over KV test and Calibration with different ranges of mA using digital multi-meter and Digital Storage Oscilloscope	1	3	-	-
PC4. perform Dose-kVp Linearity test, Dose-mAs Linearity test, kVp Accuracy and repeatability test, HVL (Half Value Layer) test, Radiation output test, reproducibility test and reciprocity test using test software, Digital multimeter and Digital Storage Oscilloscope (DSO)	1	3	-	-
PC5. if test readings are within the specified limits mentioned in the SOP, send the device for electrical safety testing	2	2	-	-
Performing functional tests on Ultrasound device	**8**	**12**	**-**	**-**
PC6. receive ultrasound device from box assembly operators	2	3	-	-
PC7. complete the documentation as per companys policy / SOP	2	3	-	-
PC8. put ultrasound machine on operation mode and conduct Monitor resolution test, Spatial distortion test, Grey scale uniformity test, Depth of visualization test, Low contrast visibility test, Display artefacts, Distance measurement test, Area estimation test and String object test as per the model specific SOP using Tissue Mimicking Phantoms	2	3	-	-
PC9. if test readings are within the specified limits mentioned in the SOP, send the device for electrical safety testing	2	3	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Perform functional tests on Patient Monitoring device	**12**	**18**	**-**	**-**
PC10. receive patient monitoring device from box assembly operators	2	3	-	-
PC11. complete the documentation as per companys policy / SOP	2	3	-	-
PC12. plug in the power supply, turn it on and connect the Patient Monitoring Device to simulator(s) and Digital Storage Oscilloscope	2	3	-	-
PC13. take Patient Monitoring Devices graph measurements, parameters and Digital Storage Oscilloscopes readings	2	3	-	-
PC14. compare PMDs readings with simulators readings	2	3	-	-
PC15. if readings are within the specified limits mentioned in the SOP, send the device for electrical safety testing	2	3	-	-
Performing electrical safety tests on medical device	**2**	**4**	**-**	**-**
PC16. perform Dielectric withstand (Hi-potential) test, Insulation resistance test, Leakage current test and Ground continuity test for electrical safety of the medical device as per the SOP	2	4	-	-
Performing rootcause analysis	**8**	**8**	**-**	**-**
PC17. separate medical devices which failed functional or / and electrical testing	2	2	-	-
PC18. perform root-cause analysis on the failed medical devices as per the SOP	2	2	-	-
PC19. send the failed medical devices back to assembly line for reassembly along with reassembly / repair specific suggestions	2	2	-	-
PC20. complete the documentation as per the SOP	2	2	-	-
Achieving productivity and quality standards	**4**	**4**	**-**	**-**
PC21. achieve 100% daily target of number of medical devices tested	2	2	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC22. ensure thorough root-cause analysis to avoid failed medical devices and their reassembly	2	2	-	-
NOS Total	**40**	**60**	**-**	**-**

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	ELE/N7902
NOS Name	Perform quality tests and root-cause analysis
Sector	Electronics
Sub-Sector	Medical Electronics
Occupation	Quality Maintenance
NSQF Level	5
Credits	TBD
Version	1.0
Last Reviewed Date	24/02/2022
Next Review Date	24/02/2025
NSQC Clearance Date	24/02/2022

ELE/N7903: Perform incoming and outgoing material testing

Description

This unit is about performing incoming material testing and inspecting outgoing finished product.

Elements and Performance Criteria

Performing incoming material testing

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

PC1. place plastic moulds of patient medical devices and other components in the cyclical chamber

PC2. set the temperature and humidity level of cyclical chamber as per the SOP

PC3. take plastic moulds and other components out of cyclical chamber after the time mentioned in the SOP

PC4. check plastic moulds physically and electrical & electronic components with multi-meter

PC5. pass materials which are as per the specifications mentioned in the SOP, reject others and send them back

Performing out-going cartons test

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

PC6. perform the visual inspection of packed carton

PC7. check that the carton is undamaged and packed as per the SOP

PC8. check that the medical device model and its specifications are mentioned correctly on the carton

PC9. check that the bar code mentioned on the label is correct

PC10. check that the carton is strapped properly

PC11. put the carton on vibrator for vibration test to check that it is safe for transportation

PC12. complete the documentation related to final testing as per the companys policy

Achieving productivity and quality standards

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

PC13. complete the incoming and outgoing material testing within the agreed time

PC14. ensure the work quality as per the company standard to avoid rework

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. companys policies on: incentives, delivery standards, and personnel management

KU2. companys quality policy

KU3. companys policies on customer management

KU4. organisation culture and typical customer profile

KU5. companys reporting structure

KU6. companys documentation policy

KU7. companys line of business and product portfolio
KU8. different quality management systems like ISO13485, FDA, GMP, ISO 14971 etc.
KU9. different validation processes for components, process and design
KU10. basic principles of how the medical equipment functions, its operating sequence, the function of individual unit or components and how they interact
KU11. different types of electrical, electronic & mechanical components and their functionalities
KU12. companys products and their different models
KU13. general health and safety procedures to be followed during production
KU14. specific safety precautions to be taken during production of medical devices
KU15. Electrostatic Discharge (ESD) precautions

Generic Skills (GS)

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

GS1. to read different quality standards and testing tools
GS2. to read best practices in quality implementation
GS3. to document testing of incoming materials and inspection of outgoing cartons
GS4. communicate suppliers about quality of materials received
GS5. communicate customers about quality of products dispatched
GS6. to work in coordination with co-workers for achieving medical device testing targets
GS7. what material received from the supplier is to be sent back after performing tests as per SOP
GS8. whether the packaging of medical device is safe for transportation
GS9. to operate computer and laptop
GS10. to operate the different electronic tools like DSO

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Performing incoming material testing	**15**	**20**	**-**	**-**
PC1. place plastic moulds of patient medical devices and other components in the cyclical chamber	3	4	-	-
PC2. set the temperature and humidity level of cyclical chamber as per the SOP	3	4	-	-
PC3. take plastic moulds and other components out of cyclical chamber after the time mentioned in the SOP	3	4	-	-
PC4. check plastic moulds physically and electrical & electronic components with multi-meter	3	4	-	-
PC5. pass materials which are as per the specifications mentioned in the SOP, reject others and send them back	3	4	-	-
Performing out-going cartons test	**21**	**34**	**-**	**-**
PC6. perform the visual inspection of packed carton	3	4	-	-
PC7. check that the carton is undamaged and packed as per the SOP	3	5	-	-
PC8. check that the medical device model and its specifications are mentioned correctly on the carton	3	5	-	-
PC9. check that the bar code mentioned on the label is correct	3	5	-	-
PC10. check that the carton is strapped properly	3	5	-	-
PC11. put the carton on vibrator for vibration test to check that it is safe for transportation	3	5	-	-
PC12. complete the documentation related to final testing as per the companys policy	3	5	-	-
Achieving productivity and quality standards	**4**	**6**	**-**	**-**

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. complete the incoming and outgoing material testing within the agreed time	2	3	-	-
PC14. ensure the work quality as per the company standard to avoid rework	2	3	-	-
NOS Total	**40**	**60**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	ELE/N7903
NOS Name	Perform incoming and outgoing material testing
Sector	Electronics
Sub-Sector	Consumer Electronics & IT Hardware
Occupation	Quality Maintenance
NSQF Level	5
Credits	TBD
Version	1.0
Last Reviewed Date	24/02/2022
Next Review Date	24/02/2025
NSQC Clearance Date	24/02/2022

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	24/02/2025
NSQC Clearance Date	24/02/2022

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	25/02/2021
Next Review Date	24/02/2024
NSQC Clearance Date	25/02/2021

Assessment Guidelines and Assessment Weightage

Assessment Guidelines

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

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

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

4. Individual assessment agencies will create unique question papers for 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 the Recommended Pass % aggregate for the QP.

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/N7901.Provide quality support for product development	40	60	-	-	100	25
ELE/N7902.Perform quality tests and root-cause analysis	40	60	-	-	100	30
ELE/N7903.Perform incoming and outgoing material testing	40	60	-	-	100	25
ELE/N1002.Apply health and safety practices at the workplace	35	65	-	-	100	10
DGT/VSQ/N0102.Employability Skills (60 Hours)	20	30	-	-	50	10
Total	**175**	**275**	**-**	**-**	**450**	**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.