Qualification Pack

Quality Engineer

QP Code: ELE/Q7901

Version: 3.0

NSQF Level: 5

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Contents

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/N9905: Work effectively at the workplace
5. ELE/N1002: Apply health and safety practices at the workplace

Qualification Pack (QP) Parameters

Sector	Electronics
Sub-Sector	Consumer Electronics & IT Hardware
Occupation	Quality Maintenance
Country	India
NSQF Level	5
Credits	NA
Aligned to NCO/ISCO/ISIC Code	NCO-2004/3152.90

Minimum Educational Qualification & Experience	Diploma (3 Years) after 10th (Electrical or Electronics Engineering) with 3 Years of relevant experience Or after 12th (Electrical or Electronics Engineering) with 1 Year of Relevant experience) OR B.E./B.Tech (Degree in Electrical or Electronics Engineering) OR Certificate-NSQF (Level-4 in Quality Assurance) with 2 Years of experience relevant
Minimum Level of Education for Training in School	Not Applicable
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 Years
Last Reviewed On	24/02/2022
Next Review Date	02/06/2025
Deactivation Date	31/07/2024
NSQC Approval Date	24/02/2022
Version	3.0
Reference code on NQR	2022/EHW/ESSC/05384
NQR Version	1.0

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	-	-
Perform functional tests on Patient Monitoring device	**12**	**18**	**-**	**-**

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

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
NOS Total	40	60	-	-

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/N9905: Work effectively at the workplace

Description

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

Scope

The scope covers the following :

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

Elements and Performance Criteria

Communicate effectively at the workplace

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

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

PC2. assist colleagues where required

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

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

Work effectively

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

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

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

PC7. monitor own and team performance as per agreed plan

PC8. complete duties accurately, systematically and within required timeframes

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

PC10. maintain orderliness and cleanliness in the work area

Maintain and enhance professional competence

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

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

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

PC13. seek and select opportunities for continuous professional development

PC14. formulate a professional development plan to enhance capabilities

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

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

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

Work in a disciplined and ethical manner

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

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

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

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

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

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

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

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

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

Uphold social diversity at the workplace

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

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

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

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

PC29. respect the personal and professional space of others

PC30. access grievance redressal mechanisms as per legislations

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

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

KU2. organizational hierarchy and escalation matrix

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

KU4. organisational norms on health, safety and sustainability

KU5. work area inspection procedures and practices

KU6. professional etiquette and grooming

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

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

KU9. developments and trends impacting professional practice

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

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

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

KU13. strategies for collaboration with colleagues and clients.

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

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

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

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

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

Generic Skills (GS)

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

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

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

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

GS4. convey and share technical information clearly using appropriate language

GS5. clarify task-related information

GS6. liaise with authorities and supervisors as per organizational protocol

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

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

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

GS10. deliver product to next work process on time

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

GS12. communicate problems appropriately to others

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

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

GS15. complete tasks efficiently and accurately within stipulated time

GS16. appreciate and respect social diversity in all professional settings

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

GS18. maintain positive and effective relationships with colleagues and customers

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Communicate effectively at the workplace	**5**	**13**	**-**	**-**
PC1. exchange information and instruction with colleagues, and seek clarifications and feedback as necessary	1	3	-	-
PC2. assist colleagues where required	1	3	-	-
PC3. follow business communication etiquette in all interactions and communicative formats (online, digital, and in-person)	1	4	-	-
PC4. document and share all relevant information with stakeholders in agreed formats and as per agreed timelines	2	3	-	-
Work effectively	**6**	**13**	**-**	**-**
PC5. identify and obtain clarity regarding organisational, team and own goals and targets	1	2	-	-
PC6. prioritise and plan work in order to achieve goals and targets	1	2	-	-
PC7. monitor own and team performance as per agreed plan	1	2	-	-
PC8. complete duties accurately, systematically and within required timeframes	1	2	-	-
PC9. express emotions appropriately at the workplace and manage own response to heightened emotions	1	2	-	-
PC10. maintain orderliness and cleanliness in the work area	1	3	-	-
Maintain and enhance professional competence	**8**	**7**	**-**	**-**
PC11. identify own strengths and weaknesses in relation to goals and targets	1	1	-	-
PC12. adapt self, service, or product to meet success criteria	1	1	-	-
PC13. seek and select opportunities for continuous professional development	1	1	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC14. formulate a professional development plan to enhance capabilities	2	1	-	-
PC15. build or contribute to the organizational knowledge base of cases, clients, issues, solutions, and innovations	1	1	-	-
PC16. examine developments and trends in field of work and their potential impact on work	1	1	-	-
PC17. take feedback from peers, supervisors and clients to improve own performance and practices	1	1	-	-
Work in a disciplined and ethical manner	**11**	**16**	**-**	**-**
PC18. perform tasks as per workplace standards, organisational policies and legislative requirements	2	2	-	-
PC19. display appropriate professional appearance at the workplace and adhere to the organisational dress code	1	2	-	-
PC20. demonstrate responsible and disciplined behaviour at the workplace such as punctuality; completing tasks as per given time and standards; demonstrating professional behaviour at all times, adopting environment- friendly practices, etc.	1	2	-	-
PC21. identify the cause of conflict and options for resolution with peers or escalate grievances and problems to appropriate authority as per procedure for conflict resolution	2	2	-	-
PC22. protect the rights of the client and organisation when delivering services	1	2	-	-
PC23. ensure services are delivered equally to all clients regardless of personal and cultural beliefs	1	2	-	-
PC24. operate within an agreed ethical code of practice and report unethical conduct to the appropriate authorities	2	2	-	-
PC25. follow organisational guidelines and legal requirements on disclosure and confidentiality	1	2	-	-
Uphold social diversity at the workplace	**10**	**11**	**-**	**-**

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

National Occupational Standards (NOS) Parameters

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

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

Description

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

Scope

The scope covers the following :

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

Elements and Performance Criteria

Deal with workplace hazards

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

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

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

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

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

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

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

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

PC8. maintain appropriate posture while handling heavy objects

PC9. apply good housekeeping practices at all times

Apply fire safety practices

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

PC10. take preventive measures to prevent fire hazards

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

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

Follow emergencies, rescue and first-aid procedures

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

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

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

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

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

Effective waste management/recycling practices

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

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

PC18. segregate waste into different categories

PC19. ensure disposal of non-recyclable waste appropriately

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

PC21. follow processes specified for disposal of hazardous waste

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

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

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

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

KU4. basic knowledge of electronic devices and related health risks

KU5. meaning of hazards and risks

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

KU7. methods of accident prevention

KU8. importance of using protective clothing/equipment while working

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

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

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

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

KU13. forms and classifications of hazardous substances

KU14. safe working practices while working at various hazardous sites

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

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

KU17. precautionary activities to prevent the fire accident
KU18. various causes of fire such as heating of metal, spontaneous ignition, sparking, electrical eating, loose fires (smoking, welding, etc.) chemical fires etc.
KU19. techniques of using the different fire extinguishers
KU20. different methods and material to extinguish fires
KU21. different materials used for extinguishing fire such as sand, water, foam, CO2, dry powder
KU22. rescue techniques used during a fire hazard
KU23. various types of safety signs and their meaning
KU24. basic first aid treatment relevant to the common work place injuries e.g. shock, electrical shock, bleeding, breaks to bones, minor burns, resuscitation, poisoning, eye injuries
KU25. contents of written accident report
KU26. potential injuries and ill health associated with incorrect handing of tools and equipment
KU27. safe lifting and carrying practices
KU28. potential impact to a person who is moved incorrectly
KU29. personal safety, health and dignity issues relating to the movement of a person by others
KU30. ESD measures and 5S
KU31. efficient utilization and management of material and water
KU32. ways to recognize common electrical problems and practices of conserving electricity
KU33. usage of different colours of dustbins, categorization of waste into dry, wet, recyclable, nonrecyclable and items of single-use plastics
KU34. organization's procedure for minimizing waste
KU35. waste management and methods of waste disposal
KU36. common sources of pollution and ways to minimize it
KU37. names, contact information and location of people responsible for health and safety in the workplace
KU38. location of documents and equipment for health and safety compliance/practices in the workplace
KU39. safety notices, signs and instructions at workplace

Generic Skills (GS)

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

GS1. interpret general health and safety guidelines labels, charts, signages
GS2. read operation manuals
GS3. write health and safety compliance report
GS4. write an accident/incident report in local language or English
GS5. provide an emergency or safety incident brief to seniors or relevant authorities in a calm, clear and to-the-point manner
GS6. communicate general health and safety guidelines to colleagues/co-workers
GS7. communicate appropriately with co-workers in order to clarify instructions and other issues
GS8. act in case of any potential hazards observed in the work place

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

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

GS11. identify immediate or temporary solutions to resolve delays

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

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

GS14. recognise emergency and potential emergency situations

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

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

GS17. record data on waste disposal at workplace

Assessment Criteria

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

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. • use appropriate fire extinguishers for different types of fires • Types of fires: Class A: e.g. ordinary solid combustibles, such as wood, paper, cloth, plastic, charcoal, etc.; Class B: flammable liquids and gases, such as gasoline, propane, diesel fuel, tar, cooking oil, and similar substances; Class C: e.g. electrical equipment such as appliances, wiring, breaker panels, etc. (These categories of fires become Class A, B, and D fires when the electrical equipment that initiated the fire is no l	1	3	-	-
PC12. exhibit rescue and first-aid techniques in case of fire or electrocution	1	3	-	-
Follow emergencies, rescue and first-aid procedures	**6**	**13**	**-**	**-**
PC13. administer appropriate first aid to victims in case of bleeding, burns, choking, electric shock, poisoning etc.	1	3	-	-
PC14. administer first aid to victims in case of a heart attack or cardiac arrest due to electric shock,	1	2	-	-
PC15. participate regularly in emergency procedures such as raising alarm, safe/efficient, evacuation, correct means of taking shelter and escaping, correct assembly point, roll call, correct return to work	2	4	-	-
PC16. use correct method to move injured people and others during an emergency	2	4	-	-
Effective waste management/recycling practices	**5**	**12**	**-**	**-**
PC17. identify recyclable and non-recyclable, and hazardous waste generated	1	3	-	-
PC18. segregate waste into different categories	1	2	-	-
PC19. ensure disposal of non-recyclable waste appropriately	1	2	-	-
PC20. deposit non-recyclable and reusable material at identified location	1	3	-	-
PC21. follow processes specified for disposal of hazardous waste	1	2	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
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

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/N9905.Work effectively at the workplace	40	60	-	-	100	10
ELE/N1002.Apply health and safety practices at the workplace	35	65	-	-	100	10
Total	**195**	**305**	**-**	**-**	**500**	**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.