

Qualification Pack



Lab Technician - Radiographic Testing

QP Code: CSC/Q0603

Version: 4.0

NSQF Level: 4

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CSC/Q0603: Lab Technician - Radiographic Testing

Brief Job Description

A Lab Technician - Radiographic Testing is responsible for preparing the test zone, radiographic testing tools and equipment, test material, and carrying out a variety of radiographic tests. The individual is also responsible for developing the exposed films after testing, recording the relevant data and preparing the appropriate reports. The person ensures compliance with the applicable regulations and also carried out minor repair and maintenance of the radiographic testing equipment.

Personal Attributes

The individual must be physically fit to work for long durations with concentration. The individual must have attention to detail, basic written and verbal communication skills, and numerical ability along with problem-solving skills. The person must be able to work in coordination with others to achieve the work objectives.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. [CSC/N1335: Follow the health and safety practices at the work](#)
2. [CSC/N1336: Coordinate with co-workers to achieve work efficiency](#)
3. [CSC/N0603: Carry out radiographic testing on various materials](#)
4. [DGT/VSQ/N0102: Employability Skills \(60 Hours\)](#)

Qualification Pack (QP) Parameters

Sector	Capital Goods
Sub-Sector	Machine Tools, Dies, Moulds and Press Tools, Plastics Manufacturing Machinery, Textile Manufacturing Machinery, Process Plant Machinery, Electrical and Power Machinery, Light Engineering Goods
Occupation	Quality
Country	India
NSQF Level	4



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Credits	16
Aligned to NCO/ISCO/ISIC Code	NCO-2004/NIL
Minimum Educational Qualification & Experience	10th grade pass (with 2 years of relevant experience OR 11th Grade Pass with 1 year of relevant experience OR 10th grade pass and pursuing continuous schooling OR 8th pass plus 2-year NTC plus 1-Year NAC plus 1-Year CITS OR 10th grade pass with two years of any combination of NTC/NAC/CITS or equivalent OR Pursuing 2nd year of 3-year regular Diploma (after 10th) OR Completed 2nd year of 3-year diploma (after 10th) OR 12th grade pass OR Operator - Quality Level 3 with 3 years of relevant experience)
Minimum Level of Education for Training in School	
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 Years
Last Reviewed On	NA
Next Review Date	31/03/2025
NSQC Approval Date	31/03/2022
Version	4.0
Reference code on NQR	QG-04-CG-00182-2023-V1.1-CGSC
NQR Version	1



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CSC/N1335: Follow the health and safety practices at the work

Description

This OS unit is about following the appropriate health and safety practices at work. It covers responsibilities towards self and others to ensure a safe work environment.

Scope

The scope covers the following :

- Maintain personal health and safety
- Assist in hazard management
- Check the first aid box, firefighting and safety equipment
- Assist in waste management
- Follow the fire safety guidelines
- Follow the emergency and first-aid procedures
- Carry out relevant documentation and review

Elements and Performance Criteria

Maintain personal health and safety

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

- PC1.** follow the recommended practices to ensure protection from infections and transmission to others, such as the use of hand sanitiser and face mask
- PC2.** check the work conditions, assess the potential health and safety risks, and take appropriate measures to mitigate them
- PC3.** select and use the appropriate Personal Protective Equipment (PPE) relevant to the task and work conditions
- PC4.** follow the recommended techniques while lifting and moving heavy objects to avoid injury
- PC5.** follow the manufacturer's instructions and workplace safety guidelines while working on heavy machinery, tools and equipment

Assist in hazard management

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

- PC6.** identify existing and potential hazards at work
- PC7.** assess the potential risks and injuries associated with the identified hazards
- PC8.** coordinate with the supervisor or other relevant personnel to prevent or minimise the identified hazards
- PC9.** handle hazardous materials safely and store them in the designated storage

Check the first aid box, firefighting and safety equipment

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

- PC10.** check the first aid box to ensure it is updated with the relevant first aid supplies
- PC11.** check and test the firefighting and various safety equipment to ensure they are in usable condition



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PC12. coordinate with the supervisor for the repair and replacement of firefighting and safety equipment

Assist in waste management

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

PC13. segregate waste into appropriate categories

PC14. recycle the recyclable waste appropriately

PC15. dispose of the non-recyclable waste in an environment-friendly manner, complying with the applicable regulations

Follow the fire safety guidelines

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

PC16. use the appropriate type of fire extinguisher to extinguish different types of fires safely

PC17. follow the recommended practices for a safe rescue during a fire emergency

PC18. coordinate with the fire department to request assistance to extinguish a serious fire

Follow the emergency and first-aid procedures

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

PC19. follow the organisational health and safety guidelines during workplace emergencies to ensure own and co-workers' safety

PC20. follow the recommended practices to minimise loss to organisational property during an emergency

PC21. follow the recommended procedure to free a person from electrocution

PC22. administer appropriate first aid to the injured personnel

PC23. perform Cardiopulmonary Resuscitation (CPR) on a potential victim of cardiac arrest

PC24. coordinate with the emergency services to request medical assistance for seriously injured/ill personnel requiring professional medical attention or hospitalisation

Carry out relevant documentation and review

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

PC25. carry out appropriate documentation following a health and safety incident at work, including all the required information

PC26. coordinate with the relevant personnel to review health and safety conditions at work regularly or following an incident

PC27. assist in implementing appropriate changes to improve the health and safety conditions at work

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. the recommended practices to be followed to ensure protection from infections and transmission to others, such as the use of hand sanitiser and face mask

KU2. the importance and process of checking the work conditions, assessing the potential health and safety risks, and take appropriate measures to mitigate them

KU3. the importance and process of selecting and using the appropriate PPE relevant to the task and work conditions



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- KU4.** the recommended techniques to be followed while lifting and moving heavy objects to avoid injury
- KU5.** the importance of following the manufacturer's instructions and workplace safety guidelines while working on heavy machinery, tools and equipment
- KU6.** the importance and process of identifying existing and potential hazards at work
- KU7.** the process of assessing the potential risks and injuries associated with the various hazards
- KU8.** how to prevent or minimise different types of hazards
- KU9.** how to handle and store hazardous materials safely
- KU10.** the importance of ensuring the first aid box is updated with the relevant first aid supplies
- KU11.** the process of checking and testing the firefighting and various safety equipment to ensure they are in a usable condition
- KU12.** the criteria for segregating waste into appropriate categories
- KU13.** the appropriate methods for recycling the recyclable waste
- KU14.** the process of disposing of the non-recyclable waste safely and the applicable regulations
- KU15.** Use of different types of fire extinguishers to extinguish different types of fires
- KU16.** the recommended practices to be followed for a safe rescue during a fire emergency
- KU17.** how to request assistance from the fire department to extinguish a serious fire
- KU18.** the appropriate practices to be followed during workplace emergencies to ensure safety and minimise loss to organisational property
- KU19.** common health and safety hazards present in a work environment, associated risks, and how to mitigate them
- KU20.** safe working practices to be followed while working at various hazardous sites and using electrical equipment
- KU21.** the importance of ensuring easy access to firefighting and safety equipment
- KU22.** the appropriate preventative and remedial actions to be taken in the case of exposure to toxic materials, such as poisonous chemicals and gases
- KU23.** various causes of fire in different work environments and the recommended precautions to be taken to prevent fire accidents
- KU24.** different methods of extinguishing fire
- KU25.** different materials used for extinguishing fire, such as sand, water, foam, CO₂, dry powder, etc.
- KU26.** the applicable rescue techniques to be followed during a fire emergency
- KU27.** the importance of placing safety signs and instructions at strategic locations in a workplace and following them
- KU28.** different types of first aid treatment to be provided for different types of injuries
- KU29.** potential injuries associated with incorrect manual handling
- KU30.** how to move an injured person safely
- KU31.** various hazards associated with the use of various machinery, tools, implements, equipment and materials
- KU32.** the importance of ensuring no obstruction and free access to fire exits
- KU33.** how to free a person from electrocution safely
- KU34.** how to administer appropriate first aid to an injured person



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- KU35.** how to perform Cardiopulmonary Resuscitation (CPR)
- KU36.** the importance of coordinating with the emergency services to request urgent medical assistance for persons requiring professional medical attention or hospitalisation
- KU37.** the appropriate documentation to be carried out following a health and safety incident at work, and the relevant information to be included
- KU38.** the importance and process of reviewing the health and safety conditions at work regularly or following an incident
- KU39.** the importance and process of implementing appropriate changes to improve the health and safety conditions at work

Generic Skills (GS)

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

- GS1.** maintain work-related notes and records
- GS2.** communicate clearly and politely with co-workers and clients
- GS3.** read the relevant literature to get the latest updates about the field of work
- GS4.** listen attentively to understand the information being shared
- GS5.** plan and prioritise tasks to ensure timely completion
- GS6.** take quick decisions to deal with workplace emergencies and accidents
- GS7.** identify possible disruptions to work and take appropriate preventive measures
- GS8.** coordinate with the co-workers to achieve the work objectives
- GS9.** evaluate all possible solutions to a problem to select the best one

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Maintain personal health and safety</i>	7	12	-	-
PC1. follow the recommended practices to ensure protection from infections and transmission to others, such as the use of hand sanitiser and face mask	2	3	-	-
PC2. check the work conditions, assess the potential health and safety risks, and take appropriate measures to mitigate them	1	2	-	-
PC3. select and use the appropriate Personal Protective Equipment (PPE) relevant to the task and work conditions	1	2	-	-
PC4. follow the recommended techniques while lifting and moving heavy objects to avoid injury	1	3	-	-
PC5. follow the manufacturer's instructions and workplace safety guidelines while working on heavy machinery, tools and equipment	2	2	-	-
<i>Assist in hazard management</i>	4	10	-	-
PC6. identify existing and potential hazards at work	1	1	-	-
PC7. assess the potential risks and injuries associated with the identified hazards	1	3	-	-
PC8. coordinate with the supervisor or other relevant personnel to prevent or minimise the identified hazards	1	3	-	-
PC9. handle hazardous materials safely and store them in the designated storage	1	3	-	-
<i>Check the first aid box, firefighting and safety equipment</i>	3	7	-	-
PC10. check the first aid box to ensure it is updated with the relevant first aid supplies	1	2	-	-
PC11. check and test the firefighting and various safety equipment to ensure they are in usable condition	1	3	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC12. coordinate with the supervisor for the repair and replacement of firefighting and safety equipment	1	2	-	-
<i>Assist in waste management</i>	3	8	-	-
PC13. segregate waste into appropriate categories	1	3	-	-
PC14. recycle the recyclable waste appropriately	1	3	-	-
PC15. dispose of the non-recyclable waste in an environment-friendly manner, complying with the applicable regulations	1	2	-	-
<i>Follow the fire safety guidelines</i>	3	12	-	-
PC16. use the appropriate type of fire extinguisher to extinguish different types of fires safely	1	4	-	-
PC17. follow the recommended practices for a safe rescue during a fire emergency	1	4	-	-
PC18. coordinate with the fire department to request assistance to extinguish a serious fire	1	4	-	-
<i>Follow the emergency and first-aid procedures</i>	7	12	-	-
PC19. follow the organisational health and safety guidelines during workplace emergencies to ensure own and co-workers' safety	1	2	-	-
PC20. follow the recommended practices to minimise loss to organisational property during an emergency	1	3	-	-
PC21. follow the recommended procedure to free a person from electrocution	1	2	-	-
PC22. administer appropriate first aid to the injured personnel	1	2	-	-
PC23. perform Cardiopulmonary Resuscitation (CPR) on a potential victim of cardiac arrest	1	2	-	-
PC24. coordinate with the emergency services to request medical assistance for seriously injured/ ill personnel requiring professional medical attention or hospitalisation	2	1	-	-



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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Carry out relevant documentation and review</i>	3	9	-	-
PC25. carry out appropriate documentation following a health and safety incident at work, including all the required information	1	3	-	-
PC26. coordinate with the relevant personnel to review health and safety conditions at work regularly or following an incident	1	3	-	-
PC27. assist in implementing appropriate changes to improve the health and safety conditions at work	1	3	-	-
NOS Total	30	70	-	-



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National Occupational Standards (NOS) Parameters

NOS Code	CSC/N1335
NOS Name	Follow the health and safety practices at the work
Sector	Capital Goods
Sub-Sector	Machine Tools, Process Plant Machinery, Dies, Moulds and Press Tools, Electrical and Power Machinery, Plastics Manufacturing Machinery, Light Engineering Goods, Textile Manufacturing Machinery
Occupation	Machining
NSQF Level	3
Credits	TBD
Version	2.0
Last Reviewed Date	26/05/2022
Next Review Date	31/03/2024
NSQC Clearance Date	31/03/2021



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CSC/N1336: Coordinate with co-workers to achieve work efficiency

Description

This OS unit is about working in coordination with co-workers to achieve the work objectives efficiently. It also covers practising inclusion at work.

Scope

The scope covers the following :

- Work effectively with co-workers
- Communicate effectively with co-workers
- Practice inclusion at work

Elements and Performance Criteria

Work effectively with co-workers

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

- PC1.** plan daily tasks at work to ensure their timely completion and efficient use of time
- PC2.** carry out work responsibilities adhering to the limits of authority
- PC3.** follow the supervisor's instructions to ensure adherence to the applicable quality standards and timescales
- PC4.** coordinate with the co-workers to achieve the work objectives efficiently
- PC5.** prepare the relevant documents and reports as per the supervisor's instructions, providing appropriate information clearly and systematically
- PC6.** coordinate with the supervisor or relevant personnel to deal with out of authority tasks and concerns
- PC7.** mentor and assist subordinates in the execution of their work responsibilities
- PC8.** identify possible disruptions to work through coordination with the relevant stakeholders and take appropriate preventive measures
- PC9.** use various resources efficiently to ensure maximum utilisation and minimum wastage
- PC10.** follow the recommended practices to avoid and resolve conflicts at work
- PC11.** follow the relevant organisational policies to ensure disciplined behaviour with maximum productivity at work

Communicate effectively with co-workers

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

- PC12.** follow the organisational policy for the efficient and timely dissemination of information to the authorised personnel
- PC13.** communicate clearly and politely to ensure effective communication with co-workers
- PC14.** follow the appropriate techniques for active listening during interactions

Practice inclusion at work

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

- PC15.** empathise with Persons with Disabilities (PwD)



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PC16. adopt gender-neutral behaviour at work

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** the importance and process of effective communication in the workplace
- KU2.** the barriers to effective communication and how to overcome them
- KU3.** the importance of teamwork in an organisation's and individual's success
- KU4.** the importance of active listening in the work environment
- KU5.** the appropriate techniques to be followed for active listening
- KU6.** importance of avoiding casual expletives and unpleasant terms while communicating professional circles
- KU7.** the importance of maintaining discipline and ethical behaviour at work
- KU8.** the common reasons for interpersonal conflict and how to resolve them
- KU9.** the importance of developing effective work relationships for professional success
- KU10.** how expressing and addressing grievances appropriately and effectively
- KU11.** the importance and process of planning daily tasks to ensure their timely completion and efficient use of time
- KU12.** the importance of adhering to the limits of authority at work
- KU13.** the importance of following the applicable quality standards and timescales at work
- KU14.** the importance of coordinating with the co-workers to achieve the work objectives efficiently
- KU15.** the relevant documentation requirements
- KU16.** the importance of providing appropriate information clearly and systematically in work documents
- KU17.** the escalation matrix to be followed to deal with out of authority tasks and concerns
- KU18.** the importance and process of mentoring and assisting subordinates in the execution of their work responsibilities
- KU19.** how to identify possible disruptions to work prevent them
- KU20.** how to use various resources efficiently to ensure maximum utilisation and minimum wastage
- KU21.** the recommended practices to be followed at work to avoid and resolve conflicts at work
- KU22.** the importance and process of efficient and timely dissemination of information to the authorised personnel
- KU23.** how to communicate clearly and politely to ensure effective communication
- KU24.** the importance of following the recommended practices to ensure an inclusive environment for PwD and all genders at work

Generic Skills (GS)

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

- GS1.** maintain work-related notes and records



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- GS2.** read work-related and other relevant literature
- GS3.** communicate politely and -professionally
- GS4.** listen attentively to understand the information or instructions being shared
- GS5.** plan and prioritise tasks to ensure timely completion
- GS6.** take prompt decisions to deal with workplace emergencies and accidents
- GS7.** evaluate all possible solutions to a problem to select the best one

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Work effectively with co-workers</i>	20	43	-	-
PC1. plan daily tasks at work to ensure their timely completion and efficient use of time	2	4	-	-
PC2. carry out work responsibilities adhering to the limits of authority	2	4	-	-
PC3. follow the supervisor's instructions to ensure adherence to the applicable quality standards and timescales	2	4	-	-
PC4. coordinate with the co-workers to achieve the work objectives efficiently	2	4	-	-
PC5. prepare the relevant documents and reports as per the supervisor's instructions, providing appropriate information clearly and systematically	2	4	-	-
PC6. coordinate with the supervisor or relevant personnel to deal with out of authority tasks and concerns	2	4	-	-
PC7. mentor and assist subordinates in the execution of their work responsibilities	2	4	-	-
PC8. identify possible disruptions to work through coordination with the relevant stakeholders and take appropriate preventive measures	2	4	-	-
PC9. use various resources efficiently to ensure maximum utilisation and minimum wastage	2	4	-	-
PC10. follow the recommended practices to avoid and resolve conflicts at work	1	4	-	-
PC11. follow the relevant organisational policies to ensure disciplined behaviour with maximum productivity at work	1	3	-	-
<i>Communicate effectively with co-workers</i>	6	15	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC12. follow the organisational policy for the efficient and timely dissemination of information to the authorised personnel	2	5	-	-
PC13. communicate clearly and politely to ensure effective communication with co-workers	2	5	-	-
PC14. follow the appropriate techniques for active listening during interactions	2	5	-	-
<i>Practice inclusion at work</i>	4	12	-	-
PC15. empathise with Persons with Disabilities (PwD)	2	6	-	-
PC16. adopt gender-neutral behaviour at work	2	6	-	-
NOS Total	30	70	-	-



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National Occupational Standards (NOS) Parameters

NOS Code	CSC/N1336
NOS Name	Coordinate with co-workers to achieve work efficiency
Sector	Capital Goods
Sub-Sector	Machine Tools, Dies, Moulds and Press Tools, Plastics Manufacturing Machinery, Textile Manufacturing Machinery, Process Plant Machinery, Electrical and Power Machinery, Light Engineering Goods
Occupation	Machining
NSQF Level	3
Credits	TBD
Version	2.0
Last Reviewed Date	26/05/2022
Next Review Date	31/03/2024
NSQC Clearance Date	31/03/2021



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CSC/N0603: Carry out radiographic testing on various materials

Description

This OS unit is about carrying out radiographic testing on a variety of materials in a controlled test zone, ensuring compliance with the applicable regulations to ensure the safety of all the personnel involved.

Scope

The scope covers the following :

- Prepare for carrying out radiographic testing
- Carry out radiographic testing
- Use resources optimally

Elements and Performance Criteria

Prepare for carrying out radiographic testing

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

- PC1.** determine the job specifications by referring to the job sheet job card and instructions from the supervisor
- PC2.** coordinate with the supervisor or other relevant personnel for the rectification of incorrect and inconsistent information in the job specification documents
- PC3.** check the availability of the relevant Personal Protective Equipment (PPE), raw metals/ metal alloys/ non-metals, machine consumables, relevant testing tools and equipment for carrying out radiographic testing
- PC4.** prepare the test zone for carrying out radiographic testing, ensuring no hazards such as radiation
- PC5.** ensure barriers, relevant warning signs, appropriate lighting, and radiation survey meters are available in the test zone
- PC6.** set up radiographic films, intensifying screens Image Quality Indicators (IQIs) and identification markers in the test zone appropriately, providing the correct source location, Source Focal Distance (SFD), beam orientation and exposure
- PC7.** prepare the testing tools and equipment for use, and carry out their routine maintenance before use, as required to ensure they fit for purpose
- PC8.** prepare the test samples following the relevant procedures and check their integrity

Carry out radiographic testing

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

- PC9.** set the raw material/ workpiece between the source of radiation and film/ detector
- PC10.** conduct various radiographic tests, following the defined radiographic testing procedures
- PC11.** operate the relevant radiographic tools and equipment as per the manufacturers' instructions
- PC12.** follow the recommended standards, codes, Occupational Health and Safety (OHS) practices, and applicable regulations to contain radioactivity safely while conducting radiography tests
- PC13.** process the radiographic films to maximise the quality of images



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- PC14.** use the appropriate imaging techniques to display the final image, such as Film Radiography, Real-Time Radiography (RTR), Computed Tomography (CT), Digital Radiography (DR), Computed Radiography (CR), etc.
- PC15.** use the relevant Industry 4.0 technologies to ensure interconnectivity, automation, machine learning, and real-time data collection and analysis
- PC16.** develop the film following the recommended method after conducting the radiographic test
- PC17.** coordinate with the supervisor or the relevant expert to resolve any complex issues encountered while conducting radiographic tests
- PC18.** record the test results manually and electronically following the organisational procedures
- PC19.** review the results and carry out further tests if necessary
- PC20.** analyse the testing data, draw appropriate conclusions and prepare the relevant reports
- PC21.** follow the recommended practices while handling and storing gamma radiation source containers
- PC22.** carry out minor repair and maintenance of the testing tools and equipment and store them at the designated storage safely

Use resources optimally

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

- PC23.** use electricity and other resources optimally in various tasks and processes
- PC24.** connect the electrical tools and equipment safely and disconnect them when they are not in use

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** the applicable documentation in the job role, and the importance of recording the relevant data during the various stages of testing
- KU2.** the terminology associated with radiographic testing procedures
- KU3.** the concepts and benefits of Industry 4.0 and Industrial Internet of Things (IIoT)
- KU4.** relevant tools, equipment and resources used while conducting radiographic tests, such as films, machine consumables, test materials, etc.
- KU5.** the relevant regulations and codes of practice to be followed when using radiographic testing equipment
- KU6.** the relevant safety precautions to be taken while conducting radiographic tests on engineering products and materials
- KU7.** the process of checking the Controlled Test Zone complies with the applicable regulatory requirements, such as the identification and marking of boundary exclusion zones the erection of physical barriers warning lights and visual signs to restrict unauthorized entrance the sighting of radiation survey meters the positioning of appropriate radiation screens, etc.
- KU8.** how to deal with various hazards associated with radiographic testing activities, such as electrical contact, moving mechanical parts, radiation, toxic chemicals, etc.
- KU9.** various safe working practices to be followed in industrial radiography, as prescribed by Atomic Energy Regulatory Board (AERB)



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- KU10.** the process of conducting radiographic testing, i.e. the use of gamma and x-ray radiation as a penetrating agent shadow effect projection and capture of the image on photographic type film development, fixing, washing and drying of the film analysis of the exposed images
- KU11.** the sources of radiation used in radiographic testing activities, such as x-ray tubes and radioactive isotopes
- KU12.** the process of image formation, including rectilinear propagation
- KU13.** the geometry of shadow projection, inverse square law, focal spot, formation of penumbra and image quality indicators
- KU14.** the preparation requirements of the X-ray tube generator
- KU15.** how to set up the tube or radiation source, including the equipment controls, testing parameters, focal spot size, safety devices, and the use of exposure charts
- KU16.** the importance of checking the condition of all electrical cables and connections of the relevant equipment
- KU17.** the process of handling and storing gamma-ray source containers safely
- KU18.** importance and process of transporting the radioactive materials safely
- KU19.** different types of discontinuities/ flaws detected through radiography and their effect on the material
- KU20.** the types of X-ray generators and radioisotopes and their effect on radiographic sensitivity tools, equipment, techniques and system verification checks
- KU21.** the specialized applications radiography
- KU22.** the principles of image formation, film and chemical properties and processing techniques
- KU23.** various types of films and screens, their properties and effects on image quality
- KU24.** the relevant parameters against which the quality of the developed image is checked, such as processing faults, contrast, sensitivity, density, etc.
- KU25.** how to maintain and store radiographic testing equipment
- KU26.** how to use the safety features of radioisotope cameras and X-ray equipment
- KU27.** how to prepare materials or structures for the radiographic testing activities, including the identification of the test area and the use of lead markers
- KU28.** various material/ product areas on which radiographic tests are conducted, such as welded joints, castings forged, rolled, extruded products/materials cold-formed products, heat-treated components, etc
- KU29.** various types of information included in a radiographic test report, such as product identification test areas covered by identified radiographs test area geometries and thickness radiographic parameters testing conditions type of Image Quality Indication (IQI) film type processing conditions etc.
- KU30.** different types of radiographic films, such as emulsion, and intensifying screens
- KU31.** the process of developing, fixing, washing and drying films
- KU32.** the effect of processing faults, characteristic curves, light exposure and temperature on the film
- KU33.** how to control the conditions during the development film
- KU34.** the response of defects to penetrative radiation, and the resulting images on the film
- KU35.** the process of setting up/maintaining the storage facilities for unexposed, exposed and developed films the importance of monitoring the equipment settings and functioning during the testing process



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- KU36.** the appropriate action to be taken in case accidents involving radioactive sources take place
- KU37.** various problems associated with different stages of the radiographic testing, and how to prevent/ resolve them, such as sample collection, inspection and testing activities and the interpretation of test results
- KU38.** the benefits and methods of resource optimisation

Generic Skills (GS)

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

- GS1.** maintain work-related notes and records
- GS2.** undertake work-related numerical computations
- GS3.** use the appropriate units of measurement and measuring techniques
- GS4.** read the relevant literature to learn about the latest developments in the field of work
- GS5.** listen attentively to understand the information or instructions being shared
- GS6.** communicate politely and professionally
- GS7.** plan and prioritise tasks to ensure timely completion
- GS8.** coordinate with co-workers to achieve the work objectives
- GS9.** evaluate all possible solutions to a problem to select the best one
- GS10.** take prompt decisions to deal with workplace emergencies and accidents

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Prepare for carrying out radiographic testing</i>	14	24	-	-
PC1. determine the job specifications by referring to the job sheet job card and instructions from the supervisor	2	3	-	-
PC2. coordinate with the supervisor or other relevant personnel for the rectification of incorrect and inconsistent information in the job specification documents	2	3	-	-
PC3. check the availability of the relevant Personal Protective Equipment (PPE), raw metals/ metal alloys/ non-metals, machine consumables, relevant testing tools and equipment for carrying out radiographic testing	2	3	-	-
PC4. prepare the test zone for carrying out radiographic testing, ensuring no hazards such as radiation	2	3	-	-
PC5. ensure barriers, relevant warning signs, appropriate lighting, and radiation survey meters are available in the test zone	2	3	-	-
PC6. set up radiographic films, intensifying screens Image Quality Indicators (IQIs) and identification markers in the test zone appropriately, providing the correct source location, Source Focal Distance (SFD), beam orientation and exposure	2	3	-	-
PC7. prepare the testing tools and equipment for use, and carry out their routine maintenance before use, as required to ensure they fit for purpose	1	3	-	-
PC8. prepare the test samples following the relevant procedures and check their integrity	1	3	-	-
<i>Carry out radiographic testing</i>	14	40	-	-
PC9. set the raw material/ workpiece between the source of radiation and film/ detector	1	3	-	-
PC10. conduct various radiographic tests, following the defined radiographic testing procedures	1	3	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. operate the relevant radiographic tools and equipment as per the manufacturers' instructions	1	3	-	-
PC12. follow the recommended standards, codes, Occupational Health and Safety (OHS) practices, and applicable regulations to contain radioactivity safely while conducting radiography tests	1	3	-	-
PC13. process the radiographic films to maximise the quality of images	1	3	-	-
PC14. use the appropriate imaging techniques to display the final image, such as Film Radiography, Real-Time Radiography (RTR), Computed Tomography (CT), Digital Radiography (DR), Computed Radiography (CR), etc.	1	3	-	-
PC15. use the relevant Industry 4.0 technologies to ensure interconnectivity, automation, machine learning, and real-time data collection and analysis	1	3	-	-
PC16. develop the film following the recommended method after conducting the radiographic test	1	3	-	-
PC17. coordinate with the supervisor or the relevant expert to resolve any complex issues encountered while conducting radiographic tests	1	3	-	-
PC18. record the test results manually and electronically following the organisational procedures	1	3	-	-
PC19. review the results and carry out further tests if necessary	1	3	-	-
PC20. analyse the testing data, draw appropriate conclusions and prepare the relevant reports	1	3	-	-
PC21. follow the recommended practices while handling and storing gamma radiation source containers	1	2	-	-
PC22. carry out minor repair and maintenance of the testing tools and equipment and store them at the designated storage safely	1	2	-	-
<i>Use resources optimally</i>	2	6	-	-



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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC23. use electricity and other resources optimally in various tasks and processes	1	3	-	-
PC24. connect the electrical tools and equipment safely and disconnect them when they are not in use	1	3	-	-
NOS Total	30	70	-	-



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National Occupational Standards (NOS) Parameters

NOS Code	CSC/N0603
NOS Name	Carry out radiographic testing on various materials
Sector	Capital Goods
Sub-Sector	Machine Tools, Dies, Moulds and Press Tools, Plastics Manufacturing Machinery, Textile Manufacturing Machinery, Process Plant Machinery, Electrical and Power Machinery, Light Engineering Goods
Occupation	Quality Inspection
NSQF Level	4
Credits	9
Version	3.0
Last Reviewed Date	NA
Next Review Date	31/03/2025
NSQC Clearance Date	31/03/2022



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:



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- 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.



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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



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- 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

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Introduction to Employability Skills</i>	1	1	-	-
PC1. identify employability skills required for jobs in various industries	-	-	-	-
PC2. identify and explore learning and employability portals	-	-	-	-
<i>Constitutional values - Citizenship</i>	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	-	-	-	-
<i>Becoming a Professional in the 21st Century</i>	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	-	-	-	-
<i>Basic English Skills</i>	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	-	-	-	-
<i>Career Development & Goal Setting</i>	1	2	-	-

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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	-	-	-	-
<i>Communication Skills</i>	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	-	-	-	-
<i>Diversity & Inclusion</i>	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	-	-	-	-
<i>Financial and Legal Literacy</i>	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	-	-	-	-
<i>Essential Digital Skills</i>	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	-	-	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Entrepreneurship</i>	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	-	-	-	-
<i>Customer Service</i>	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	-	-	-	-
<i>Getting ready for apprenticeship & Jobs</i>	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	-	-



Qualification Pack

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	31/08/2023
Next Review Date	31/08/2026
NSQC Clearance Date	31/08/2023

Assessment Guidelines and Assessment Weightage

Assessment Guidelines

1. Criteria for assessment for the Qualification Pack will be created by CGSC.
2. Performance Criteria (PC) have been assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
3. The assessment for the theory part will/may be based on knowledge bank of questions approved CGSC.
4. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.
5. Assessment Agencies will create Assessor Guides comprising of Theory and Practical Assessment Set and Guidelines for each examination/training centre (as per assessment criteria below). The same will be approved by CGSC for adequacy.
6. To successfully attain Certification on the Qualification Pack, the trainee must score a minimum of 70% in each Core NOS and minimum of 70% in all non-core NOS. In addition, a candidate needs to attain a minimum overall pass percentage of 70% for certification.
7. In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack.



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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
CSC/N1335.Follow the health and safety practices at the work	30	70	-	-	100	20
CSC/N1336.Coordinate with co-workers to achieve work efficiency	30	70	-	-	100	20
CSC/N0603.Carry out radiographic testing on various materials	30	70	-	-	100	50
DGT/VSQ/N0102.Employability Skills (60 Hours)	20	30	0	0	50	10
Total	110	240	0	0	350	100



Qualification Pack

Acronyms

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training
CO₂	Carbon Dioxide
CPR	Cardiac Pulmonary Resuscitation
PPE	Personal Protective Equipment
IQI	Image Quality Indication
CTZ	Control Test Zone
SFD	Source Focal Distance
SMR	Source Movement Register

Qualification Pack

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.

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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.