Qualification Pack

Solar LED Technician

QP Code: ELE/Q5903

Version: 3.0

NSQF Level: 4

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

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ELE/Q5903: Solar LED Technician

Brief Job Description

The individual is capable of installing various types of solar home based LED lighting, outdoor and street lighting as per given instructions. The person should be able to identify faults in a solar PV system and carry out repair at preliminary level in line with given performance parameters. The individual must adhere to all the relevant environmental, safety and regulatory requirements while carrying out his/her job duties.

Personal Attributes

An individual on this job must have good communication and interpersonal skills. The individual must exhibit good customer handling attributes, good decision-making skills and focussed on quality work outcome, should be courteous, solution-oriented, polite. The individual should possess an alert mind, a physically active body and energetic. The individual should be responsible for own outcome and work in a team.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. ELE/N5905: Perform installation of Solar PV System
2. ELE/N5906: Perform maintenance and repair of Solar PV System
3. ELE/N1002: Apply health and safety practices at the workplace
4. DGT/VSQ/N0102: Employability Skills (60 Hours)

Qualification Pack (QP) Parameters

Sector	Electronics
Sub-Sector	Solar & LED
Occupation	Installation-S&L
Country	India
NSQF Level	4
Credits	20
Aligned to NCO/ISCO/ISIC Code	NCO-2015/NIL

Minimum Educational Qualification & Experience	8th grade pass with 2 years of NTC (plus 2 year of NAC/relevant experience) OR 10th grade pass (plus 2 year of NTC/NAC/relevant experience) OR 12th Class OR Certificate-NSQF (level 3 in Maintenance Technician) with 2 Years of experience
Minimum Level of Education for Training in School	8th Class
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 Years
Last Reviewed On	NA
Next Review Date	27/05/2025
NSQC Approval Date	27/01/2022
Version	3.0
Reference code on NQR	2022/EHW/ESSC/06655
NQR Version	1.0

Remarks:

NA

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ELE/N5905: Perform installation of Solar PV System

Description

This NOS is about analyzing job requirements for installing solar PV system in accordance with relevant environmental, safety and regulatory guidelines.

Scope

The scope covers the following :

- This unit/task covers the following:
- Identify job requirements to prepare work plan and visit customer site
- Install PV panel structure
- Analyze specific requirements for roof structure
- Assemble panels
- Connect panels and fix solar LED lightings
- Post installation activities

Elements and Performance Criteria

Identify job requirements to prepare work plan and visit customer site

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

PC1. coordinate with supervisor for work order to identify job requirements

PC2. interpret drawings, schematics and site layout for PV system installation

PC3. prepare a plan to carry out the work as per organizational approved standards, procedures, appropriate techniques and manufacturer's instructions for PV system installation

PC4. analyze the different aspects of solar technologies such as solar photo voltaic and solar thermal technologies, including possible risks/hazards of PV system

PC5. select calibrated tools/equipment, testing devices and materials/items to conduct solar installation work

PC6. identify the required system components, as per job specifications, in compliance with relevant performance and safety standards defined in IEC and other international standards

Install PV panel structure

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

PC7. visit customer site as per work plan for carrying out installation

PC8. perform preliminary checks of site prior to installation of PV system

PC9. mark the work area accurately in accordance with measurements/estimations of the diagram layout

PC10. prepare appropriate type of structures which are treated prior to fixing the panels as per standard requirements

PC11. assemble the structure safely and securely using approved methods and materials

PC12. inspect that buildings have been water-proofed wherever the array cables pass through the building fabric

Analyze specific requirements for roof structure

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

PC13. fix solar PV modules on different types of roof materials using appropriate techniques

PC14. remove the roof safely without causing any damage to the surrounding area for home based solar lighting

PC15. store removed roof covering safely at appropriate location, protected from any possible leakage or damage

PC16. verify that the exposed roof area is in appropriate condition to carry out the installation work

PC17. check that brackets do not interfere with the integrity of the roof covering

Assemble panels

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

PC18. inspect that the structure/brackets are in safe condition to undergo fixing procedures

PC19. fix the appropriate type of mounting system on the given structure by applying suitable fixing methods

PC20. check that panels are in good working condition/undamaged during handling and move them to the installation area

PC21. fix the panels to the mounting system and brackets using correct fixing accessories/cable containments

PC22. check that the panels are securely fastened to the brackets or mounting bars using appropriate tools and method

PC23. report problems or issues, if any, with the safety of system structures and violation of regulatory norms to the appropriate authority

Connect panels and fix solar LED lightings

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

PC24. select appropriate connecting methods of the modules

PC25. terminate the wiring correctly in line with manufacturer’s instructions, operational and regulatory requirements

PC26. allocate appropriate string voltages and current to inverter rating and overall system installation

PC27. perform approved cable routing procedures within solar photovoltaic module arrays

PC28. test the operation of the PV system including panel/module connections, connecting cables and complete array structure, etc. using approved procedures

PC29. select the appropriate type of electronics luminaries such as LED lightings and their specifications that comply with performance parameters of the installed PV system

Post installation activities

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

PC30. document required information after handover of the completed work to the customer

PC31. provide information to customer about manufacturer’s guide on annual maintenance contract, warranty and guarantees, schedule maintenance tracker, etc.

PC32. return all used tools and equipment safely in their appropriate storage area

PC33. perform steps to dispose toxic and non-toxic waste materials as per relevant environmental safety policies

PC34. resolve customer queries, concerns and requests in line with relevant organization’s policies on customer service

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. importance of referring to site diagrams, drawings and schedules pertaining to architectural, electrical, circuit, wiring, OEM manuals, etc.

KU2. basic electrical and solar terms such as current, voltage, resistance, power, energy, irradiance etc. as well as signs, symbols, measurement units, graphical representation, etc.

KU3. organizational standards, appropriate techniques, manufacturer's instructions and procedures pertaining to construction, installation, erection and commissioning of solar PV systems

KU4. safety compliances, regulatory requirements, relevant state legislations and policies on renewable energy

KU5. • "different types of solar photo voltaic technologies
• such as crystalline, thin film, concentrated etc. and their applications such as solar home lighting systems, solar water pumping systems etc."

KU6. principles of solar energy and irradiance

KU7. hazards and possible risks such as loose or naked electric connection, handling heated items, working at height/confined spaces, component/equipment mishandling, chemical leaks from components, corrosive battery, etc.

KU8. usage of tools, testing devices and materials such as drills, hammer, earth tester, multimeter, solar LED lights, etc.

KU9. system components such as solar array, charge controller, battery, inverter, module mounting systems, inverter, generation meter, generation display unit, structures, LED lightings, etc.

KU10. types of solar PV systems such as DC system, AC system, standalone system, hybrid system

KU11. maintaining professional attitude and customer service standards as per organizational guidelines

KU12. parameters affecting the performance of a solar PV system such as tilt angle, reflectance, dust, shading, light intensity, temperature, and so on

KU13. different checks such as accessibility to site, availability of land and foundation needs, clear south facing without obstruction, availability of grid, inspection & testing of electrical wirings or connections and so on

KU14. factors affecting selection of site including soil investigation

KU15. types of structures such as roof/non-roof and their building materials

KU16. types of assembling materials such as steel frame, sunlight/UV resistant (outdoor lightings), urethane sealants, heat resistant materials, high quality fasteners, etc.

KU17. types of roof materials such as RCC, corrugated sheet, wood, thatched, tin, etc.

KU18. LED lighting systems such as home lighting, outdoor & street lighting

KU19. methods and tools to fix/connect panels using fixing accessories/ cable containments such as nuts, bolts, screws, connectors, plates, brackets, mounting bar, conduits, lugs/thimbles, pipes, etc.

KU20. sources of information and support for problem solving

KU21. connecting methods of the modules such as a single string array and multiple string array

KU22. electrical safety practices in solar PV installations in terms of safe handling, protection from DC&AC disconnects, lightening, surge, grounding, etc.

KU23. basic of electricity such as voltage, circuit, wirings, series and parallel connections, etc.

KU24. requirements such as avoidance of inductive loops, necessity of earthing systems, and other requirements

KU25. methods used to secure and route cables, etc.

KU26. safety and operational standards

KU27. types and specifications such as input voltage, current, LED consumption, LED luminous efficiency, illumination, and so on

KU28. information like product and system details, service rendered (installation), etc.

KU29. document format as per organization's policies and procedures

KU30. safe disposal of toxic and non-toxic wastes

Generic Skills (GS)

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

GS1. organize and analyze information relevant to work

GS2. read and interpret information correctly from job specification documents

GS3. classify task related information

GS4. read signages, safety symbols, warnings, etc. displayed in work environment

GS5. read and comprehend manufacturer's instructions on equipment and devices correctly

GS6. determine the suitability of installation site based on own learning and work requirements

GS7. liaise with appropriate authorities using correct protocol

GS8. suggest solutions to potential problems by applying logic and reasoning

GS9. seek clarification from immediate supervisor or responsible authority on how to resolve problems when faced with difficult situations

GS10. fill up appropriate forms, activity logs, attendance sheets as per organizational format

GS11. record customer details, service availed, issue of warranty/guarantee in appropriate forms

GS12. document work completion report including key tasks performed, product category, customer feedback/requests, etc.

GS13. provide customer with information on how to enhance quality and efficiency of equipment/system

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Identify job requirements to prepare work plan and visit customer site	**11**	**10**	**-**	**2**
PC1. coordinate with supervisor for work order to identify job requirements	2	1	-	-
PC2. interpret drawings, schematics and site layout for PV system installation	2	2	-	-
PC3. prepare a plan to carry out the work as per organizational approved standards, procedures, appropriate techniques and manufacturer's instructions for PV system installation	1	2	-	-
PC4. analyze the different aspects of solar technologies such as solar photo voltaic and solar thermal technologies, including possible risks/hazards of PV system	2	2	-	1
PC5. select calibrated tools/equipment, testing devices and materials/items to conduct solar installation work	2	2	-	-
PC6. identify the required system components, as per job specifications, in compliance with relevant performance and safety standards defined in IEC and other international standards	2	1	-	1
Install PV panel structure	**6**	**10**	**-**	**3**
PC7. visit customer site as per work plan for carrying out installation	-	1	-	-
PC8. perform preliminary checks of site prior to installation of PV system	2	2	-	1
PC9. mark the work area accurately in accordance with measurements/estimations of the diagram layout	1	2	-	-
PC10. prepare appropriate type of structures which are treated prior to fixing the panels as per standard requirements	1	2	-	1
PC11. assemble the structure safely and securely using approved methods and materials	1	2	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC12. inspect that buildings have been water-proofed wherever the array cables pass through the building fabric	1	1	-	-
Analyze specific requirements for roof structure	**5**	**7**	**-**	**-**
PC13. fix solar PV modules on different types of roof materials using appropriate techniques	1	2	-	-
PC14. remove the roof safely without causing any damage to the surrounding area for home based solar lighting	1	2	-	-
PC15. store removed roof covering safely at appropriate location, protected from any possible leakage or damage	1	1	-	-
PC16. verify that the exposed roof area is in appropriate condition to carry out the installation work	1	1	-	-
PC17. check that brackets do not interfere with the integrity of the roof covering	1	1	-	-
Assemble panels	**6**	**8**	**-**	**2**
PC18. inspect that the structure/brackets are in safe condition to undergo fixing procedures	1	1	-	-
PC19. fix the appropriate type of mounting system on the given structure by applying suitable fixing methods	1	2	-	1
PC20. check that panels are in good working condition/undamaged during handling and move them to the installation area	1	1	-	-
PC21. fix the panels to the mounting system and brackets using correct fixing accessories/cable containments	1	2	-	1
PC22. check that the panels are securely fastened to the brackets or mounting bars using appropriate tools and method	1	1	-	-
PC23. report problems or issues, if any, with the safety of system structures and violation of regulatory norms to the appropriate authority	1	1	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Connect panels and fix solar LED lightings	**6**	**8**	**-**	**3**
PC24. select appropriate connecting methods of the modules	1	1	-	1
PC25. terminate the wiring correctly in line with manufacturer's instructions, operational and regulatory requirements	1	1	-	-
PC26. allocate appropriate string voltages and current to inverter rating and overall system installation	1	1	-	-
PC27. perform approved cable routing procedures within solar photovoltaic module arrays	1	2	-	1
PC28. test the operation of the PV system including panel/module connections, connecting cables and complete array structure, etc. using approved procedures	1	2	-	-
PC29. select the appropriate type of electronics luminaries such as LED lightings and their specifications that comply with performance parameters of the installed PV system	1	1	-	1
Post installation activities	**6**	**7**	**-**	**-**
PC30. document required information after handover of the completed work to the customer	1	2	-	-
PC31. provide information to customer about manufacturer's guide on annual maintenance contract, warranty and guarantees, schedule maintenance tracker, etc.	2	-	-	-
PC32. return all used tools and equipment safely in their appropriate storage area	-	1	-	-
PC33. perform steps to dispose toxic and non-toxic waste materials as per relevant environmental safety policies	1	2	-	-
PC34. resolve customer queries, concerns and requests in line with relevant organization's policies on customer service	2	2	-	-
NOS Total	**40**	**50**	**-**	**10**

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National Occupational Standards (NOS) Parameters

NOS Code	ELE/N5905
NOS Name	Perform installation of Solar PV System
Sector	Electronics
Sub-Sector	Solar & LED
Occupation	Installation
NSQF Level	4
Credits	TBD
Version	2.0
Last Reviewed Date	24/02/2022
Next Review Date	27/05/2025
NSQC Clearance Date	27/01/2022

ELE/N5906: Perform maintenance and repair of Solar PV System

Description

This NOS is about identifying faults in solar PV system and carry out repair in compliance with relevant regulatory requirements and occupational health & safety guidelines.

Scope

The scope covers the following :

- This unit/task covers the following:
- Identify work requirements and prepare service kit
- Perform maintenance work at site
- Identify and repair faults
- Post repair and maintenance activities

Elements and Performance Criteria

Identify work requirements and prepare service kit

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

PC1. coordinate with supervisor for work order to identify type of system fault from the job specifications

PC2. identify required resources, materials, tools, equipment and testing devices as per given job specification

PC3. verify that the identified tools/equipment are in working condition and safe to handle

PC4. check that the required type, quality and quantity of materials are available

Perform routine maintenance work at site

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

PC5. access the work site in accordance with organization’s approved procedures and state the purpose of visit

PC6. plan customer’s security coverage requirements in detail as per needs communicated

PC7. provide accurate information at all times in accordance with organizational quality standards and procedures

PC8. inspect that circuits or machines are safely isolated as per regulatory requirements and organizational procedures

PC9. check that the identified work plan conforms to environmental, architectural, structural, site and regulatory requirements

PC10. perform washing away dust/dirt from the surface of the panels, using approved procedures and cleansing agents, to ensure panels/inverter are dust-free and moisture-free

PC11. inspect the integrated connection system for any loose wiring, connectors using approved testing procedures

Identify and repair faults

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

PC12. detect faults in the functionality of the system using photo voltaic panel fault finding methods

PC13. repair, or replace, faulty components using approved methods without causing damage to any equipment, components, circuits, etc.

PC14. report any unprecedented problems identified in the work to responsible authority and seek advice on how to resolve them

Perform post repair and maintenance activities

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

PC15. perform steps to handover the completed work to the customer and demonstrate the operation of the system as per standard quality requirements

PC16. document the required information accurately after work completion as per organization's policies & procedures

PC17. resolve customer queries, concerns and requests efficiently and accurately in line with relevant organizational customer service practices

PC18. return all used tools and equipment safely in designated storage

PC19. perform steps to dispose toxic and non-toxic waste materials as per relevant environmental safety policies

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. range of tools, equipment, fixings and materials

KU2. how to use tools and equipment safely

KU3. customer service standards such as self-introduction, time required to solve customer's problem, etc.

KU4. various types of PV solar systems and products commercially available such as off-grid system , grid connected, hybrid systems , etc

KU5. approved procedures and cleaning agents as per manufacturer instructions

KU6. how to diagnose faults such as read inverter error display, measure and calculate values of system operational parameters, etc.

KU7. how to repair faults of home based solar LED lightings, outdoor and street lightings

KU8. information such as product/equipment and system details, type of fault, list of items/components replaced/removed, product history, warranty/guarantee, customer information, etc.

Generic Skills (GS)

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

GS1. maintain professional relationship with customers adhering to relevant confidentiality clauses

GS2. understand customer's requirements

GS3. apply logic and reasoning for problem solving

GS4. liaise with appropriate authorities using correct protocol

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Identify work requirements and prepare service kit	**8**	**8**	**-**	**1**
PC1. coordinate with supervisor for work order to identify type of system fault from the job specifications	2	2	-	-
PC2. identify required resources, materials, tools, equipment and testing devices as per given job specification	2	2	-	1
PC3. verify that the identified tools/equipment are in working condition and safe to handle	2	2	-	-
PC4. check that the required type, quality and quantity of materials are available	2	2	-	-
Perform routine maintenance work at site	**14**	**18**	**-**	**4**
PC5. access the work site in accordance with organization's approved procedures and state the purpose of visit	2	3	-	1
PC6. plan customer's security coverage requirements in detail as per needs communicated	2	2	-	-
PC7. provide accurate information at all times in accordance with organizational quality standards and procedures	2	2	-	-
PC8. inspect that circuits or machines are safely isolated as per regulatory requirements and organizational procedures	2	2	-	1
PC9. check that the identified work plan conforms to environmental, architectural, structural, site and regulatory requirements	2	3	-	1
PC10. perform washing away dust/dirt from the surface of the panels, using approved procedures and cleansing agents, to ensure panels/inverter are dust-free and moisture-free	2	3	-	1
PC11. inspect the integrated connection system for any loose wiring, connectors using approved testing procedures	2	3	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Identify and repair faults	**8**	**10**	**-**	**3**
PC12. detect faults in the functionality of the system using photo voltaic panel fault finding methods	3	3	-	1
PC13. repair, or replace, faulty components using approved methods without causing damage to any equipment, components, circuits, etc.	3	4	-	2
PC14. report any unprecedented problems identified in the work to responsible authority and seek advice on how to resolve them	2	3	-	-
Perform post repair and maintenance activities	**10**	**14**	**-**	**2**
PC15. perform steps to handover the completed work to the customer and demonstrate the operation of the system as per standard quality requirements	2	4	-	1
PC16. document the required information accurately after work completion as per organization’s policies & procedures	2	3	-	1
PC17. resolve customer queries, concerns and requests efficiently and accurately in line with relevant organizational customer service practices	2	3	-	-
PC18. return all used tools and equipment safely in designated storage	2	2	-	-
PC19. perform steps to dispose toxic and non-toxic waste materials as per relevant environmental safety policies	2	2	-	-
NOS Total	**40**	**50**	**-**	**10**

National Occupational Standards (NOS) Parameters

NOS Code	ELE/N5906
NOS Name	Perform maintenance and repair of Solar PV System
Sector	Electronics
Sub-Sector	Solar & LED
Occupation	Installation
NSQF Level	4
Credits	TBD
Version	2.0
Last Reviewed Date	24/02/2022
Next Review Date	27/05/2025
NSQC Clearance Date	27/01/2022

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

Description

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

Scope

The scope covers the following :

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

Elements and Performance Criteria

Deal with workplace hazards

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

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

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

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

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

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

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

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

PC8. maintain appropriate posture while handling heavy objects

PC9. apply good housekeeping practices at all times

Apply fire safety practices

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

PC10. take preventive measures to prevent fire hazards

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

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

Follow emergencies, rescue and first-aid procedures

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

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

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

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

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

Effective waste management/recycling practices

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

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

PC18. segregate waste into different categories

PC19. ensure disposal of non-recyclable waste appropriately

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

PC21. follow processes specified for disposal of hazardous waste

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

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

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

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

KU4. basic knowledge of electronic devices and related health risks

KU5. meaning of hazards and risks

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

KU7. methods of accident prevention

KU8. importance of using protective clothing/equipment while working

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

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

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

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

KU13. forms and classifications of hazardous substances

KU14. safe working practices while working at various hazardous sites

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

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

KU17. precautionary activities to prevent the fire accident

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

KU19. techniques of using the different fire extinguishers

KU20. different methods and material to extinguish fires

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

KU22. rescue techniques used during a fire hazard

KU23. various types of safety signs and their meaning

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

KU25. contents of written accident report

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

KU27. safe lifting and carrying practices

KU28. potential impact to a person who is moved incorrectly

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

KU30. ESD measures and 5S

KU31. efficient utilization and management of material and water

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

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

KU34. organization's procedure for minimizing waste

KU35. waste management and methods of waste disposal

KU36. common sources of pollution and ways to minimize it

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

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

KU39. safety notices, signs and instructions at workplace

Generic Skills (GS)

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

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

GS2. read operation manuals

GS3. write health and safety compliance report

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

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

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

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

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

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

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

GS11. identify immediate or temporary solutions to resolve delays

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

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

GS14. recognise emergency and potential emergency situations

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

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

GS17. record data on waste disposal at workplace

Assessment Criteria

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

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

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

National Occupational Standards (NOS) Parameters

NOS Code	ELE/N1002
NOS Name	Apply health and safety practices at the workplace
Sector	Electronics
Sub-Sector	Generic
Occupation	Generic - Health Safety
NSQF Level	4
Credits	TBD
Version	3.0
Last Reviewed Date	24/02/2022
Next Review Date	30/12/2026
NSQC Clearance Date	30/12/2021

Qualification Pack

DGT/VSQ/N0102: Employability Skills (60 Hours)

Description

This unit is about employability skills, Constitutional values, becoming a professional in the 21st Century, digital, financial, and legal literacy, diversity and Inclusion, English and communication skills, customer service, entrepreneurship, and apprenticeship, getting ready for jobs and career development.

Scope

The scope covers the following :

- Introduction to Employability Skills
- Constitutional values - Citizenship
- Becoming a Professional in the 21st Century
- Basic English Skills
- Career Development & Goal Setting
- Communication Skills
- Diversity & Inclusion
- Financial and Legal Literacy
- Essential Digital Skills
- Entrepreneurship
- Customer Service
- Getting ready for Apprenticeship & Jobs

Elements and Performance Criteria

Introduction to Employability Skills

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

PC1. identify employability skills required for jobs in various industries

PC2. identify and explore learning and employability portals

Constitutional values – Citizenship

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

PC3. recognize the significance of constitutional values, including civic rights and duties, citizenship, responsibility towards society etc. and personal values and ethics such as honesty, integrity, caring and respecting others, etc.

PC4. follow environmentally sustainable practices

Becoming a Professional in the 21st Century

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

PC5. recognize the significance of 21st Century Skills for employment

PC6. practice the 21st Century Skills such as Self-Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn for continuous learning etc. in personal and professional life

Basic English Skills

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

PC7. use basic English for everyday conversation in different contexts, in person and over the telephone

PC8. read and understand routine information, notes, instructions, mails, letters etc. written in English

PC9. write short messages, notes, letters, e-mails etc. in English

Career Development & Goal Setting

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

PC10. understand the difference between job and career

PC11. prepare a career development plan with short- and long-term goals, based on aptitude

Communication Skills

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

PC12. follow verbal and non-verbal communication etiquette and active listening techniques in various settings

PC13. work collaboratively with others in a team

Diversity & Inclusion

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

PC14. communicate and behave appropriately with all genders and PwD

PC15. escalate any issues related to sexual harassment at workplace according to POSH Act

Financial and Legal Literacy

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

PC16. select financial institutions, products and services as per requirement

PC17. carry out offline and online financial transactions, safely and securely

PC18. identify common components of salary and compute income, expenses, taxes, investments etc

PC19. identify relevant rights and laws and use legal aids to fight against legal exploitation

Essential Digital Skills

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

PC20. operate digital devices and carry out basic internet operations securely and safely

PC21. use e- mail and social media platforms and virtual collaboration tools to work effectively

PC22. use basic features of word processor, spreadsheets, and presentations

Entrepreneurship

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

PC23. identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research

PC24. develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion

PC25. identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity

Customer Service

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

PC26. identify different types of customers

PC27. identify and respond to customer requests and needs in a professional manner.

PC28. follow appropriate hygiene and grooming standards

Getting ready for apprenticeship & Jobs

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

PC29. create a professional Curriculum vitae (Résumé)

PC30. search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively

PC31. apply to identified job openings using offline /online methods as per requirement

PC32. answer questions politely, with clarity and confidence, during recruitment and selection

PC33. identify apprenticeship opportunities and register for it as per guidelines and requirements

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. need for employability skills and different learning and employability related portals

KU2. various constitutional and personal values

KU3. different environmentally sustainable practices and their importance

KU4. Twenty first (21st) century skills and their importance

KU5. how to use English language for effective verbal (face to face and telephonic) and written communication in formal and informal set up

KU6. importance of career development and setting long- and short-term goals

KU7. about effective communication

KU8. POSH Act

KU9. Gender sensitivity and inclusivity

KU10. different types of financial institutes, products, and services

KU11. how to compute income and expenditure

KU12. importance of maintaining safety and security in offline and online financial transactions

KU13. different legal rights and laws

KU14. different types of digital devices and the procedure to operate them safely and securely

KU15. how to create and operate an e- mail account and use applications such as word processors, spreadsheets etc.

KU16. how to identify business opportunities

KU17. types and needs of customers

KU18. how to apply for a job and prepare for an interview

KU19. apprenticeship scheme and the process of registering on apprenticeship portal

Generic Skills (GS)

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

GS1. read and write different types of documents/instructions/correspondence

GS2. communicate effectively using appropriate language in formal and informal settings

GS3. behave politely and appropriately with all
GS4. how to work in a virtual mode
GS5. perform calculations efficiently
GS6. solve problems effectively
GS7. pay attention to details
GS8. manage time efficiently
GS9. maintain hygiene and sanitization to avoid infection

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Introduction to Employability Skills	**1**	**1**	**-**	**-**
PC1. identify employability skills required for jobs in various industries	-	-	-	-
PC2. identify and explore learning and employability portals	-	-	-	-
Constitutional values – Citizenship	**1**	**1**	**-**	**-**
PC3. recognize the significance of constitutional values, including civic rights and duties, citizenship, responsibility towards society etc. and personal values and ethics such as honesty, integrity, caring and respecting others, etc.	-	-	-	-
PC4. follow environmentally sustainable practices	-	-	-	-
Becoming a Professional in the 21st Century	**2**	**4**	**-**	**-**
PC5. recognize the significance of 21st Century Skills for employment	-	-	-	-
PC6. practice the 21st Century Skills such as Self-Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn for continuous learning etc. in personal and professional life	-	-	-	-
Basic English Skills	**2**	**3**	**-**	**-**
PC7. use basic English for everyday conversation in different contexts, in person and over the telephone	-	-	-	-
PC8. read and understand routine information, notes, instructions, mails, letters etc. written in English	-	-	-	-
PC9. write short messages, notes, letters, e-mails etc. in English	-	-	-	-
Career Development & Goal Setting	**1**	**2**	**-**	**-**

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. understand the difference between job and career	-	-	-	-
PC11. prepare a career development plan with short- and long-term goals, based on aptitude	-	-	-	-
Communication Skills	**2**	**2**	**-**	**-**
PC12. follow verbal and non-verbal communication etiquette and active listening techniques in various settings	-	-	-	-
PC13. work collaboratively with others in a team	-	-	-	-
Diversity & Inclusion	**1**	**2**	**-**	**-**
PC14. communicate and behave appropriately with all genders and PwD	-	-	-	-
PC15. escalate any issues related to sexual harassment at workplace according to POSH Act	-	-	-	-
Financial and Legal Literacy	**2**	**3**	**-**	**-**
PC16. select financial institutions, products and services as per requirement	-	-	-	-
PC17. carry out offline and online financial transactions, safely and securely	-	-	-	-
PC18. identify common components of salary and compute income, expenses, taxes, investments etc	-	-	-	-
PC19. identify relevant rights and laws and use legal aids to fight against legal exploitation	-	-	-	-
Essential Digital Skills	**3**	**4**	**-**	**-**
PC20. operate digital devices and carry out basic internet operations securely and safely	-	-	-	-
PC21. use e- mail and social media platforms and virtual collaboration tools to work effectively	-	-	-	-
PC22. use basic features of word processor, spreadsheets, and presentations	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Entrepreneurship	**2**	**3**	**-**	**-**
PC23. identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research	-	-	-	-
PC24. develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion	-	-	-	-
PC25. identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity	-	-	-	-
Customer Service	**1**	**2**	**-**	**-**
PC26. identify different types of customers	-	-	-	-
PC27. identify and respond to customer requests and needs in a professional manner.	-	-	-	-
PC28. follow appropriate hygiene and grooming standards	-	-	-	-
Getting ready for apprenticeship & Jobs	**2**	**3**	**-**	**-**
PC29. create a professional Curriculum vitae (Résumé)	-	-	-	-
PC30. search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively	-	-	-	-
PC31. apply to identified job openings using offline /online methods as per requirement	-	-	-	-
PC32. answer questions politely, with clarity and confidence, during recruitment and selection	-	-	-	-
PC33. identify apprenticeship opportunities and register for it as per guidelines and requirements	-	-	-	-
NOS Total	**20**	**30**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	DGT/VSQ/N0102
NOS Name	Employability Skills (60 Hours)
Sector	Cross Sectoral
Sub-Sector	Professional Skills
Occupation	Employability
NSQF Level	4
Credits	2
Version	1.0
Last Reviewed Date	NA
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/N5905.Perform installation of Solar PV System	40	50	-	10	100	35
ELE/N5906.Perform maintenance and repair of Solar PV System	40	50	-	10	100	35
ELE/N1002.Apply health and safety practices at the workplace	35	65	-	-	100	20
DGT/VSQ/N0102.Employability Skills (60 Hours)	20	30	-	-	50	10
Total	**135**	**195**	**-**	**20**	**350**	**100**

Acronyms

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training

Glossary

Sector	Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
Sub-sector	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
Occupation	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
Occupational Standards (OS)	OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the Knowledge and Understanding (KU) they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria (PC)	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
National Occupational Standards (NOS)	NOS are occupational standards which apply uniquely in the Indian context.
Qualifications Pack (QP)	QP comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.
Unit Code	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
Unit Title	Unit title gives a clear overall statement about what the incumbent should be able to do.
Description	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
Scope	Scope is a set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on quality of performance required.

Knowledge and Understanding (KU)	Knowledge and Understanding (KU) are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard.
Organisational Context	Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Technical Knowledge	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Core Skills/ Generic Skills (GS)	Core skills or Generic Skills (GS) are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles.
Electives	Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.
Options	Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.