

Qualification Pack



Automotive Automation Specialist

QP Code: ASC/Q6807

Version: 3.0

NSQF Level: 6

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ASC/Q6807: Automotive Automation Specialist

Brief Job Description

Individual at this job is responsible for identification of automation opportunity, vendor identification and implementation of automation system at shop floor for various automotive manufacturing processes.

Personal Attributes

The person should be organised, team-oriented and have the ability to work independently for long hours in adverse conditions. They should be result-oriented, keen observers and have an eye for detail and quality.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. [ASC/N9810: Manage work and resources \(Manufacturing\)](#)
2. [ASC/N6809: Repair and maintain the process control systems](#)
3. [ASC/N6810: Plan and arrange installation of new systems](#)
4. [ASC/N6811: Select and operate 3D Printing machine for product generation](#)
5. [DGT/VSQ/N0103: Employability Skills \(90 Hours\)](#)

Qualification Pack (QP) Parameters

Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Plant and Equipment Maintenance
Country	India
NSQF Level	6
Credits	20
Aligned to NCO/ISCO/ISIC Code	NCO-2015/7412.0101

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Minimum Educational Qualification & Experience	10th Class + I.T.I (Machinist/Turner) with 4 Years of experience OR Completed 3 year diploma after 10th (Mechanical/Automobile) with 4 Years of experience OR B.E./B.Tech (Mechanical/Automobile) with 1 Year of experience
Minimum Level of Education for Training in School	
Pre-Requisite License or Training	NA
Minimum Job Entry Age	23 Years
Last Reviewed On	27/05/2021
Next Review Date	27/05/2026
NSQC Approval Date	27/05/2021
Version	3.0
Reference code on NQR	QG-06-AU-00689-2023-V1.1-ASDC
NQR Version	1.1

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ASC/N9810: Manage work and resources (Manufacturing)

Description

This NOS unit is about implementing safety, planning work, adopting sustainable practices for optimising the use of resources.

Scope

The scope covers the following :

- Maintain safe and secure working environment
- Maintain Health and Hygiene
- Effective waste management practices
- Material/energy conservation practices

Elements and Performance Criteria

Maintain safe and secure working environment

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

- PC1.** identify hazardous activities and the possible causes of risks or accidents in the workplace
- PC2.** implement safe working practices for dealing with hazards to ensure safety of self and others
- PC3.** conduct regular checks of the machines with support of the maintenance team to identify potential hazards
- PC4.** ensure that all the tools/equipment/fasteners/spare parts are arranged as per specifications/utility into proper trays, cabinets, lockers as mentioned in the 5S guidelines/work instructions
- PC5.** organise safety drills or training sessions to create awareness amongst others on the identified risks and safety practices
- PC6.** fill daily check sheet to report improvements done and risks identified
- PC7.** ensure that relevant safety boards/signs are placed on the shop floor for the safety of self and others
- PC8.** report any identified breaches in health, safety and security policies and procedures to the designated person

Maintain Health and Hygiene

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

- PC9.** ensure workplace, equipment, restrooms etc. are sanitized regularly
- PC10.** ensure team is aware about hygiene and sanitation regulations and following them on the shop floor
- PC11.** ensure availability of running water, hand wash and alcohol-based sanitizers at the workplace
- PC12.** report advanced hygiene and sanitation issues to appropriate authority
- PC13.** follow stress and anxiety management techniques and support employees to cope with stress, anxiety etc
- PC14.** wear and dispose PPEs regularly and appropriately

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Effective waste management practices

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

PC15. ensure recyclable, non-recyclable and hazardous wastes are segregated as per SOP

PC16. ensure proper mechanism is followed while collecting and disposing of non-recyclable, recyclable and reusable waste

Material/energy conservation practices

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

PC17. ensure malfunctioning (fumes/sparks/emission/vibration/noise) and lapse in maintenance of equipment are resolved effectively

PC18. prepare and analyze material and energy audit reports to decipher excessive consumption of material and water

PC19. identify possibilities of using renewable energy and environment friendly fuels

PC20. identify processes where material and energy/electricity utilization can be optimized

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. organisation procedures for health, safety and security, individual role and responsibilities in this context

KU2. the organisation's emergency procedures for different emergency situations and the importance of following the same

KU3. evacuation procedures for workers and visitors

KU4. how and when to report hazards as well as the limits of responsibility for dealing with hazards

KU5. potential hazards, risks and threats based on the nature of work

KU6. various types of fire extinguisher

KU7. various types of safety signs and their meaning

KU8. appropriate first aid treatment relevant to different condition e.g. bleeding, minor burns, eye injuries etc.

KU9. relevant standards, procedures and policies related to 5S followed in the company

KU10. the various materials used and their storage norms

KU11. importance of efficient utilisation of material and water

KU12. basics of electricity and prevalent energy efficient devices

KU13. common practices of conserving electricity

KU14. common sources and ways to minimize pollution

KU15. categorisation of waste into dry, wet, recyclable, non-recyclable and items of single-use plastics

KU16. waste management techniques

KU17. significance of greening

Generic Skills (GS)

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

- GS1.** read safety instructions/guidelines
- GS2.** modify work practices to improve them
- GS3.** work with supervisors/team members to carry out work related tasks
- GS4.** complete tasks efficiently and accurately within stipulated time
- GS5.** inform/report to concerned person in case of any problem
- GS6.** make timely decisions for efficient utilization of resources
- GS7.** write reports such as accident report, in at least English/regional language

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Maintain safe and secure working environment</i>	20	13	-	8
PC1. identify hazardous activities and the possible causes of risks or accidents in the workplace	4	2	-	2
PC2. implement safe working practices for dealing with hazards to ensure safety of self and others	3	1	-	2
PC3. conduct regular checks of the machines with support of the maintenance team to identify potential hazards	2	2	-	1
PC4. ensure that all the tools/equipment/fasteners/spare parts are arranged as per specifications/utility into proper trays, cabinets, lockers as mentioned in the 5S guidelines/work instructions	3	2	-	1
PC5. organise safety drills or training sessions to create awareness amongst others on the identified risks and safety practices	2	-	-	-
PC6. fill daily check sheet to report improvements done and risks identified	2	2	-	-
PC7. ensure that relevant safety boards/signs are placed on the shop floor for the safety of self and others	2	2	-	1
PC8. report any identified breaches in health, safety and security policies and procedures to the designated person	2	2	-	1
<i>Maintain Health and Hygiene</i>	13	7	-	5
PC9. ensure workplace, equipment, restrooms etc. are sanitized regularly	3	2	-	1
PC10. ensure team is aware about hygiene and sanitation regulations and following them on the shop floor	2	1	-	-
PC11. ensure availability of running water, hand wash and alcohol-based sanitizers at the workplace	2	2	-	1

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC12. report advanced hygiene and sanitation issues to appropriate authority	1	1	-	1
PC13. follow stress and anxiety management techniques and support employees to cope with stress, anxiety etc	2	1	-	1
PC14. wear and dispose PPEs regularly and appropriately	3	-	-	1
<i>Effective waste management practices</i>	6	4	-	1
PC15. ensure recyclable, non-recyclable and hazardous wastes are segregated as per SOP	3	2	-	-
PC16. ensure proper mechanism is followed while collecting and disposing of non-recyclable, recyclable and reusable waste	3	2	-	1
<i>Material/energy conservation practices</i>	11	6	-	6
PC17. ensure malfunctioning (fumes/sparks/emission/vibration/noise) and lapse in maintenance of equipment are resolved effectively	2	2	-	1
PC18. prepare and analyze material and energy audit reports to decipher excessive consumption of material and water	3	2	-	1
PC19. identify possibilities of using renewable energy and environment friendly fuels	3	1	-	2
PC20. identify processes where material and energy/electricity utilization can be optimized	3	1	-	2
NOS Total	50	30	-	20

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National Occupational Standards (NOS) Parameters

NOS Code	ASC/N9810
NOS Name	Manage work and resources (Manufacturing)
Sector	Automotive
Sub-Sector	Generic
Occupation	Generic
NSQF Level	5
Credits	TBD
Version	1.0
Last Reviewed Date	30/09/2021
Next Review Date	30/09/2024
NSQF Clearance Date	30/09/2021

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ASC/N6809: Repair and maintain the process control systems

Description

This NOS is about carrying out the repair and maintenance activities of the process control and automation systems.

Scope

The scope covers the following :

- Coordination for inspection of process control and automation systems
- Repair and carry out the breakdown maintenance
- Maintaining documentation

Elements and Performance Criteria

Coordination for inspection of process control and automation systems

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

- PC1.** prepare a Project Management (PM) schedule for Automotive manufacturing process control system
- PC2.** inspect the process control systems as per schedule
- PC3.** inspect the in-process breakdown of systems
- PC4.** ensure that all the systems are integrated through a computer interface & softwares are updated as per standards
- PC5.** check for electrical circuit continuity & joint's connections as per specifications
- PC6.** prepare the monthly plan for inspection of critical process control

Repair and carry out the breakdown maintenance

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

- PC7.** repair the process control and automation systems and replace the spare parts as per the schedule
- PC8.** repair the internal wiring condition, motherboard conditions, software/ hardware malfunctioning, circuit failures etc. and verify the working status
- PC9.** perform the scheduled activities to verify the automotive equipment condition as per the defined sequence
- PC10.** follow the sequence of activities for changing the critical components
- PC11.** use appropriate material handling equipment and tools to carry out the automotive maintenance task
- PC12.** check for software program installations and up gradations
- PC13.** coordinate with the system vendor and arrange for procurement of critical spares
- PC14.** note down the duration for the tasks to improve the scheduling and planning process
- PC15.** coordinate with machine/system/robot vendors and if required, in consultation with sourcing department, procure an AMC for upkeep of the machines/systems/robots etc.

Maintain the documentation

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

- PC16.** maintain record of spares stored in store-house as per standards
- PC17.** maintain a record of all the automotive vendors in the system
- PC18.** maintain the history of the equipment for the PM/breakdown maintenance activities conducted in log book/history sheets/ERP
- PC19.** prepare the documents required for process control and automation as per the Quality Management System (QMS) requirements
- PC20.** ensure all QMS documents are maintained and easily traceable for future requirements

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** company manufacturing processes & the equipment in use
- KU2.** sequence of operations for each process
- KU3.** type of automotive systems being used for the process
- KU4.** electrical-wiring drawings of existing layout/equipment/systems
- KU5.** QMS requirements
- KU6.** trouble shooting/fault finding in pneumatic, hydraulic, electrical control system elements
- KU7.** problem solving techniques – TOPS 8D, 7 QC tools etc.
- KU8.** robotic instruments used during the process

Generic Skills (GS)

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

- GS1.** communicate effectively at the workplace
- GS2.** attentively listen and comprehend the information given by the process managers
- GS3.** write observations and any work related information in English/regional language
- GS4.** recognise a workplace problem and take suitable action
- GS5.** analyse and apply the information gathered from observation, experience, reasoning or communication to act efficiently
- GS6.** complete the assigned tasks in a timely and efficient manner
- GS7.** coordinate with shop floor workers and team for installing the new systems efficiently

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Coordination for inspection of process control and automation systems</i>	14	20	-	10
PC1. prepare a Project Management (PM) schedule for Automotive manufacturing process control system	2	4	-	2
PC2. inspect the process control systems as per schedule	2	4	-	2
PC3. inspect the in-process breakdown of systems	4	-	-	-
PC4. ensure that all the systems are integrated through a computer interface & softwares are updated as per standards	2	4	-	2
PC5. check for electrical circuit continuity & joint's connections as per specifications	2	8	-	4
PC6. prepare the monthly plan for inspection of critical process control	2	-	-	-
<i>Repair and carry out the breakdown maintenance</i>	18	20	-	10
PC7. repair the process control and automation systems and replace the spare parts as per the schedule	1	4	-	2
PC8. repair the internal wiring condition, motherboard conditions, software/ hardware malfunctioning, circuit failures etc. and verify the working status	3	4	-	2
PC9. perform the scheduled activities to verify the automotive equipment condition as per the defined sequence	1	-	-	-
PC10. follow the sequence of activities for changing the critical components	2	2	-	1
PC11. use appropriate material handling equipment and tools to carry out the automotive maintenance task	3	2	-	1
PC12. check for software program installations and up gradations	3	2	-	1

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. coordinate with the system vendor and arrange for procurement of critical spares	3	2	-	1
PC14. note down the duration for the tasks to improve the scheduling and planning process	1	-	-	-
PC15. coordinate with machine/system/robot vendors and if required, in consultation with sourcing department, procure an AMC for upkeep of the machines/systems/robots etc.	1	4	-	2
<i>Maintain the documentation</i>	8	-	-	-
PC16. maintain record of spares stored in store-house as per standards	1	-	-	-
PC17. maintain a record of all the automotive vendors in the system	2	-	-	-
PC18. maintain the history of the equipment for the PM/breakdown maintenance activities conducted in log book/history sheets/ERP	2	-	-	-
PC19. prepare the documents required for process control and automation as per the Quality Management System (QMS) requirements	2	-	-	-
PC20. ensure all QMS documents are maintained and easily traceable for future requirements	1	-	-	-
NOS Total	40	40	-	20

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National Occupational Standards (NOS) Parameters

NOS Code	ASC/N6809
NOS Name	Repair and maintain the process control systems
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Plant and Equipment Maintenance
NSQF Level	6
Credits	TBD
Version	2.0
Last Reviewed Date	27/05/2021
Next Review Date	27/05/2026
NSQF Clearance Date	27/05/2021

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ASC/N6810: Plan and arrange installation of new systems

Description

This NOS is about the planning and installation of the new automotive process control and automation systems

Scope

The scope covers the following :

- Information gathering & planning
- Vendor identification and system trials
- Installation of the new system

Elements and Performance Criteria

Information gathering & planning

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

- PC1.** identify the manufacturing process control requirements as per organization's plans
- PC2.** compute the individual quantity of the automotive systems to be installed, based on the requirements gathered
- PC3.** plan the procurement and installation process as per standardization & modular arrangements

Vendor identification and system trials

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

- PC4.** identify vendor for the procurement of the new system from the company data, share the drawings of the systems along with request for quotes
- PC5.** recognise compatible vendors in case the registered vendors are unable to provide new system requirements.
- PC6.** identify atleast two vendors who fulfill all the automotive product requirements & present them to higher management for selection
- PC7.** conduct trial run of the systems at the vendor's facility
- PC8.** suggest modifications in the new system as per requirements
- PC9.** conduct re-trials with the modified system and present the final report with the management for necessary approvals

Installation of the new system

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

- PC10.** approve generation of the purchase order (P.O.) and procure the system in the organization
- PC11.** inspect the components received from vendor, reject the damaged components and procure the fresh component
- PC12.** ensure the correct installation of the new system at the pre-defined location in consultation with the vendor representative
- PC13.** test run the entire system on completion of the installation and identify the discrepancies, if any

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- PC14.** implement the countermeasure for discrepancies found and re-run the system
- PC15.** interpret the coding & logic, circuit diagrams of the system received from vendor and document it for future references
- PC16.** record and communicate the progress to the higher management and seek their feedback
- PC17.** guide the team in resolving performance issues, based on feedback received
- PC18.** prepare the system handover documents and share them with all the concerned departments

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** sequence of operations for each process
- KU2.** type of systems used in the process
- KU3.** process control and automation systems installed for the processes
- KU4.** eligible vendor database for the process and automation systems
- KU5.** existing layout of the processes
- KU6.** electrical wiring drawings of existing layout/equipment/systems
- KU7.** operation of electrical equipments viz motors etc. being used for the process
- KU8.** Quality Management System (QMS) requirements
- KU9.** protocol & standards for new system installation of the company
- KU10.** PLC, SCADA & electrical elements operation and testing
- KU11.** trouble shooting & fault finding for all the systems

Generic Skills (GS)

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

- GS1.** read the information displayed at the workplace
- GS2.** recognise a workplace problem and take suitable action
- GS3.** analyse and apply the information gathered from observation, experience, reasoning or communication to act efficiently
- GS4.** communicate effectively at the workplace
- GS5.** attentively listen and comprehend the information given by the process managers
- GS6.** write observations and any work related information in English/regional language
- GS7.** complete assigned tasks in a timely and efficient manner

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Information gathering & planning</i>	5	6	-	3
PC1. identify the manufacturing process control requirements as per organization's plans	1	2	-	1
PC2. compute the individual quantity of the automotive systems to be installed, based on the requirements gathered	2	-	-	-
PC3. plan the procurement and installation process as per standardization & modular arrangements	2	4	-	2
<i>Vendor identification and system trials</i>	12	18	-	9
PC4. identify vendor for the procurement of the new system from the company data, share the drawings of the systems along with request for quotes	2	-	-	-
PC5. recognise compatible vendors in case the registered vendors are unable to provide new system requirements.	2	4	-	2
PC6. identify atleast two vendors who fulfill all the automotive product requirements & present them to higher management for selection	2	8	-	4
PC7. conduct trial run of the systems at the vendor's facility	2	4	-	2
PC8. suggest modifications in the new system as per requirements	2	-	-	-
PC9. conduct re-trials with the modified system and present the final report with the management for necessary approvals	2	2	-	1
<i>Installation of the new system</i>	23	16	-	8
PC10. approve generation of the purchase order (P.O.) and procure the system in the organization	2	4	-	2

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. inspect the components received from vendor, reject the damaged components and procure the fresh component	2	4	-	2
PC12. ensure the correct installation of the new system at the pre-defined location in consultation with the vendor representative	2	-	-	-
PC13. test run the entire system on completion of the installation and identify the discrepancies, if any	3	4	-	2
PC14. implement the countermeasure for discrepancies found and re-run the system	2	-	-	-
PC15. interpret the coding & logic, circuit diagrams of the system received from vendor and document it for future references	3	4	-	2
PC16. record and communicate the progress to the higher management and seek their feedback	3	-	-	-
PC17. guide the team in resolving performance issues, based on feedback received	3	-	-	-
PC18. prepare the system handover documents and share them with all the concerned departments	3	-	-	-
NOS Total	40	40	-	20

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National Occupational Standards (NOS) Parameters

NOS Code	ASC/N6810
NOS Name	Plan and arrange installation of new systems
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Plant and Equipment Maintenance
NSQF Level	6
Credits	TBD
Version	2.0
Last Reviewed Date	27/05/2021
Next Review Date	27/05/2026
NSQC Clearance Date	27/05/2021

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ASC/N6811: Select and operate 3D Printing machine for product generation

Description

This NOS describes the process of selecting the 3D printing machine for product generation and performing the postprocessing of the fabricated product.

Scope

The scope covers the following :

- Select 3D Printing machine
- Select and upload code files into system memory
- Pre-processing settings of the machine
- Operate and perform post-printing operations
- Inspection & storage of parts

Elements and Performance Criteria

Select 3D Printing machine

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

- PC1.** identify the 3D Printing technology such as Fused Deposition Modelling, StereoLithography etc.
- PC2.** identify and select the raw material to print the automotive components as per product specifications
- PC3.** determine the part orientation and support structure requirement from Computer Aided Design (CAD) data
- PC4.** determine the machine specifications such as build speed, extrusion speed, nozzle temperature required as per process application
- PC5.** determine the parameters such as room temperature range, air cleanliness for operating the machine
- PC6.** select the suitable 3D printing machine as per defined parameters

Select and upload code files into system memory

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

- PC7.** select the standard tessellation language (.stl) code file needed for machine operation
- PC8.** delete unwanted code files & upload new code files into the machine memory
- PC9.** select any pre-stored program from machine memory
- PC10.** connect the data storage devices with the machine
- PC11.** check the number of automotive parts to be manufactured for each design file
- PC12.** coordinate with designer to rectify any errors which are generated in the file uploading process or error observed during the running of process

Pre-processing settings of machine

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

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- PC13.** perform daily check of machine's critical components
- PC14.** perform the pre-setting of 3D printing machine before the start of operation
- PC15.** prepare the machine for operation by cleaning it as per the recommended process
- PC16.** calculate the volume of material needed to generate the part as per the code provided
- PC17.** load adequate consumable material into the machine for non-stop working of the machine
- PC18.** pre-heat the bed of the machine to adequate temperature as per process specifications
- PC19.** set the laser or nozzles temperature to defined values as per process specification

Operate and perform post-printing operations

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

- PC20.** operate the machine, identify and rectify process errors if any
- PC21.** use emergency stop button in case of any unwanted situation
- PC22.** remove the part from machine without damaging its structure.
- PC23.** identify & carefully remove the support structures present in the fabricated part
- PC24.** clean the part for improving the surface finish

Inspection & storage of parts produced

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

- PC25.** inspect the part as per the drawing/process and if non-conforming, take action for rework or rejection
- PC26.** store & preserve the automotive parts manufactured

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** relevant manufacturing standards and procedures followed in the company
- KU2.** organization methodology/procedures used for automotive product design
- KU3.** all the symbols and notifications being displayed by the 3D Printing machine and their corresponding meaning
- KU4.** functionality of different buttons and switches available on the machine dashboard
- KU5.** how to upload and remove code files from the machine memory
- KU6.** preservation of critical electronic parts/equipments from moisture/heat/environmental external conditions as specified in the process
- KU7.** how to maintain the log book for produced parts
- KU8.** error detection and rectification at various stages of part generation
- KU9.** types of 3D Printing techniques
- KU10.** recommended process for cleaning machine
- KU11.** post-processing techniques
- KU12.** types of materials available for fabrication in various 3D printing technique
- KU13.** various inspection methods for inspecting the quality of product
- KU14.** optimum temperature range, air cleanliness and humidity required for the machine
- KU15.** types of files such as .stl, code file, etc generated in the various steps of the process

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KU16. techniques of fabricating a component with 3D Printing

Generic Skills (GS)

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

- GS1.** read equipment manuals and process documents
- GS2.** attentively listen and comprehend the information given by the process managers
- GS3.** communicate effectively at the workplace
- GS4.** write observations and any work related information in English/regional language
- GS5.** recognise a workplace problem and take suitable action
- GS6.** analyse and apply the information gathered from observation, experience, reasoning or communication to act efficiently
- GS7.** complete assigned tasks in a timely and efficient manner

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Select 3D Printing machine</i>	6	2	-	2
PC1. identify the 3D Printing technology such as Fused Deposition Modelling, StereoLithography etc.	1	1	-	1
PC2. identify and select the raw material to print the automotive components as per product specifications	1	1	-	1
PC3. determine the part orientation and support structure requirement from Computer Aided Design (CAD) data	1	-	-	-
PC4. determine the machine specifications such as build speed, extrusion speed, nozzle temperature required as per process application	1	-	-	-
PC5. determine the parameters such as room temperature range, air cleanliness for operating the machine	1	-	-	-
PC6. select the suitable 3D printing machine as per defined parameters	1	-	-	-
<i>Select and upload code files into system memory</i>	6	11	-	4
PC7. select the standard tessellation language (.stl) code file needed for machine operation	1	2	-	1
PC8. delete unwanted code files & upload new code files into the machine memory	1	3	-	1
PC9. select any pre-stored program from machine memory	1	2	-	1
PC10. connect the data storage devices with the machine	1	2	-	-
PC11. check the number of automotive parts to be manufactured for each design file	2	-	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC12. coordinate with designer to rectify any errors which are generated in the file uploading process or error observed during the running of process	-	2	-	1
<i>Pre-processing settings of machine</i>	16	14	-	7
PC13. perform daily check of machine's critical components	-	2	-	-
PC14. perform the pre-setting of 3D printing machine before the start of operation	2	2	-	1
PC15. prepare the machine for operation by cleaning it as per the recommended process	2	2	-	1
PC16. calculate the volume of material needed to generate the part as per the code provided	8	-	-	2
PC17. load adequate consumable material into the machine for non-stop working of the machine	2	4	-	1
PC18. pre-heat the bed of the machine to adequate temperature as per process specifications	2	2	-	1
PC19. set the laser or nozzles temperature to defined values as per process specification	-	2	-	1
<i>Operate and perform post-printing operations</i>	8	11	-	4
PC20. operate the machine, identify and rectify process errors if any	-	2	-	1
PC21. use emergency stop button in case of any unwanted situation	-	2	-	1
PC22. remove the part from machine without damaging its structure.	4	3	-	1
PC23. identify & carefully remove the support structures present in the fabricated part	2	2	-	-
PC24. clean the part for improving the surface finish	2	2	-	1
<i>Inspection & storage of parts produced</i>	4	2	-	3

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC25. inspect the part as per the drawing/process and if non-conforming, take action for rework or rejection	2	1	-	2
PC26. store & preserve the automotive parts manufactured	2	1	-	1
NOS Total	40	40	-	20

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N6811
NOS Name	Select and operate 3D Printing machine for product generation
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Plant and Equipment Maintenance
NSQF Level	6
Credits	TBD
Version	1.0
Last Reviewed Date	30/09/2021
Next Review Date	30/09/2024
NSQC Clearance Date	30/09/2021

Qualification Pack

DGT/VSQ/N0103: Employability Skills (90 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.** understand the significance of employability skills in meeting the current job market requirement and future of work
- PC2.** identify and explore learning and employability relevant portals
- PC3.** research about the different industries, job market trends, latest skills required and the available opportunities

Constitutional values - Citizenship

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

- PC4.** 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.
- PC5.** follow environmentally sustainable practices

Becoming a Professional in the 21st Century

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

- PC6.** recognize the significance of 21st Century Skills for employment

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- PC7.** 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
- PC8.** adopt a continuous learning mindset for personal and professional development

Basic English Skills

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

- PC9.** use basic English for everyday conversation in different contexts, in person and over the telephone
- PC10.** read and understand routine information, notes, instructions, mails, letters etc. written in English
- PC11.** 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:

- PC12.** identify career goals based on the skills, interests, knowledge, and personal attributes
- PC13.** prepare a career development plan with short- and long-term goals

Communication Skills

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

- PC14.** follow verbal and non-verbal communication etiquette while communicating in professional and public settings
- PC15.** use active listening techniques for effective communication
- PC16.** communicate in writing using appropriate style and format based on formal or informal requirements
- PC17.** work collaboratively with others in a team

Diversity & Inclusion

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

- PC18.** communicate and behave appropriately with all genders and PwD
- PC19.** 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:

- PC20.** identify and select reliable institutions for various financial products and services such as bank account, debit and credit cards, loans, insurance etc.
- PC21.** carry out offline and online financial transactions, safely and securely, using various methods and check the entries in the passbook
- PC22.** identify common components of salary and compute income, expenses, taxes, investments etc
- PC23.** 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:

- PC24.** operate digital devices and use their features and applications securely and safely
- PC25.** carry out basic internet operations by connecting to the internet safely and securely, using the mobile data or other available networks through Bluetooth, Wi-Fi, etc.
- PC26.** display responsible online behaviour while using various social media platforms

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- PC27.** create a personal email account, send and process received messages as per requirement
- PC28.** carry out basic procedures in documents, spreadsheets and presentations using respective and appropriate applications
- PC29.** utilize virtual collaboration tools to work effectively

Entrepreneurship

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

- PC30.** identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research
- PC31.** develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion
- PC32.** 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:

- PC33.** identify different types of customers and ways to communicate with them
- PC34.** identify and respond to customer requests and needs in a professional manner
- PC35.** use appropriate tools to collect customer feedback
- PC36.** follow appropriate hygiene and grooming standards

Getting ready for apprenticeship & Jobs

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

- PC37.** create a professional Curriculum vitae (Résumé)
- PC38.** search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively
- PC39.** apply to identified job openings using offline /online methods as per requirement
- PC40.** answer questions politely, with clarity and confidence, during recruitment and selection
- PC41.** 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

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- KU11.** components of salary and 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
- KU16.** use applications such as word processors, spreadsheets etc.
- KU17.** how to identify business opportunities
- KU18.** types and needs of customers
- KU19.** how to apply for a job and prepare for an interview
- KU20.** 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 in English and other languages
- GS2.** communicate effectively using appropriate language in formal and informal settings
- GS3.** behave politely and appropriately with all to maintain effective work relationship
- GS4.** how to work in a virtual mode, using various technological platforms
- 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. understand the significance of employability skills in meeting the current job market requirement and future of work	-	-	-	-
PC2. identify and explore learning and employability relevant portals	-	-	-	-
PC3. research about the different industries, job market trends, latest skills required and the available opportunities	-	-	-	-
<i>Constitutional values - Citizenship</i>	1	1	-	-
PC4. 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.	-	-	-	-
PC5. follow environmentally sustainable practices	-	-	-	-
<i>Becoming a Professional in the 21st Century</i>	1	3	-	-
PC6. recognize the significance of 21st Century Skills for employment	-	-	-	-
PC7. 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	-	-	-	-
PC8. adopt a continuous learning mindset for personal and professional development	-	-	-	-
<i>Basic English Skills</i>	3	4	-	-
PC9. use basic English for everyday conversation in different contexts, in person and over the telephone	-	-	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. read and understand routine information, notes, instructions, mails, letters etc. written in English	-	-	-	-
PC11. write short messages, notes, letters, e-mails etc. in English	-	-	-	-
<i>Career Development & Goal Setting</i>	1	2	-	-
PC12. identify career goals based on the skills, interests, knowledge, and personal attributes	-	-	-	-
PC13. prepare a career development plan with short- and long-term goals	-	-	-	-
<i>Communication Skills</i>	2	2	-	-
PC14. follow verbal and non-verbal communication etiquette while communicating in professional and public settings	-	-	-	-
PC15. use active listening techniques for effective communication	-	-	-	-
PC16. communicate in writing using appropriate style and format based on formal or informal requirements	-	-	-	-
PC17. work collaboratively with others in a team	-	-	-	-
<i>Diversity & Inclusion</i>	1	1	-	-
PC18. communicate and behave appropriately with all genders and PwD	-	-	-	-
PC19. escalate any issues related to sexual harassment at workplace according to POSH Act	-	-	-	-
<i>Financial and Legal Literacy</i>	2	3	-	-
PC20. identify and select reliable institutions for various financial products and services such as bank account, debit and credit cards, loans, insurance etc.	-	-	-	-
PC21. carry out offline and online financial transactions, safely and securely, using various methods and check the entries in the passbook	-	-	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC22. identify common components of salary and compute income, expenses, taxes, investments etc	-	-	-	-
PC23. identify relevant rights and laws and use legal aids to fight against legal exploitation	-	-	-	-
<i>Essential Digital Skills</i>	3	5	-	-
PC24. operate digital devices and use their features and applications securely and safely	-	-	-	-
PC25. carry out basic internet operations by connecting to the internet safely and securely, using the mobile data or other available networks through Bluetooth, Wi-Fi, etc.	-	-	-	-
PC26. display responsible online behaviour while using various social media platforms	-	-	-	-
PC27. create a personal email account, send and process received messages as per requirement	-	-	-	-
PC28. carry out basic procedures in documents, spreadsheets and presentations using respective and appropriate applications	-	-	-	-
PC29. utilize virtual collaboration tools to work effectively	-	-	-	-
<i>Entrepreneurship</i>	2	3	-	-
PC30. identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research	-	-	-	-
PC31. develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion	-	-	-	-
PC32. identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity	-	-	-	-
<i>Customer Service</i>	1	2	-	-
PC33. identify different types of customers and ways to communicate with them	-	-	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC34. identify and respond to customer requests and needs in a professional manner	-	-	-	-
PC35. use appropriate tools to collect customer feedback	-	-	-	-
PC36. follow appropriate hygiene and grooming standards	-	-	-	-
<i>Getting ready for apprenticeship & Jobs</i>	2	3	-	-
PC37. create a professional Curriculum vitae (Résumé)	-	-	-	-
PC38. search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively	-	-	-	-
PC39. apply to identified job openings using offline /online methods as per requirement	-	-	-	-
PC40. answer questions politely, with clarity and confidence, during recruitment and selection	-	-	-	-
PC41. 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/N0103
NOS Name	Employability Skills (90 Hours)
Sector	Cross Sectoral
Sub-Sector	Professional Skills
Occupation	Employability
NSQF Level	5
Credits	3
Version	1.0
Last Reviewed Date	31/08/2021
Next Review Date	31/08/2024
NSQC Clearance Date	31/08/2021

Assessment Guidelines and Assessment Weightage

Assessment Guidelines

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) (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 PC.
2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training centre (as per assessment criteria below).
4. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/ training centre based on these criteria.
5. In case of successfully passing only certain number of NOSs, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack.
6. In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack

Minimum Aggregate Passing % at QP Level : 70

Qualification Pack

(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
ASC/N9810.Manage work and resources (Manufacturing)	50	30	-	20	100	15
ASC/N6809.Repair and maintain the process control systems	40	40	-	20	100	20
ASC/N6810.Plan and arrange installation of new systems	40	40	-	20	100	25
ASC/N6811.Select and operate 3D Printing machine for product generation	40	40	-	20	100	30
DGT/VSQ/N0103.Employability Skills (90 Hours)	20	30	-	-	50	10
Total	190	180	-	80	450	100

Qualification Pack

Acronyms

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training
AMC	Annual Maintenance Contract
PPE	Personal Protective Equipment
ERP	Enterprise Resource Planning
PM	Predictive Maintenance
QMS	Quality Management System
PLC	Programmable Logic Controller
SCADA	Supervisory Control And Data Acquisition
TOPS	Team Oriented Problem Solving
HMI	Human Machine Interfaces
PLC	Programmable Logic Controller
SCADA	Supervisory Control And Data Acquisition
VFD	Variable Frequency Drive
HMI	Human Machine Interfaces
RFID	Radio Frequency Identification
QMS	Quality Management System
CFT	Complement Fixation Test

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.