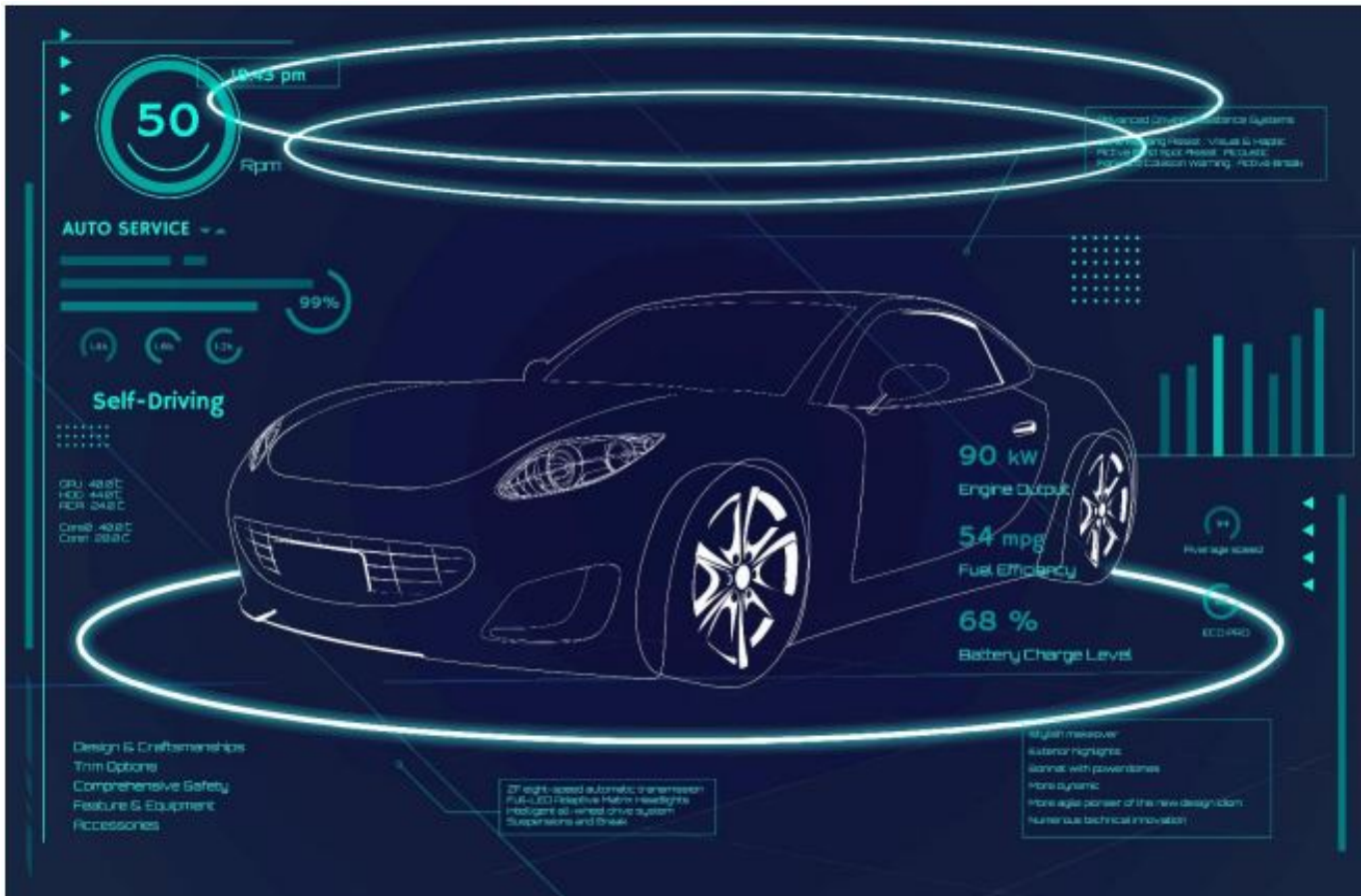


Qualification Pack



Automotive Open System (AUTOSAR) Engineer

QP Code: ASC/Q8309

Version: 1.0

NSQF Level: 6

Automotive Skills Development Council || 153, GF, Okhla Industrial Area, Phase 3
New Delhi 110020 || email:ayushi@asdc.org.in

Qualification Pack

Contents

ASC/Q8309: Automotive Open System (AUTOSAR) Engineer	3
<i>Brief Job Description</i>	3
Applicable National Occupational Standards (NOS)	3
<i>Compulsory NOS</i>	3
<i>Qualification Pack (QP) Parameters</i>	3
ASC/N9810: Manage work and resources (Manufacturing)	5
DGT/VSQ/N0103: Employability Skills (90 Hours)	11
ASC/N8346: Develop AUTOSAR Architecture	20
ASC/N8347: Configure and execute AUTOSAR project	25
Assessment Guidelines and Weightage	30
<i>Assessment Guidelines</i>	30
<i>Assessment Weightage</i>	31
Acronyms	32
Glossary	33

Qualification Pack

ASC/Q8309: Automotive Open System (AUTOSAR) Engineer

Brief Job Description

The individual in this job roles performs planning, creation and integration of internal and exterior software and its components. The individual creates software configuration and also monitor its consistency for different variants of system. He/she coordinate with the responsible person of the software subsystems and the software project manager with regards to software integration and testing, debugging and analyzing integration problems

Personal Attributes

The person should be result oriented with good technical and analytical skills, should have Excellent Interpersonal Skills, communication and presentation skills and a good team player. They should have ability to manage projects, prioritizing of work and mentoring the budding engineers

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. [ASC/N9810: Manage work and resources \(Manufacturing\)](#)
2. [DGT/VSQ/N0103: Employability Skills \(90 Hours\)](#)
3. [ASC/N8346: Develop AUTOSAR Architecture](#)
4. [ASC/N8347: Configure and execute AUTOSAR project](#)

Qualification Pack (QP) Parameters

Sector	Automotive
Sub-Sector	Research & Development
Occupation	Automotive Product Development
Country	India
NSQF Level	6
Credits	21
Aligned to NCO/ISCO/ISIC Code	NCO-2015/7213.0201

Qualification Pack

Minimum Educational Qualification & Experience	Completed 3 year diploma after 10th (Mechanical/Automobile/ Electrical / Electronics/ Computer Science/ IT) with 5 Years of experience in relevant field like Automotive embedded system OR B.E./B.Tech with 1 Year of experience in relevant field OR M.E. OR Certificate-NSQF (Automotive Prototype Manufacturing Lead Technician/ Electric Vehicle Product Design Engineer Level 5) with 3 Years of experience in relevant field
Minimum Level of Education for Training in School	
Pre-Requisite License or Training	Basic of Microcontrollers ,Automobile ECU functionality ,Embedded C Course
Minimum Job Entry Age	22 Years
Last Reviewed On	NA
Next Review Date	17/11/2025
NSQC Approval Date	17/11/2022
Version	1.0
Reference code on NQR	2022/AUT/ASDC/06447
NQR Version	1.0

Qualification Pack

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

Qualification Pack

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)

Qualification Pack

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

Qualification Pack

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

Qualification Pack

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

Qualification Pack

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
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

Qualification Pack

- 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

Qualification Pack

- 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

Qualification Pack

- 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

Qualification Pack

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	-	-	-	-

Qualification Pack

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	-	-	-	-

Qualification Pack

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	-	-	-	-

Qualification Pack

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	31/01/2024
Next Review Date	31/01/2027
NSQC Clearance Date	31/01/2024

Qualification Pack

ASC/N8346: Develop AUTOSAR Architecture

Description

This NOS unit is about building design and specifications of AUTOSAR architecture and its components i.e. Virtual Functional Bus, ports and interfaces, runtime environment, operating system, abstraction layer and service layer etc. as per the AUTOSAR standards.

Scope

The scope covers the following :

- Prepare for building AUTOSAR architecture
- Build AUTOSAR architecture

Elements and Performance Criteria

Prepare for building AUTOSAR architecture

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

- PC1.** obtain AUTOSAR project develop requirements from the organization/OEM
- PC2.** interpret technical specification document and AUTOSAR standards to identify vehicle ECU input-output, Virtual functional bus (VFB), Runtime Environment (RTE), ECU Layered Software Architecture, Microcontroller Abstraction Layer etc. requirements
- PC3.** identify and select appropriate AUTOSAR development tools, coding language, development platform, OS etc. as per the project requirements

Build AUTOSAR architecture

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

- PC4.** identify vehicle ECU's functional domains (Body Control, Security systems, Power train) for building the AUTOSAR architecture on the basis of requirement
- PC5.** interpret ECU architecture and extract SW-C (standard description format) product specifications from vehicle specifications
- PC6.** interpret and develop code for Virtual functional bus (VFB) as per the requirement
- PC7.** build code and configure Runtime Environment (RTE) for the project
- PC8.** build code and configure software, its components and their oriented design
- PC9.** configure ports and interfaces, Sender-Receiver communication and Client-Server communication as per the requirement
- PC10.** validate codes of all the components of architecture to ensure required output
- PC11.** analyse and validate components communication behavior
- PC12.** write code to develop and configure ECU Layered Software Architecture, Microcontroller Abstraction Layer and service layer as per the requirement
- PC13.** develop complex drivers for running the system

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

Qualification Pack

- KU1.** need of AUTOSAR
- KU2.** history of AUTOSAR and evolutions brought in AUTOSAR
- KU3.** objectives, principles and vision behind AUTOSAR
- KU4.** motivation for AUTOSAR development
- KU5.** AUTOSAR organization structure
- KU6.** type of partners and list of partner companies in AUTOSAR consortium
- KU7.** different standard description formats used in AUTOSAR
- KU8.** different protocols used for ECU s communication in Automobile. E.g., CAN, Flexray
- KU9.** AUTOSAR system constraints and ECU descriptions
- KU10.** AUTOSAR Tools- implementation, BSW configurator, RTE generator, system tooling
- KU11.** separation between application and infrastructure
- KU12.** atomic software component
- KU13.** shipment of software component
- KU14.** source code component implementation
- KU15.** API, Client Server relationship and Sender Receiver relationship
- KU16.** communication and application attributes required
- KU17.** various sensor and actuator components
- KU18.** various non-standardized drivers

Generic Skills (GS)

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

- GS1.** read 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

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Prepare for building AUTOSAR architecture</i>	3	15	5	2
PC1. obtain AUTOSAR project develop requirements from the organization/OEM	1	5	1	-
PC2. interpret technical specification document and AUTOSAR standards to identify vehicle ECU input-output, Virtual functional bus (VFB), Runtime Environment (RTE), ECU Layered Software Architecture, Microcontroller Abstraction Layer etc. requirements	1	5	2	1
PC3. identify and select appropriate AUTOSAR development tools, coding language, development platform, OS etc. as per the project requirements	1	5	2	1
<i>Build AUTOSAR architecture</i>	17	35	15	8
PC4. identify vehicle ECU's functional domains (Body Control, Security systems, Power train) for building the AUTOSAR architecture on the basis of requirement	2	3	2	-
PC5. interpret ECU architecture and extract SW-C (standard description format) product specifications from vehicle specifications	2	3	2	1
PC6. interpret and develop code for Virtual functional bus (VFB) as per the requirement	2	4	2	1
PC7. build code and configure Runtime Environment (RTE) for the project	1	3	2	1
PC8. build code and configure software, its components and their oriented design	2	3	-	1
PC9. configure ports and interfaces, Sender-Receiver communication and Client-Server communication as per the requirement	2	4	2	1
PC10. validate codes of all the components of architecture to ensure required output	1	4	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. analyse and validate components communication behavior	1	3	2	1
PC12. write code to develop and configure ECU Layered Software Architecture, Microcontroller Abstraction Layer and service layer as per the requirement	2	4	2	1
PC13. develop complex drivers for running the system	2	4	1	1
NOS Total	20	50	20	10

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N8346
NOS Name	Develop AUTOSAR Architecture
Sector	Automotive
Sub-Sector	Research & Development
Occupation	Automotive Product Development
NSQF Level	6
Credits	8
Version	1.0
Last Reviewed Date	17/11/2022
Next Review Date	17/11/2025
NSQF Clearance Date	17/11/2022

Qualification Pack

ASC/N8347: Configure and execute AUTOSAR project

Description

This NOS unit is about design, software processes, interfacing with RTE, events, Report attributes and RPort attributes. It also describes runnable and communication, activation of runnable, resource consumption etc.

Scope

The scope covers the following :

- Develop system work flow
- Configure and build executable system

Elements and Performance Criteria

Develop system work flow

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

- PC1.** design steps to go from system level configuration to generation of ECU executable
- PC2.** select system configuration input and customize it as per the requirement
- PC3.** identify and distinguish system constraints
- PC4.** configure ECU extract of system configuration
- PC5.** define detailed scheduling information or the configuration data of the system

Configure and build executable system

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

- PC6.** configure component aspect that supports proper configuration of RTE and the BSW
- PC7.** configure component aspect that describes the communication properties of software component
- PC8.** configure and execute component aspect that serves as a basis for the description of detailed resource
- PC9.** configure component aspect that provides more detailed description of the timing behavior of atomic software component
- PC10.** define and execute RTE events
- PC11.** design and investigate response to events
- PC12.** define and configure communication attributes, RPort attributes, PPort attributes and connector attributes
- PC13.** design and execute time driven activation of runnables
- PC14.** interpret resource consumption for the project

Execute and validate project

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

- PC15.** use appropriate BSW configurator, RTE generator, system tooling etc. to connect all the AUTOSAR architecture components and execute them for demonstration
- PC16.** set up environment and develop use cases for simulation and testing

Qualification Pack

- PC17.** plan to use proper testing methodologies to check the system functioning as per specifications
- PC18.** test the performance of the system against product specifications and regulatory requirements
- PC19.** review codes and UTCs to identify errors, if any
- PC20.** check inputs to identify design corrections
- PC21.** correct the code and submit the corrected code to the concerned person for approval

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** AUTOSAR format for formal description via information exchange format
- KU2.** software components template, ECU resources, System constraints
- KU3.** AUTOSAR system configuration tool
- KU4.** system configuration matrix
- KU5.** runnable entities
- KU6.** states of an Atomic software component in each runnable
- KU7.** AUTOSAR services
- KU8.** Pre-emption, Reentrancy and library functions
- KU9.** tree of ComSpec classes
- KU10.** attributes specific to distribution of data
- KU11.** communication attributes for server port
- KU12.** interaction pattern for application of the sender receiver paradigm
- KU13.** internal behavior of runnable
- KU14.** data set points of runnable entity
- KU15.** invoking an operation
- KU16.** planning of scheduling strategy
- KU17.** basic handling of BSW implementation tools, MCAL implementation tools, BSW configurator tools, RTE generator tools and system tools
- KU18.** type of licenses and their respective usage scenario
- KU19.** different hardware used as ECU
- KU20.** sample projects and its repository

Generic Skills (GS)

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

- GS1.** read 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

Qualification Pack

- 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

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Develop system work flow</i>	5	15	5	2
PC1. design steps to go from system level configuration to generation of ECU executable	1	3	1	-
PC2. select system configuration input and customize it as per the requirement	1	3	1	1
PC3. identify and distinguish system constraints	1	3	1	1
PC4. configure ECU extract of system configuration	1	3	1	-
PC5. define detailed scheduling information or the configuration data of the system	1	3	1	-
<i>Configure and build executable system</i>	10	20	10	5
PC6. configure component aspect that supports proper configuration of RTE and the BSW	1	2	2	-
PC7. configure component aspect that describes the communication properties of software component	2	2	1	-
PC8. configure and execute component aspect that serves as a basis for the description of detailed resource	1	2	1	1
PC9. configure component aspect that provides more detailed description of the timing behavior of atomic software component	1	3	1	1
PC10. define and execute RTE events	1	2	1	-
PC11. design and investigate response to events	1	2	1	1
PC12. define and configure communication attributes, RPort attributes, PPort attributes and connector attributes	1	2	1	1
PC13. design and execute time driven activation of runnables	1	3	1	-
PC14. interpret resource consumption for the project	1	2	1	1

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Execute and validate project</i>	5	15	5	3
PC15. use appropriate BSW configurator, RTE generator, system tooling etc. to connect all the AUTOSAR architecture components and execute them for demonstration	1	3	1	1
PC16. set up environment and develop use cases for simulation and testing	1	2	1	-
PC17. plan to use proper testing methodologies to check the system functioning as per specifications	1	2	1	-
PC18. test the performance of the system against product specifications and regulatory requirements	-	2	-	1
PC19. review codes and UTCs to identify errors, if any	1	2	-	-
PC20. check inputs to identify design corrections	-	2	1	1
PC21. correct the code and submit the corrected code to the concerned person for approval	1	2	1	-
NOS Total	20	50	20	10

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N8347
NOS Name	Configure and execute AUTOSAR project
Sector	Automotive
Sub-Sector	Research & Development
Occupation	Automotive Product Development
NSQF Level	6
Credits	8
Version	1.0
Last Reviewed Date	17/11/2022
Next Review Date	17/11/2025
NSQC Clearance Date	17/11/2022

Assessment Guidelines and Assessment Weightage

Assessment Guidelines

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each 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 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
DGT/VSQ/N0103.Employability Skills (90 Hours)	20	30	-	-	50	10
ASC/N8346.Develop AUTOSAR Architecture	20	50	20	10	100	35
ASC/N8347.Configure and execute AUTOSAR project	20	50	20	10	100	40
Total	110	160	40	40	350	100

Qualification Pack

Acronyms

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

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.

Qualification Pack

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.