



Automotive Electric Vehicle BSS (Battery Swapping System) Planning Engineer

QP Code: ASC/Q8314

Version: 1.0

NSQF Level: 5.5

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

Contents

ASC/Q8314: Automotive Electric Vehicle BSS (Battery Swapping System) Planning 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/N8333: Develop prominent options of BSS architecture, infrastructure and solutions	20
ASC/N8334: Assist manager & project teams to execute implementation of BSS	25
ASC/N8345: Review the types of BSS & targeted set of EV	29
Assessment Guidelines and Weightage	33
<i>Assessment Guidelines</i>	33
<i>Assessment Weightage</i>	33
Acronyms	35
Glossary	36

ASC/Q8314: Automotive Electric Vehicle BSS (Battery Swapping System) Planning Engineer

Brief Job Description

Individual at this job should plan, evaluate & identify several solutions in the design and architecture of BSS system & its setup for Electric Vehicles Battery Swapping solutions (BSS) as per the safety norms prescribed by the IEC Standards. BSS planning engineer supports manager and core team in planning and implementation of technical solutions based on the demand-supply analysis performed.

Personal Attributes

He/she must have the ability to plan, analyse and assess the solutions co-work with stakeholders, have clarity and clear understanding of safety, recycle and reuse standards and latest government Policies and regulations, work in a team, good communication skills, tech-savvy individual as well

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/N8333: Develop prominent options of BSS architecture, infrastructure and solutions](#)
4. [ASC/N8334: Assist manager & project teams to execute implementation of BSS](#)
5. [ASC/N8345: Review the types of BSS & targeted set of EV](#)

Qualification Pack (QP) Parameters

Sector	Automotive
Sub-Sector	Research & Development
Occupation	Automotive Product Development
Country	India
NSQF Level	5.5
Credits	21
Aligned to NCO/ISCO/ISIC Code	NCO-2015/8212.0100

Minimum Educational Qualification & Experience	Completed 3 year diploma after 10th (Mechanical/Automobile/ Electrical / Electronics) with 3 Years of experience in relevant field OR B.E. (Pursuing 4th year) OR Certificate-NSQF (Electric Vehicle Product Design Engineer/ Automotive Prototype Manufacturing Lead Technician Level 5) with 2 Years of experience in relevant field
Minimum Level of Education for Training in School	
Pre-Requisite License or Training	NA
Minimum Job Entry Age	22 Years
Last Reviewed On	NA
Next Review Date	NA
NSQC Approval Date	
Version	1.0

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

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)

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

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
PC12. report advanced hygiene and sanitation issues to appropriate authority	1	1	-	1

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

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	2
Version	2.0
Last Reviewed Date	31/08/2021
Next Review Date	31/08/2024
NSQ Clearance Date	31/08/2021

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
- 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

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
- 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

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	-	-	-	-

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	-	-	-	-

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	-	-	-	-

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	-	-

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

ASC/N8333: Develop prominent options of BSS architecture, infrastructure and solutions

Description

This NOS unit is about performing task related to define & develop various solutions and types of BSS systems with the solution provider. This is also about selection of most prominent options, components used in the BSS infrastructure including the safety aspects associated with the selection, usage and maintenance of the BSS Infra. based on design requirements.

Scope

The scope covers the following :

- Prepare overall timeline, Budgets for the selected solution
- Review design and plan for Design validation and planning (DVP) requirements
- Publish technical verification / validations results and architectures options

Elements and Performance Criteria

Prepare overall timeline, budgets for the selected solution

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

- PC1.** Analyse & initiate concept for BMS, Hardware & Software configurations
- PC2.** Analyse & initiate concept for BSS and its configurations, parameters, specifications, project scope etc.
- PC3.** Follow government norms for EV, legal requirements, safety requirements as per IEC TS 62840-1:2016
- PC4.** Conduct core team interactions to define budgets and timelines for BSS deployment
- PC5.** Prepare overall project planning with critical milestones like Design Review (DR), Validation plans, Trial run, Pilot and Start of Production (SOP)
- PC6.** Define the resources including the project stakeholders
- PC7.** Define the cost allocated to the project and the timelines for disbursements
- PC8.** Prepare budget tracking documents to be shared at regular intervals with stakeholders
- PC9.** Submit the same for approval to the management

Review design and plan for Design validation and planning (DVP) requirements

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

- PC10.** Complete a thorough comparison of the requirement vs the proposed technical solutions
- PC11.** Review the synthesis and comparison including any earlier experience database
- PC12.** Discuss with R&D teams & perform design Improvements based on the above two steps
- PC13.** Benchmark technical guidelines TGR/TGW for similar BSS
- PC14.** Benchmark safety guidelines follow Government Norms, Legal Requirements, Safety requirements as per IEC TS 62840-1:2016

PC15. Get the design Validation Plan (DVP) from the solution provider considering design requirements, loading conditions, vehicle applications, usage patterns, Governing legal regulations & Safety standards & requirements, recyclability and resume consideration Compliance, EMI/EMC Requirements

PC16. Support testing & planning team to complete testing / validations on technical topics

Publish technical verification / validations results and architectures options

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

PC17. Prepare comparison study with verification & testing results outcomes

PC18. Discuss & prepare most suitable BSS architecture option recommendation considering design parameters, adaption complexity, cost

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. MPP-Microsoft project planning tool

KU2. Basics of Planning including red alerts

KU3. Standard Quality gates and milestones including Critical Path definition

KU4. Deep understanding of BSS types and pros and cons

KU5. Battery types, Cooling, and storage procedures

KU6. Impact of Thermal & external parameters on performance of BSS systems

KU7. Thermal Management of Battery System & its requirements,

KU8. Types of Charging Stations, connector types & protocols

KU9. Government Norms, Legal Requirements, Safety requirements as per IEC TS 62840-1:2016 or similar & international compliance requirements

KU10. Standard testing requirements & testing procedures, DVP for various components & systems

KU11. Limitations of various BSS architectures & its possible resolutions

KU12. Merits and Demerits of the several solutions proposed

Generic Skills (GS)

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

GS1. follow instructions, guidelines, procedures, rules, and service level agreements

GS2. listen effectively and communicate information accurately

GS3. follow rule-based decision-making processes

GS4. make decisions on suitable courses

GS5. plan and organize the work to achieve targets and meet deadlines

GS6. apply problem-solving approaches to different situations

GS7. analyse the business impact and disseminate relevant information to others

GS8. apply balanced judgments to different situations

GS9. check the work is complete and free from errors

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Prepare overall timeline, budgets for the selected solution</i>	19	19	-	9
PC1. Analyse & initiate concept for BMS, Hardware & Software configurations	1	1	-	1
PC2. Analyse & initiate concept for BSS and its configurations, parameters, specifications, project scope etc.	2	2	-	1
PC3. Follow government norms for EV, legal requirements, safety requirements as per IEC TS 62840-1:2016	2	2	-	1
PC4. Conduct core team interactions to define budgets and timelines for BSS deployment	3	3	-	1
PC5. Prepare overall project planning with critical milestones like Design Review (DR), Validation plans, Trial run, Pilot and Start of Production (SOP)	3	3	-	1
PC6. Define the resources including the project stakeholders	2	2	-	1
PC7. Define the cost allocated to the project and the timelines for disbursements	2	2	-	1
PC8. Prepare budget tracking documents to be shared at regular intervals with stakeholders	2	2	-	1
PC9. Submit the same for approval to the management	2	2	-	1
<i>Review design and plan for Design validation and planning (DVP) requirements</i>	17	17	-	9
PC10. Complete a thorough comparison of the requirement vs the proposed technical solutions	2	2	-	1
PC11. Review the synthesis and comparison including any earlier experience database	2	2	-	1
PC12. Discuss with R&D teams & perform design Improvements based on the above two steps	3	3	-	1
PC13. Benchmark technical guidelines TGR/TGW for similar BSS	2	2	-	2

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC14. Benchmark safety guidelines follow Government Norms, Legal Requirements, Safety requirements as per IEC TS 62840-1:2016	2	2	-	1
PC15. Get the design Validation Plan (DVP) from the solution provider considering design requirements, loading conditions, vehicle applications, usage patterns, Governing legal regulations & Safety standards & requirements, recyclability and resume consideration Compliance, EMI/EMC Requirements	4	4	-	2
PC16. Support testing & planning team to complete testing / validations on technical topics	2	2	-	1
<i>Publish technical verification / validations results and architectures options</i>	4	4	-	2
PC17. Prepare comparison study with verification & testing results outcomes	2	2	-	1
PC18. Discuss & prepare most suitable BSS architecture option recommendation considering design parameters, adaption complexity, cost	2	2	-	1
NOS Total	40	40	-	20

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N8333
NOS Name	Develop prominent options of BSS architecture, infrastructure and solutions
Sector	Automotive
Sub-Sector	Research & Development
Occupation	Automotive Product Development
NSQF Level	5.5
Credits	8
Version	1.0
Next Review Date	NA

ASC/N8334: Assist manager & project teams to execute implementation of BSS

Description

This NOS unit is about preparing detail planning for the selected BSS architecture, project plan including major milestones, review mechanism and role of execution team based on the solution selected for deployment. This is also about providing system implementation support to the core team and manager, field issue resolution support.

Scope

The scope covers the following :

- Prepare for implementation of BSS
- Support manager & project teams to execute implementation of BSS

Elements and Performance Criteria

Prepare for implementation of BSS

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

- PC1.** Obtain the approval from the management on the selected proposal
- PC2.** Prepare the complete technical approved design including the type of solution agreed, its timeline and the project resources allotted for deployment both internally as well as from the solution provider
- PC3.** Prepare the deployment plan to be tracked on a regular basis to ensure smooth launch
- PC4.** obtain the released detail design, architecture drawings for deployment from the solution provider
- PC5.** Release and track the proposal agreed by R&D teams including the sign-off document

Support manager & project teams to execute implementation of BSS

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

- PC6.** Participate in design reviews with the team internally & externally
- PC7.** Support the core team for necessary technical clarifications & resolutions from R&D network
- PC8.** Support for deployment & execution / implementation
- PC9.** Participate in the project meetings & receive BSS deployment status and performance feedback
- PC10.** Understand field issues regarding BSS related to various architecture, performance or installation troubles and work with solution provider
- PC11.** Propose & provide necessary technical resolution for the issues during deployment

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** Vehicle application & Market usage patterns
- KU2.** Charging infrastructure being installed and the types of EV coming for charging

- KU3.** Various materials used in BSS and their environmental impacts including Government Policies on recycling/reuse
- KU4.** Battery charging cycles and several solutions used with their merits and de-merits
- KU5.** Types of Batteries used in EV, Loading cycles and its impacts on battery life, Safety requirements for selected battery types
- KU6.** Communicating with internal & external stakeholders
- KU7.** Getting from the solutions provider (External/internal the details of the Design & Drawings for system and various components, Product design management & release
- KU8.** LLC and Book of defects database available with the solutions provider
- KU9.** The updated internal and external regulations for system and its selected designs
- KU10.** Latest technology discussion forums and future technology study
- KU11.** Understanding deployment issues, its relationship with BSS system & its resolutions
- KU12.** Team working & communications
- KU13.** Latest Automotive trends & development strategies

Generic Skills (GS)

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

- GS1.** follow instructions, guidelines, procedures, rules, and service level agreements
- GS2.** listen effectively and communicate information accurately
- GS3.** follow rule-based decision-making processes
- GS4.** make decisions on suitable courses
- GS5.** plan and organize the work to achieve targets and meet deadlines
- GS6.** apply problem-solving approaches to different situations
- GS7.** analyse the business impact and disseminate relevant information to others
- GS8.** apply balanced judgments to different situations
- GS9.** check the work is complete and free from errors

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Prepare for implementation of BSS</i>	19	19	-	9
PC1. Obtain the approval from the management on the selected proposal	3	3	-	1
PC2. Prepare the complete technical approved design including the type of solution agreed, its timeline and the project resources allotted for deployment both internally as well as from the solution provider	5	5	-	2
PC3. Prepare the deployment plan to be tracked on a regular basis to ensure smooth launch	4	4	-	2
PC4. obtain the released detail design, architecture drawings for deployment from the solution provider	4	4	-	2
PC5. Release and track the proposal agreed by R&D teams including the sign-off document	3	3	-	2
<i>Support manager & project teams to execute implementation of BSS</i>	21	21	-	11
PC6. Participate in design reviews with the team internally & externally	4	4	-	2
PC7. Support the core team for necessary technical clarifications & resolutions from R&D network	4	4	-	2
PC8. Support for deployment & execution / implementation	4	4	-	2
PC9. Participate in the project meetings & receive BSS deployment status and performance feedback	4	4	-	2
PC10. Understand field issues regarding BSS related to various architecture, performance or installation troubles and work with solution provider	3	3	-	2
PC11. Propose & provide necessary technical resolution for the issues during deployment	2	2	-	1
NOS Total	40	40	-	20

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N8334
NOS Name	Assist manager & project teams to execute implementation of BSS
Sector	Automotive
Sub-Sector	Research & Development
Occupation	Automotive Product Development
NSQF Level	5.5
Credits	5
Version	1.0
Next Review Date	NA

ASC/N8345: Review the types of BSS & targeted set of EV

Description

This NOS unit is about performing tasks related to review the types of BSS & the targeted set of EV for the swapping setup of the electric vehicle & vehicle charging infrastructure, area allotted and the manual or automatic swapping designs being implemented.

Scope

The scope covers the following :

- Assess the requirements
- Assessing the mode of battery swapping to be used

Elements and Performance Criteria

Assess the requirements

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

- PC1.** Evaluate the type of EV that is 2W/3W/4W for information about vehicle design architecture, its components, and operational parameters to be received from the customer/OEM for the BSS infrastructure
- PC2.** Obtain the benchmarking data of previous project and evaluate the targeted applications and market requirements for the current project
- PC3.** Check the types of BSS solution to be deployed to meet the customer requirement
- PC4.** Identify prominent battery architectural and storage issues in the selected BSS options for the current project
- PC5.** Identify required hardware & software for BSS with estimated budgeting
- PC6.** Propose the best suitable solutions to manager for the selection

Assessing the mode of battery swapping to be used

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

- PC7.** Prepare the outline for proposed battery swapping system and cell design packaging
- PC8.** Evaluate proposed battery thermal management system design considering applications and vehicle architecture
- PC9.** Evaluate the time available/targeted for 1 swapping to be done and total number of transactions to be done
- PC10.** Review several market solutions and latest trends for the similar applications and best practices to carefully choose from available best solutions
- PC11.** Benchmark BSS in the market comparing target vehicle
- PC12.** Review the policy guidelines on the safety measurements for similar applications

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** organisation policies, procedures, and guidelines that relate to designing and maintaining networks
- KU2.** market trends of latest technologies, types of EVs, types of EV Batteries
- KU3.** BSS System & EV basics, its components & working principals
- KU4.** range of standard templates and tools available and how to use them
- KU5.** solutions proposed including process layouts, drawings & other technical details
- KU6.** energy consumptions & usage
- KU7.** energy controlling & monitoring systems, its types & limitations
- KU8.** updated internal and external regulations for systems design
- KU9.** impact of organisational processes & products on the environment and human health safety guidelines

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

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Assess the requirements</i>	20	20	-	10
PC1. Evaluate the type of EV that is 2W/3W/4W for information about vehicle design architecture, its components, and operational parameters to be received from the customer/OEM for the BSS infrastructure	4	4	-	3
PC2. Obtain the benchmarking data of previous project and evaluate the targeted applications and market requirements for the current project	3	3	-	2
PC3. Check the types of BSS solution to be deployed to meet the customer requirement	3	3	-	1
PC4. Identify prominent battery architectural and storage issues in the selected BSS options for the current project	4	4	-	1
PC5. Identify required hardware & software for BSS with estimated budgeting	3	3	-	1
PC6. Propose the best suitable solutions to manager for the selection	3	3	-	2
<i>Assessing the mode of battery swapping to be used</i>	20	20	-	10
PC7. Prepare the outline for proposed battery swapping system and cell design packaging	3	3	-	1
PC8. Evaluate proposed battery thermal management system design considering applications and vehicle architecture	4	4	-	2
PC9. Evaluate the time available/targeted for 1 swapping to be done and total number of transactions to be done	4	4	-	2
PC10. Review several market solutions and latest trends for the similar applications and best practices to carefully choose from available best solutions	4	4	-	2
PC11. Benchmark BSS in the market comparing target vehicle	3	3	-	2

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC12. Review the policy guidelines on the safety measurements for similar applications	2	2	-	1
NOS Total	40	40	-	20

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N8345
NOS Name	Review the types of BSS & targeted set of EV
Sector	Automotive
Sub-Sector	Research & Development
Occupation	Automotive Product Development
NSQF Level	5.5
Credits	3
Version	1.0
Next Review Date	NA

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

(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/N8333.Develop prominent options of BSS architecture, infrastructure and solutions	40	40	-	20	100	15
ASC/N8334.Assist manager & project teams to execute implementation of BSS	40	40	-	20	100	30
ASC/N8345.Review the types of BSS & targeted set of EV	40	40	-	20	100	30
Total	190	180	-	80	450	100

Acronyms

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

Glossary

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

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