Model Curriculum

QP Name: Drone Service Technician

QP Code: ELE/Q7003

QP Version: 3.0

NSQF Level: 4

Model Curriculum Version: 3.0

Electronics Sector Skills Council of India || 155, 2nd Floor, ESC House, Okhla Industrial Area- Phase 3, New Delhi110020

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Training Parameters

Sector	Electronics
Sub-Sector	E-Mobility & Battery
Occupation	After Sale Support – EM&B
Country	India
NSQF Level	4
Aligned to NCO/ISCO/ISIC Code	NCO-2015/8212.0400
Minimum Educational Qualification and Experience	12th grade pass (Science) or equivalent with No experience required 10th grade pass with 2 years NTC/NAC/relevant experience 8th grade pass with 2 years NTC/NAC and 3 years relevant experience Certificate-NSQF (Level-3 in Maintenance Technician) with 1.5 years of relevant experience and 18 Years
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 Years
Last Reviewed On	17.12.2024
Next Review Date	17.12.2027
NSQC Approval Date	17.12.2024
QP Version	3.0
Model Curriculum Creation Date	17.12.2024
Model Curriculum Valid Up to Date	17.12.2027
Model Curriculum Version	3.0
Maximum Duration of the Course	450 Hours

Program Overview

This section summarizes the end objectives of the program along with its duration.

Training Outcomes

At the end of the program, the learner should have acquired the listed knowledge and skills:

- State the role and responsibilities of a Drone service technician
- Demonstrate the process of assembling/ disassembling different types of Drone
- Demonstrate the process of inspecting different components of a Drone for defects
- Demonstrate the process of repairing/ replacing the defective components of a Drone
- Explain the process of testing a Drone for correct functioning after repair and maintenance
- Explain the process of preparing a repair and maintenance report
- Explain the importance of following the quality and customer service standards
- Explain the importance of following inclusive practices for all genders and PwD at work
- Demonstrate the use of relevant health and safety equipment

Compulsory Modules

The table lists the modules and their duration corresponding to the Compulsory NOS of the QP.

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Recommended)	On-the-Job Training Duration (Mandatory)	Total Duration
ELE/N7005- Troubleshoot and Repair Drone Malfunctions	**66:00**	**114:00**	**00:00**	**150:00**	**330:00**
Module 1: Routine repairand maintenance of a Drone	66:00	114:00	00:00	150:00	330:00
ELE/N7010- Calibrate, Optimize, and Test Drone Performance	**30:00**	**30:00**	**00:00**	**00:00**	**60:00**
Module 2: Calibrate, Optimize, and Test Drone Performance	30:00	30:00	00:00	00:00	60:00
DGT/VSQ/N0102- Employability Skills (60 Hours)	**24:00**	**36:00**	**00:00**	**00:00**	**60:00**
Module 3: Employability Skills (60 Hours)	24:00	36:00	00:00	00:00	60:00
Total Duration	**120:00**	**180:00**	**00:00**	**150:00**	**450:00**

Module Details

Module 1: Routine repair and maintenance of a Drone

Mapped to ELE/N7005

Terminal Outcomes:

- Demonstrate the process of assembling/ disassembling a Drone.
- Demonstrate the process of inspecting the functional components of a Drone for defects.
- Demonstrate the process of repairing/ replacing the defective components of a Drone.
- Demonstrate the process of testing the functioning of a Drone after repair and maintenance.

Duration: 66:00	**Duration: 114:00**
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain the basic principles governing the Alternating Current, Direct Current (DC) and electronic circuits. • Explain the use of various types of electronic components such as a resistor, capacitors, coil, diode, transistor, integrated circuit (IC) etc. • Explain the importance of following safety and quality standards. • State the manufacturer guidelines for starting and shutting down a Drone safely. • Describe the functions of various Drone components such as fan, propeller, electric-motor, camera, GPS, etc. • Describe the process of installing various electronic components in a Drone. • Describe various tests and procedures for checking a Drone. • List various tools and equipment required for the repair and maintenance of a Drone. • Explain the relevant troubleshooting methods for various types of Drones. • Describe the standard procedure for repairing and replacing any faulty components of a Drone.	• Demonstrate the process of conducting a preliminary check on a Drone to determine the repair or replacement needs of its modules. • Demonstrate the procedure of assembling/ disassembling different types of Drone. • Demonstrate how to conduct various tests for identifying faulty electronic components in a drone. • Demonstrate the relevant troubleshooting and maintenance procedures for different components of a Drone. • Demonstrate the process of installing various electronic components in a Drone. • Prepare a sample repair and maintenance report using the relevant computer system.

• List different types of documents to be prepared during the repair and maintenance of a Drone. • List the necessary product details to be communicated to the customer at the time of repair and maintenance such as warranty, Annual Maintenance Contract (AMC) info, operating procedure, etc. • Explain the importance of following quality and customer service standards.	
Classroom Aids	
Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Soldering Iron, Screwdriver, Torque Screwdriver, Nut Driver, Safety Knife, Pliers, Wire Strippers, Wire Cutters, Glue Gun, Tweezers, Multimeter, Heat Gun, Desk Light and Magnifier, Digital Weighing Scale, Wattmeter and Clamp Meter, Motor Thrust Stand, Connectors	

Module 2: Calibrate, Optimize, and Test Drone Performance

Mapped to ELE/N7010

Terminal Outcomes:

- Demonstrate proficiency in calibrating and optimizing drone components for accurate and efficient performance.
- Perform advanced testing and troubleshooting to ensure safety, compliance, and operational reliability.
- Maintain comprehensive documentation and effectively communicate outcomes to stakeholders.

Duration: 30:00	**Duration: 30:00**
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Understand the principles of sensor calibration, including gyroscopes, accelerometers, and barometers. • Learn the methods for optimizing motor efficiency through ESC firmware tuning. • Comprehend GPS calibration techniques and their impact on satellite connectivity. • Explore flight controller tuning, PID parameters, and their influence on drone stability. • Understand compliance requirements (e.g., DGCA/FAA) and their application in drone servicing. • Develop knowledge of analyzing flight logs to identify anomalies and improve performance.	• Perform sensor calibration using software tools and hardware rigs. • Optimize motor and propeller efficiency through balancing and firmware updates. • Conduct real-world testing of GPS accuracy, signal reception, and gimbal alignment. • Simulate emergency scenarios and validate safety mechanisms, including Return-to-Home and failsafe protocols. • Test payload integration and assess the functionality of add-ons like cameras and sensors. • Execute post-calibration tests such as hover and waypoint navigation in diverse conditions. • Maintain detailed service logs, checklists, and reports for accountability and quality assurance.
Classroom Aids	
Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Calibration Tools: IMU calibrators, gimbal alignment rigs, and propeller balancers. Software Tools: Flight controller tuning software, PID tuning tools, and firmware update utilities.	

Module 3: Employability Skills (60 Hours)

Mapped to DGT/VSQ/N0102

Terminal Outcomes:

1. Discuss about Employability Skills in meeting the job requirements
2. Describe opportunities as an entrepreneur.
3. Describe ways of preparing for apprenticeship & Jobs appropriately.

Duration: 24:00	Duration: 36:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain constitutional values, civic rights, responsibility towards society to become a responsible citizen • Discuss 21st century skills • Explain use of basic English phrases and sentences. • Demonstrate how to communicate in a well-behaved manner • Demonstrate how to work with others • Demonstrate how to operate digital devices • Discuss the significance of Internet and Computer/ Laptops • Discuss the need for identifying business opportunities • Discuss about types of customers. • Discuss on creation of biodata • Discuss about apprenticeship and opportunities related to it.	• List different learning and employability related GOI and private portals and their usage • Show how to practice different environmentally sustainable practices. • Exhibit 21st century skills like Self-Awareness, Behavior Skills, time management, etc. • Show how to use basic English sentences for everyday conversation in different contexts, in person and over the telephone • Demonstrate how to communicate in a well -mannered way with others. • Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette • Utilize virtual collaboration tools to work effectively • Demonstrate how to maintain hygiene and dressing appropriately. • Perform a mock interview
Classroom Aids	
Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Computer, UPS, Scanner, Computer Tables, LCD Projector, Computer Chairs, White Board OR Computer Lab	

Module 4: On-the-Job Training

Mapped to Drone Service Technician

Mandatory Duration: 150:00	Recommended Duration: 00:00
Location: On-Site	

Terminal Outcomes

1. Explain the fundamental concept of a Drone
2. Illustrate the preliminary tasks involve in the repair and maintenance of a Drone
3. Demonstrate how to perform preliminary checks on a Drone
4. Demonstrate how to carry out troubleshooting for different issues in a Drone
5. Inspect the Drone to spot defective module/ components
6. Demonstrate repair/ replacement of electronic components
7. Test functioning of the Drone post servicing
8. Communicate product and service-related information to the customer
9. Interact and coordinate with supervisor and colleagues
10. Perform assigned work within timelines and with defined quality
11. Demonstrate how to maintain a healthy, safe and secure working environment

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
Diploma / Degree in Electronics or Aeronautical Engineering/ Certified in relevant CITS trade	Should have knowledge of aerospace engineering	2	Drone Service Technician	1	Electronics	

Trainer Certification	
Domain Certification	**Platform Certification**
"Drone Service Technician", "ELE/Q7003, v3.0", Minimum accepted score is 80%	Recommended that the Trainer is certified for the **Drone Service Technician** "Trainer (VET and Skills)", mapped to the Qualification Pack: "MEP/Q2601, V2.0", with minimum score of 80%

Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training/Assessment Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
Diploma / Degree in Electronics or Aeronautical Engineering/ Certified in relevant CITS trade	Should have knowledge of aerospace engineering	3	Drone Service Technician	2	Electronics	

Assessor Certification	
Domain Certification	**Platform Certification**
"Drone Service Technician", "ELE/Q7003, v3.0", Minimum accepted score is 80%	Recommended that the Assessor is certified for the **Drone Service Technician** "Assessor (VET and Skills)", mapped to the Qualification Pack: "MEP/Q2701, V2.0", with minimum score of 80%

Assessment Strategy

1. Assessment System Overview:
    - Batches assigned to the assessment agencies for conducting the assessment on SDMS/SIP or email
    - Assessment agencies send the assessment confirmation to VTP/TC looping SSC
    - The assessment agency deploys the ToA certified Assessor for executing the assessment
    - SSC monitors the assessment process & records
2. Testing Environment

    To ensure a conducive environment for conducting a test, the trainer will:
    - Confirm that the centre is available at the same address as mentioned on SDMS or SIP
    - Check the duration of the training.
    - Check the Assessment Start and End time to be 10 a.m. and 5 p.m. respectively
    - Ensure there are two Assessors if the batch size is more than 30.
    - Check that the allotted time to the candidates to complete Theory & Practical Assessment is correct.
    - Check the mode of assessment—Online (TAB/Computer) or Offline (OMR/PP).
    - Confirm the number of TABs on the ground are correct to execute the Assessment smoothly.
    - Check the availability of the Lab Equipment for the particular Job Role.
3. Assessment Quality Assurance levels / Framework:
    - Question papers created by the Subject Matter Experts (SME)
    - Question papers created by the SME verified by the other subject Matter Experts
    - Questions are mapped with NOS and PC
    - Question papers are prepared considering that levels 1 to 3 are for the unskilled & semi-skilled individuals, and levels 4 and above are for the skilled, supervisor & higher management
    - The assessor must be ToA certified & the trainer must be ToT Certified
    - The assessment agency must follow the assessment guidelines to conduct the assessment
4. Types of evidence or evidence-gathering protocol:
    - Time-stamped & geotagged reporting of the assessor from assessment location
    - Centre photographs with signboards and scheme-specific branding
    - Biometric or manual attendance sheet (stamped by TP) of the trainees during the training period
    - Time-stamped & geotagged assessment (Theory + Viva + Practical) photographs & videos
5. Method of verification or validation:

    To verify the details submitted by the training centre, the assessor will undertake:
    - A surprise visit to the assessment location
    - A random audit of the batch
    - A random audit of any candidate
6. Method for assessment documentation, archiving, and access

    To protect the assessment papers and information, the assessor will ensure:
    - Hard copies of the documents are stored

- Soft copies of the documents & photographs of the assessment are uploaded/accessed from Cloud Storage
- Soft copies of the documents & photographs of the assessment are stored in the Hard drive

References

Glossary

Term	Description
Declarative knowledge	Declarative knowledge refers to facts, concepts and principles that need to be known and/or understood in order to accomplish a task or to solve a problem.
Key Learning	A key learning outcome is a statement of what a learner needs to know, understand and be able to do in order to achieve the terminal outcomes. A set of key learning outcomes will make up the training outcomes. Training outcome is specified in terms of knowledge, understanding (theory) and skills (practical application).
OJT (M)	On-the-job training (Mandatory); trainees are mandated to complete specified hours of training on-site
OJT (R)	On-the-job training (Recommended); trainees are recommended the specified hours of training on-site
Procedural Knowledge	Procedural knowledge addresses how to do something, or how to perform a
Training Outcome	Training outcome is a statement of what a learner will know, understand and be able to do **upon the completion of the training**.
Terminal Outcome	The terminal outcome is a statement of what a learner will know, understand and be able to do **upon the completion of a module.** A set of terminal outcomes help to achieve the training outcome.

Acronyms and Abbreviations

Term	Description
BEV	Battery Electric Vehicle
DC	Direct Current
EM&B	E-Mobility & Battery
IC	Integrated Circuit
ITI	Industrial Training Institute
MCU	MicroController Unit
NCO	National Occupational Standards
NOS	National Skills Qualification Committee
NSQF	National Skills Qualification Framework
OJT	On-the-Job Training
OMR	Optical Mark Recognition
PC	Performance Criteria
PwD	Persons with Disabilities
QP	Qualification Pack
SDMS	Skill Development & Management System
SIP	Skill India Portal
SME	Small and Medium Enterprises
SOP	Standard Operating Procedure
SSC	Sector Skill Council
TC	Trainer Certificate
ToA	Training of Assessors
ToT	Training of Trainers
TP	Training Provider
UL	Underwriter Laboratories
VTP	Vocational Training Provider