



Model Curriculum

QP Name: Unmanned Aerial Systems - Operation and Maintenance Supervisor

QP Code: ELE/Q6708

QP Version: 1.0

NSQF Level: 5

Model Curriculum Version: 1.0

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

Sector	Electronics
Sub-Sector	E – Mobility & Battery
Occupation	Product Design & Development-EM&B
Country	India
NSQF Level	5
Aligned to NCO/ISCO/ISIC Code	NCO-2015/8212.0400
Minimum Educational Qualification and Experience	Completed 2nd year of UG (UG Diploma) (Physics/ Electronics/Electrical/Mechanical and Others) OR Completed 3-year diploma (after 10th) (Electronics /Electrical/Mechanical and Others) with 1.5 Years of Relevant experience in Drone technology OR Previous relevant Qualification of NSQF Level (4.5) with 1.5 years of experience in Drone technology
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 years
Last Reviewed On	08.07.2026
Next Review Date	08.07.2029
NSQC Approval Date	08.07.2026
QP Version	1.0
Model Curriculum Creation Date	08.07.2026
Model Curriculum Valid Up to Date	08.07.2029
Model Curriculum Version	1.0
Minimum Duration of the Course	510 Hours
Maximum Duration of the Course	510 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 will be able to:

- Supervise assembly, configuration, maintenance, and safe operation of Unmanned Aerial Systems as per standard procedures
- Plan and execute UAS missions, conduct flight demonstrations, and manage emergency situations in line with regulatory norms
- Integrate and manage embedded vision systems, imaging devices, and onboard sensors for mission-specific applications
- Monitor system performance, troubleshoot technical issues, and ensure operational readiness of UAS platforms
- Coordinate workplace activities, communicate effectively with team members and stakeholders, and maintain proper documentation
- Apply employability skills including problem-solving, digital literacy, professional conduct, and compliance with safety and quality standards

Compulsory Modules

The table lists the modules, their duration and mode of delivery.

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
ELE/N6738: Assemble, Maintain, Configure, and Operate Unmanned Aerial Systems NOS Version No. 1.0 NSQF Level 5	30:00	60:00	30:00	00:00	120:00
Module 1: Assemble, Maintain, Configure, and Operate Unmanned Aerial Systems	30:00	60:00	30:00	00:00	120:00
ELE/N6739: UAS Mission Planning, Flight Demonstration, and Emergency Procedures NOS Version No. 1.0 NSQF Level 5	36:00	54:00	60:00	00:00	150:00
Module 2: UAS Mission Planning, Flight Demonstration, and Emergency Procedures	36:00	54:00	60:00	00:00	150:00
ELE/N6740: UAS Embedded Vision Imaging, and Sensor Integration NOS Version No. 1.0 NSQF Level 5	30:00	60:00	30:00	00:00	90:00
Module 3: UAS Embedded Vision, Imaging, and Sensor Integration	30:00	60:00	30:00	00:00	90:00
ELE/N6741: Workplace Coordination and Interpersonal Communication Skills NOS Version No. 1.0 NSQF Level 5	15:00	15:00	00:00	00:00	45:00
Module 4: Workplace Coordination and Interpersonal Communication Skills	15:00	15:00	00:00	00:00	45:00

DGT/VSQ/N0102 - Employability Skills (60 hours) NOS Version No. – 1.0 NSQF Level – 5	24:00	36:00	-	-	60:00
Module 5: Introduction to Employability Skills	24:00	36:00	-	-	60:00
Total Duration	135:00	225:00	150:00	00:00	510:00

Module Details

Module 1: Assemble, Maintain, Configure, and Operate Unmanned Aerial Systems

Mapped to ELE/N6738 & v 1.0

Terminal Outcomes:

At the end of the program, the learner will be able to:

- Inspect, troubleshoot, repair, and maintain UAS platforms and components using approved tools, diagnostic methods, and ESD-safe practices
- Disassemble, reassemble, and integrate UAS assemblies, sensors, hardware, and firmware upgrades as per technical specifications
- Configure, program, and conduct functional and diagnostic testing to ensure operational readiness and system performance
- Interpret aviation regulations and ATC procedures, and demonstrate safe and compliant UAS operations through controlled validation flights
- Prepare accurate maintenance records and service reports in line with prescribed documentation standards

Duration: <30:00>	Duration: <60:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
• Explain standard troubleshooting procedures, selection of tools, equipment, and use of approved reference documents as per SOPs • Describe inspection procedures, start-up and shutdown practices, and ESD safety requirements for UAS maintenance • Explain the working principles and common failure modes of electronic and electromechanical components used in UAS • Describe approved methods for safe disassembly and reassembly of UAS assemblies and sub-systems • Explain diagnostic techniques for testing hardware and software systems, including use of multimeters and diagnostic utilities • Describe principles of sensor integration, PCB soldering, wiring harness fabrication, and firmware/software installation • Interpret applicable UAS regulations, airspace classifications, and ATC/radio telephony procedures • Explain procedures for post-maintenance validation, risk mitigation, client feedback handling, and service documentation	• Select appropriate tools, test equipment, and technical documents to perform UAS troubleshooting as per SOPs • Conduct preliminary inspections, functional checks, and ensure ESD-compliant handling during maintenance activities • Identify, test, repair, and replace faulty electronic and electromechanical components in UAS platforms • Safely disassemble and reassemble UAS assemblies, airframes, and sub-systems using approved practices • Perform hardware and software diagnostics to detect and rectify system faults • Integrate sensors, carry out PCB soldering, fabricate wiring harnesses, and install firmware/software upgrades • Conduct post-maintenance functional testing and controlled validation flights to confirm operational readiness • Comply with UAS regulations and ATC procedures during setup and operational demonstrations, and prepare maintenance/service reports as per prescribed formats

Classroom Aids

Laptop, whiteboard, marker, projector

Tools, Equipment and Other Requirements

Electronics and mechanical tool kit with ESD protection (ESD mat, wrist strap, soldering tools)

Digital multimeter and diagnostic/testing tools

External regulated power supply

Computer/laptop with firmware, configuration, and maintenance reporting software

Safety and risk assessment equipment (checklists, documentation tools)

Module 2: UAS Mission Planning, Flight Demonstration, and Emergency Procedures

Mapped to ELE/N6739 & v 1.0

Terminal Outcomes:

- Gather and document mission requirements, and configure UAS platforms and payloads to meet operational objectives
- Conduct pre-flight checks, configure communication systems, and perform safe manual flight operations in line with approved plans
- Execute emergency procedures and troubleshoot abnormal or crash situations using flight data and standard diagnostic tools
- Develop compliant mission and autonomous flight plans considering hazards, airspace, and safety requirements
- Configure autopilot systems, integrate sensors and software, and conduct autonomous flight demonstrations and validation tests

Duration: <36:00>	Duration: <54:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
• Explain structured techniques for requirement gathering and mission documentation • Describe principles of payload integration, system configuration, and customization of UAS platforms • Explain pre-flight inspection procedures, airworthiness requirements, and communication system configuration • Describe manual flight controls, flight principles, and standard maneuver execution • Explain emergency response procedures, risk mitigation strategies, and regulatory reporting requirements • Interpret flight data logs, simulation outputs, and troubleshooting documentation • Describe mission planning concepts including hazard identification, environmental assessment, and airspace coordination • Explain autopilot architecture, sensor fusion concepts, and autonomous navigation principles • Describe basic programming logic, software validation methods, and development tools used in UAS operations • Explain flight test planning, validation processes, and documentation standards	• Collect and document client requirements and translate them into actionable mission parameters • Configure payloads, controllers, and communication systems for customized mission execution • Conduct pre-flight checks and ensure system readiness before operations • Perform manual flight demonstrations and mission-specific operations safely • Execute emergency handling procedures including forced landing and loss-of-control scenarios • Analyze flight logs and troubleshoot abnormal or crash events using approved tools and methods • Develop and implement compliant flight plans for autonomous missions • Integrate sensors and configure autopilot systems for autonomous flight execution • Apply basic programming tasks to modify and test UAS software components • Conduct autonomous flight demonstrations and execute structured flight test plans, documenting outcomes as per standards

Classroom Aids

Laptop, whiteboard, marker, projector

Tools, Equipment and Other Requirements

UAS platform with configurable payload and radio controller
Simulation and flight data analysis software
Pre-flight and emergency procedure checklists
Standard troubleshooting tools and equipment

Module 3: UAS Embedded Vision, Imaging, and Sensor Integration

Mapped to ELE/N6740 & v 1.0

Terminal Outcomes:

- Understand and operate UAS imaging systems, including cameras, LiDAR, infrared sensors, and obstacle-avoidance devices, for mission-specific data collection
- Conduct pre-flight checks, configure sensors and GPS modules, and ensure operational readiness and data accuracy
- Collect, pre-process, and validate high-quality photography, videography, LiDAR, and geospatial datasets using appropriate software tools
- Apply filtering techniques, PID control, and SLAM algorithms to support autonomous navigation, stable flight, and accurate mapping
- Develop 3D models, maps, and actionable insights from sensor data, and perform UAS-based industrial and infrastructure inspections

Duration: <30:00>	Duration: <60:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
• Explain principles of photography, videography, and imaging used in UAS applications • Describe the architecture and operation of LiDAR, infrared, 3D cameras, and obstacle-avoidance sensors • Explain pre-flight inspection procedures, sensor readiness, GPS configuration, and alignment of collected data • Describe data acquisition techniques, pre-processing workflows, and software tools for imagery, LiDAR, and geospatial datasets • Explain filtering methods (histogram, Kalman, particle filters) to improve data quality and reduce noise • Describe PID control principles for flight stability and autonomous corrections • Explain SLAM algorithms for autonomous navigation and environment mapping • Outline 3D modelling, mapping, and spatial analysis techniques for industrial and infrastructure inspections • Introduce simulation tools and techniques to replicate real-world operating scenarios for training and validation • Discuss data storage, management, and reporting standards for collected sensor and imaging data	• Perform pre-flight checks, configure sensors, and validate GPS and positioning systems for operational readiness • Integrate cameras, LiDAR, infrared, and obstacle-avoidance sensors on UAS platforms as per mission requirements • Collect high-quality imagery, LiDAR, and infrared data following mission plans and operational protocols • Apply filtering techniques, PID control adjustments, and SLAM-based navigation during autonomous flight operations • Generate 3D models and maps from collected data and conduct UAS-based inspections of industrial and infrastructure assets

Classroom Aids

Laptop, whiteboard, marker, projector

Tools, Equipment and Other Requirements

Autopilot-enabled UAS platform with advanced sensors (LiDAR, IR, 3D camera, GPS)
Computer/laptop with industry-standard UAS programming, configuration, imaging, LiDAR, mapping, and simulation software
Ground control station with flight planning and data logging software
Standard troubleshooting and verification tools
Calibration and safety accessories for sensor integration

Module 4: Workplace Coordination and Interpersonal Communication Skills

Mapped to ELE/N6741 & v 1.0

Terminal Outcomes:

- Maintain a safe, secure, and organized working environment by applying safety policies, PPE, and statutory requirements
- Plan, prioritize, and execute work activities efficiently while meeting quality, productivity, and timeline requirements
- Demonstrate effective team collaboration, constructive feedback, and professional workplace ethics
- Collect, interpret, and communicate client requirements, technical information, and operational data clearly using structured methods
- Conduct mission planning, coordinate with stakeholders, and maintain organized documentation in line with organizational and industry standards

Duration: <15:00>	Duration: <15:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
• Explain organizational safety policies, statutory requirements, and standard operating procedures for workplace safety • Describe electrical safety, safe handling of tools, batteries, hazardous materials, and fire safety practices • Explain types, selection, and proper use of Personal Protective Equipment (PPE) • Describe principles of work planning, prioritization, scheduling, and quality assurance processes • Explain effective teamwork strategies, workplace ethics, and methods for giving and receiving constructive feedback • Describe principles of flight planning, hazard identification, and airspace coordination • Explain selection criteria for UAS platforms based on mission requirements, safety rules, and regulations • Describe structured methods for collecting, analyzing, and documenting client requirements and mission objectives • Explain methods for reading, interpreting, and extracting technical data from schematics, manuals, and electronic documentation • Explain professional communication methods, including oral, written, and	• Follow safety procedures to maintain a secure and hazard-free work environment, including PPE use and handling of tools/materials • Plan and execute tasks efficiently, prioritizing work to meet deadlines and quality standards • Apply quality assurance practices at each stage of task execution and explain their importance to team members • Collaborate effectively with colleagues, provide constructive feedback, and demonstrate professional workplace behavior • Conduct pre-mission planning meetings, coordinate with clients and teams, and confirm mission scope, safety, and timelines • Collect, document, and interpret client requirements and operational data for mission planning • Read and extract technical information from schematics, wiring diagrams, manuals, and electronic publications • Communicate technical instructions clearly using oral, written, and digital methods while applying correct terminology • Create, update, and maintain organized technical and design documentation in accordance with organizational standards

digital channels using appropriate technical terminology

- Describe practices for creating, updating, and maintaining technical documentation, schematics, bills of materials, and knowledge-base materials

Classroom Aids

Laptop, whiteboard, marker, projector

Tools, Equipment and Other Requirements

Personal Protective Equipment (PPE) set (gloves, safety glasses, ESD protection), Standard hand tools and electrical safety tools, Fire safety equipment (fire extinguisher, safety signage), Computer/laptop with documentation, reporting, and communication software, UAS technical manuals and regulatory/flight planning documents, Standard communication technologies (email, messaging, collaboration tools), Design documentation tools (CAD/PDF viewers, spreadsheet software)

Module 5: Employability Skills (60 Hours)

Mapped to DGT/VSQ/N0102

Terminal Outcomes:

- Discuss about Employability Skills in meeting the job requirements
- Describe opportunities as an entrepreneur.
- 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 6: On-the-Job Training

Mapped to Unmanned Aerial Systems - Operation and Maintenance Supervisor

Mandatory Duration: 150:00	Recommended Duration: 00:00
Location: On Site	
Terminal Outcomes 1. Perform pre-flight and pre-maintenance inspections, functional checks, and system readiness validation of UAS platforms and payloads. 2. Assemble, disassemble, repair, and maintain UAS components and sub-systems, including electronic, electromechanical, and sensor systems. 3. Configure UAS hardware, communication systems, and software, including autopilot, sensors, and payloads for manual and autonomous operations. 4. Conduct safe manual and autonomous flight operations, following approved flight plans and regulatory requirements. 5. Execute emergency and abnormal procedures, troubleshoot system faults, and analyze flight data and logs for corrective actions. 6. Collect, preprocess, and validate high-quality imagery, LiDAR, infrared, and geospatial datasets; apply filtering, PID control, and SLAM for navigation and data accuracy. 7. Generate 3D models, maps, and actionable insights from sensor data; conduct industrial and infrastructure inspections using UAS platforms. 8. Plan, prioritize, and execute tasks efficiently while meeting timelines, quality standards, and productivity targets. 9. Collaborate effectively with team members and clients, communicate technical instructions clearly, provide and receive constructive feedback, and maintain professional workplace behavior. 10. Create, update, and maintain technical documentation, flight plans, schematics, service records, and knowledge-base materials in compliance with organizational standards.	

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training Experience		Remarks
		Years	Specialization	Years	Specialization	
B.E./B.Tech	Electrical/ Mechanical/ Electronics	1	Unmanned Aerial System	1	Unmanned Aerial System	NA
Diploma/ITI	Electrical/ Mechanical/ Electronics	2	Unmanned Aerial System	1	Unmanned Aerial System	NA

Trainer Certification	
Domain Certification	Platform Certification
“Unmanned Aerial System, ELE/Qxxxx, version 1.0”. Minimum accepted score is 80%.	Recommended that the Trainer is certified for the job role: “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	
B.E./B.Tech	Electrical/ Mechanical/ Electronics	2	Unmanned Aerial System	1	Unmanned Aerial System	NA
Diploma/ITI	Electrical/ Mechanical/ Electronics	3	Unmanned Aerial System	1	Unmanned Aerial System	NA

Assessor Certification	
Domain Certification	Platform Certification
"Unmanned Aerial System, ELE/Qxxxx, version 1.0". Minimum accepted score is 80%.	Recommended that the Assessor is certified for the job role: "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
 - Assessment agency deploys the ToA certified Assessor for executing the assessment
 - SSC monitors the assessment process & records
2. Testing Environment:
 - 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 as 10 a.m. and 5 p.m.
 - If the batch size is more than 30, then there should be 2 Assessors.
 - 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 level 1 to 3 are for the unskilled & semi-skilled individuals, and level 4 and above are for the skilled, supervisor & higher management
 - Assessor must be ToA certified & trainer must be ToT Certified
 - 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:
 - Surprise visit to the assessment location
 - Random audit of the batch
 - Random audit of any candidate
6. Method for assessment documentation, archiving, and access
 - 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 Drives

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 Outcome	Key learning outcome is the 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 task. It is the ability to work, or produce a tangible work output by applying cognitive, affective or psychomotor skills.
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	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
QP	Qualification Pack
NSQF	National Skills Qualification Framework
NSQC	National Skills Qualification Committee
NOS	National Occupational Standards
TVET	Technical and Vocational Education and Training
IPR	Intellectual Property Rights