QUALIFICATION FILE

Drone Application Developer

☒Short-Term Training (STT) ☐ Long-Term Training (LTT) ☐ Apprenticeship

☐ Upskilling ☐ Dual/Flexi Qualification ☐ For ToT ☐ For ToA

☐ General ☐ Multi-skill (MS) ☐ Cross Sectoral (CS) ☒ Future Skills ☐ OEM

NCrF/NSQF Level: 5

Submitted By:

NATIONAL INSTITUTE OF ELECTRONICS AND INFORMATION TECHNOLOGY (NIELIT)

NIELIT Bhawan, Plot No. 3, PSP Pocket, Sector-8,
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Section 1: Basic Details

<table>
<tr><td>1.</td><td>NOS-Qualification Name</td><td colspan="2">Drone Application Developer</td></tr>
<tr><td>2.</td><td>Sector/s</td><td colspan="2">Electronics</td></tr>
<tr><td>3.</td><td>Type of Qualification: ☒ New ☐ Revised ☐ Has Electives/Options ☐OEM</td><td>NQR Code & version of the existing /previous qualification: NA</td><td>Qualification Name of the existing/previous version: NA</td></tr>
<tr><td>4.</td><td>a. OEM Name
b. Qualification Name
(Wherever applicable)</td><td colspan="2">--</td></tr>
<tr><td>5.</td><td>National Qualification Register (NQR) Code & Version</td><td>QG-05-EH-02596-2024-V1-NIELIT</td><td>6. NCrF/NSQF Level: 5</td></tr>
<tr><td>7.</td><td>Award (Certificate/Diploma/Advanced Diploma/ Any Other (Wherever applicable specify multiple entry/exits also & provide details in annexure)</td><td colspan="2">Certificate</td></tr>
<tr><td>8.</td><td>Brief Description of the Qualifications</td><td colspan="2">Nature:
The Certificate course is targeted for creating qualified professionals in the field of Drone Programming. Qualification has been developed in consultation with industry experts in the domain, aiming at Empowering the future workforce with necessary skills for employment and entrepreneur development of the qualifier.
Purpose:
The course aims to equip candidates with comprehensive skills in drone technology, covering aspects such as classification, regulations, and ethical considerations, as well as practical knowledge in drone subsystems, payload installation, integration testing, programming, and maintenance.</td></tr>
<tr><td>9.</td><td>Eligibility Criteria for Entry for a Student/Trainee/Learner/Employee</td><td colspan="2">a. Entry Qualification & Relevant Experience:
<table>
<tr><th>S. No.</th><th>Academic/Skill Qualification (with Specialization - if applicable)</th><th>Relevant Experience (with Specialization - if applicable)</th></tr>
<tr><td>1</td><td>Completed UG Diploma in Electronics and Communication Engineering/ Electrical Engineering/CS/IT and allied branches</td><td>NA</td></tr>
</table></td></tr>
</table>

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2	Completed 3 Years of Diploma in Electronics and Communication Engineering/ Electrical Engineering/CS/IT and allied branches after class 10th	1.5 Years
3	Completed 2nd Year of Diploma in Electronics and Communication Engineering/ Electrical Engineering/CS/IT and allied branches after class 12th	NA
4	Acquired NSQF Level 4.5 in Electronics and Communication Engineering/ Electrical Engineering/CS/IT and allied branches	1.5 Years
5	Acquired NSQF Level 4 in Electronics and Communication Engineering/ Electrical Engineering/CS/IT and allied branches	3 Years

10.	**Credits Assigned to this Qualification, Subject to Assessment** *(as per National Credit Framework (NCrF))*	18 Credits	**11. Common Cost Norm Category (I/II/III)** *(wherever applicable)***:** Category-I
12.	**Any Licensing Requirements for Undertaking Training on This Qualification** *(wherever applicable)*	NA	
13.	**Training Duration by Modes of Training Delivery** *(Specify **Total Duration** as per selected training delivery modes and as per requirement of the qualification)*	☒ **Offline** ☐ **Online** ☐ **Blended**	
14.	**Aligned to NCO/ISCO Code/s (if no code is available, mention the same)**	NCO-2015/ 2152.9900	

Training Delivery Modes	Theory (Hours)	Practical (Hours)	OJT Mandatory (Hours)	ES (Hours)	Total (Hours)
Classroom (offline)	**150**	**210**	**120**	**60**	**540**

Training shall be conducted in any of the 3 modes depending on the regional need.

(Refer Blended Learning Annexure-V for details)

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15.	**Progression path after attaining the qualification** *(Please show Professional and Academic progression)*	Drone Software Developer/Drone Engineer/Drone Consultant/Chief Technology Officer	
16.	**Other Indian languages in which the Qualification & Model Curriculum are being submitted**	Qualification file available in English & Hindi Language.	
17.	**Is similar Qualification(s) available on NQR-if yes, justification for this qualification**	**☐ Yes ☒ No URLs of similar Qualifications:**	
18.	**Is the Job Role Amenable to Persons with Disability**	**☒ Yes ☐ No** **If "Yes", specify applicable type of Disability:** a. Locomotor Disability • Leprosy Cured Person • Dwarfism • Muscular Dystrophy • Acid Attack Victims b. Visual Impairment • Low Vision	
19.	**How Participation of Women will be Encouraged**	Participation by women can be ensured through Government Schemes. Occasionally, exclusive batches for women would be run for the proposed courses. Funding is available for women's participation under other schemes launched by the Government from time to time.	
20.	**Are Greening/ Environment Sustainability Aspects Covered** *(Specify the NOS/Module which covers it)*	**☐ Yes ☒ No**	
21.	**Is Qualification Suitable to be Offered in Schools/Colleges**	**Schools ☐ Yes ☒ No Colleges ☒ Yes ☐ No**	
22.	**Name and Contact Details Submitting / Awarding Body SPOC** *(In the case of CS or MS, provide details of both Lead AB & Supporting ABs)*	**Name:** Ripunjay Dinanath Singh **Email:** ripunjay@nielit.gov.in **Contact No.:** 011-25308300 **Website:** https://nielit.gov.in/	
23.	**Final Approval Date by NSQC: 30.05.2024**	**24. Validity Duration: 3 years**	**25. Next Review Date: 30.05.2027**

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Section 2: Module Summary

Mandatory NOS of Qualification:

NOS1: Drone Technology, Regulations & Ethical Considerations
NOS2: Drone Subsystem
NOS3: Drone Fight Controller & Peripherals
NOS4: Drone Payload Installation and Integration Testing
NOS5: Drone Programming and its Applications
NOS6: Drone Equipment Safety and Maintenance

***Th**.-Theory **Pr.**-Practical **OJT**-On the Job **Man.**-Mandatory Training **Rec.**-Recommended Proj.-Project*

S. No	NOS/Module Name	NOS/Module Code & Version (if applicable)	Core/ Non-Core	NCrF/NSQF Level	Credits as per NCrF	Training Duration (Hours)			Assessment Marks			
						Theory	Practical	Total	Theory	Practical	Total	Weightage (%) *(if applicable)*
1.	NOS1: Drone Technology, Regulations & Ethical Considerations	NOS Code: NIE/ELE/N2507 Version: 1.0	Core	5	2	25	35	60	34	15	49	9.8
2.	NOS2: Drone Subsystem	NOS Code: NIE/ELE/N2508 Version:1.0	Core	5	2	25	35	60	33	15	48	9.6
3.	*NOS3: Drone Fight Controller & Peripherals*	NOS Code: NIE/ELE/N2503 Version:1.0	Core	5	2	25	35	60	33	15	48	9.6

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S. No	NOS/Module Name	NOS/Module Code & Version (if applicable)	Core/ Non-Core	NCrF/NSQF Level	Credits as per NCrF	Training Duration (Hours)			Assessment Marks			
						Theory	Practical	Total	Theory	Practical	Total	Weightage (%) *(if applicable)*
4.	NOS4: Drone Payload Installation and Integration Testing	NOS Code: NIE/ELE/N2504 Version:1.0	Core	5	2	25	35	60	33	15	48	9.6
5.	NOS5: Drone Programming and its Applications	NOS Code: NIE/ELE/N2505 Version:1.0	Core	5	2	25	35	60	34	15	49	9.8
6.	NOS6: Drone Equipment Safety and Maintenance	NOS Code: NIE/ELE/N2506 Version:1.0	Core	5	2	25	35	60	33	15	48	9.6
Sub Total					**12**	**150**	**210**	**360**	**200**	**90**	**290**	**58**
7.	NOS7: Employability Skills	NOS Code: DGT/VSQ/N0102 Version:1.0	Non-Core	5	2	0	0	60	0	0	50	10
8.	NOS8: OJT/Project*	NOS Code: NIE/ELE/N2509 Version:1.0	Core	5	4	0	0	120	0	0	160	32
Grand Total					**18**	**540**			**500**			**100**

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Assessment Components	NOS Included	Duration (in mins)	Marks
Theory Paper 1 – Drone Technology, Subsystem & Integration Testing	1,2,3	90	100
Theory Paper 2- Drone Programming and its Applications	4,5,6	90	100
Practical Paper 1- Drone Programming	1,2,3,4,5,6	180	90
Employability Skills	7		50
OJT/Project*	1,2,3,4,5,6		60
Major Project/Dissertation(Marks)*	1,2,3,4,5,6		100
		Total	**500**

*** Along with the report on OJT, an additional dissertation has to be submitted by the trainee.**

*****Assessment strategy shall be as per NIELIT Norms prevailing at times.**
Minimum Pass Percentage – The pass percentage is 50% in each assessment component (as mentioned in the above table) with the aggregate pass percentage be 50%

Section 3: Training Related

1.	**Trainer's Qualification and experience in the relevant sector (in years) (as per NCVET guidelines)**	B.E./B. Tech in Electronics/ Electronics & Communication/ Electrical/ Electrical and Electronics/Instrumentation/ Electronics & Instrumentation / Instrumentation & Control /Biomedical /Computer Science/Information Technology Minimum 1 year of experience in the field of Embedded systems
2.	**Master Trainer's Qualification and experience in the relevant sector (in years) (as per NCVET guidelines)**	B.E./B. Tech in Electronics/ Electronics & Communication/ Electrical/ Electrical and Electronics/Instrumentation/ Electronics & Instrumentation / Instrumentation & Control /Biomedical /Computer Science/Information Technology Minimum 3 years of experience in the field of Embedded systems
3.	**Tools and Equipment Required for the Training**	☒ Yes ☐No Available at Annexure-II

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4.	**In Case of Revised NOS, details of Any Upskilling Required for Trainer**	Not Applicable

Section 4: Assessment Related

1.	**Assessor's Qualification and experience in relevant sector (in years)** *(as per NCVET guidelines)*	B. Tech or Equivalent as per NCrF + 3 Years of relevant experience
2.	**Proctor's Qualification and experience in relevant sector (in years)** *(as per NCVET guidelines), (wherever applicable)*	The assessor carries out theory online assessments through the remote proctoring methodology. Theory examination would be conducted online and the paper comprises MCQ. Conduct of assessment is through trained proctors. Once the test begins, remote proctors have full access to the candidate's video feeds and computer screens. Proctors authenticate the candidate based on registration details, pre-test image captured and I-card in possession of the candidate. Proctors can chat with candidates or give warnings to candidates. Proctors can also take screenshots, terminate a specific user's test session, or re-authenticate candidates based on video feeds.
3.	**Lead Assessor's/Proctor's Qualification and experience in relevant sector (in years)** *(as per NCVET guidelines)*	External Examiners/ Observers (Subject matter experts) are deployed including NIELIT scientific officers who are subject experts for evaluation of Practical examination/ internal assessment / Project/ Presentation/ assignment and Major Project (if applicable). Qualification is generally B. Tech
4.	**Assessment Mode***(Specify the assessment mode)*	Centralized online examination will be conducted
5.	**Tools and Equipment Required for Assessment**	Same as for training ☒ Yes ☐ No

Section 5: Evidence of the Need for the Qualification

1.	**Latest Skill Gap Study (not older than 2 years) (Yes/No):** Yes, Available in Annexure-A: Evidence of Need
2.	**Latest Market Research Reports or any other source (not older than 2 years) (Yes/No):** Yes, Available at Annexure-A: Evidence of Need
3.	**Government /Industry initiatives/ requirement (Yes/No):** Yes, Available at Annexure-A: Evidence of Need
4.	**Number of Industry validation provided: 10**
5.	**Estimated no. of persons to be trained and employed:** 500 persons per year shall be trained.
6.	**Evidence of Concurrence/Consultation with Line Ministry/State Departments:** NIELIT is recognized as AB and AA under Government Category. NIELIT is an HRD arm of MeitY, therefore, the Line Ministry Concurrence is not required.

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Section 6: Annexure & Supporting Documents Check List

Specify Annexure Name / Supporting document file name.

1.	**Annexure:** NCrF/NSQF level justification based on NCrF/NSQF descriptors *(Mandatory)*	*Available at* Annexure-I: Evidence of Level
2.	**Annexure:** List of tools and equipment relevant for NOS *(Mandatory, except in case of online course)*	*Available at* Annexure-II: Tools and Equipment
3.	**Annexure:** Industry Validation	*Available at* Annexure-III: Industry Validation
4.	**Annexure:** Training Details	*Available at* Annexure-IV: Training Details
5.	**Annexure:** Blended Learning *(Mandatory, in case the selected Mode of delivery is Blended Learning)*	*Available at* Annexure-V: Blended Learning
6.	**Annexure:** Detailed Assessment Criteria (Mandatory)	*Available at* Annexure-VI: Detailed Assessment Criteria
7.	**Annexure:** Assessment Strategy *(Mandatory)*	*Available at* Annexure-VII: Assessment Strategy
8.	**Annexure:** Acronym and Glossary *(Optional)*	*Available at* Annexure-VIII: Acronym and Glossary
9.	**Supporting Document:** Model Curriculum	*Available at* Annexure-B: Model Curriculum
10.	**Any other document you wish to submit:**	*Syllabus is available at Annexure-D* *Examination SoP at Annexure-C*

Annexure-I: Evidence of Level

NCrF/NSQF Level Descriptors	Key requirements of the job role/ outcome of the qualification	How the job role/ outcomes relate to the NCrF/NSQF level descriptor	NCrF/NSQF Level
Professional Theoretical Knowledge/Process	1. Proficiency in defining and categorizing drones based on design, purpose, size, autonomy, and payloads. 2. Sound understanding of aerodynamic principles relevant to drone flight, including lift, drag, thrust, and weight, as well as flight dynamics and stability. 3. Understanding of ethical considerations in drone use, including privacy concerns, and the ability to apply ethical principles in drone operations.	1. Possesses specialized operational knowledge and understanding of the work. 2. Have complete knowledge of the concept of time required for delivery; and Quality for a range of issues	**5**
Professional and Technical Skills/	1. Comprehensive Understanding of Drone Technology and Regulations	1. Possesses specialized professional and technical skills; displays clarity of	**5**

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Expertise/ Professional Knowledge	2. Ability to integrate and configure drone subsystems effectively, including firmware installation, assembly, and testing, while adhering to safety and legal requirements 3. Proficiency in troubleshooting common drone issues, analyzing flight logs, and implementing advanced troubleshooting techniques to address emergencies and ensure safe drone handling.	professional knowledge and technical skills in a broad range of activities/ tasks. 2. Have knowledge of collecting and interpreting the available information, drawing conclusions & communicating the same	
Employment Readiness & Entrepreneurship Skills & Mind-set/Professional Skill	1. Ability to identify market opportunities and emerging trends in the drone industry, and formulate business strategies to capitalize on these opportunities. 2. Skills in leveraging emerging technologies and conducting research and development to drive innovation and stay ahead of competitors in the drone market. 3. Proficiency in building and maintaining strong relationships with clients and stakeholders, understanding their needs and preferences, and delivering tailored drone solutions to meet their requirements.	1. Can explain Entrepreneurial Mindset and describe the importance of it in the context of opportunity curation for future jobs 2. Can comfortably use most of the basic software with proficiency 3. Have the ability to relate to the 5 pillars of Social Emotional Skills and describe the similarities between SES and Emotional Intelligence	**5**
Broad Learning Outcomes/ Core Skill	Proficiency in drone technology, programming, and maintenance, including understanding aerodynamics, subsystems, and regulations; programming skills in Python and embedded systems; and expertise in maintenance, safety protocols, and troubleshooting for safe and reliable drone operation.	1. Students are able to use, create, and design Multimedia solutions 2. Have knowledge of Multimedia Project Cycle and apply the understanding of Multimedia Project Pitfalls in improving solution	**5**
Responsibility	Ability to manage the system resources in the most effective manner by appropriate planning, estimation, coordination and control of the activities involved in the design & development of any drone applications /project	1. Takes complete responsibility for delivery and quality of own work and output as also the subordinates. 2. Shares responsibility for the group tasks.	**5**

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Annexure II: Tools and Equipment (lab set-up)

LIST OF EQUIPMENT (For a batch of 30 students)

	Description	Qty	Specifications
1	Classroom	1	30 Sq.m
2	Student Chair	30	
3	Student Table	15	15 (2 students sharing 1 table)
4	LCD Projector	1	
5	Trainer Chair & Table	1	
6	Pin up Boards	1	
7	White Board	1	
	Computer Lab		
1	Desktop computer with accessories	30	Laptop with minimum specifications: Intel I3 or Celeron processor with at least 8GB RAM, 512GB SSD Hard disk integrated with graphics card, Display size 15.6-inch, Wi-Fi connectivity and Wired Optical Mouse.
2	Desk jet printer	1	
3	Hardware's	15	Flight Controller (Pixhawk) Sensors(IMU,GPS,LIDAR, Barometer) Communication Modules (Telemetry Radios, WiFi & Bluetooth) Power System(Battery) Frame and Motors
4	Software's		Ardupilot, Visual Studio Code, Mission Planner etc.,

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Annexure III: Industry Validations Summary

S. No	Organization Name	Representative Name	Designation	Contact Address	Contact Phone No	E-mail ID
1	Aajivika Global Skill Private Limited	Mukesh Kumar Verma	Director	Beside Vishal Trade, dasmile chowk, Khunti Road Ranchi, Jharkhand-835221	9507952882	aajivikaglobal@gmail.com
2	AISECT Ltd.	Teena Panthi	Assistant Manager	AISECT Ltd. 1-1-387, 3rd floor, Flat No. 403/404, GNR Heights, Above SBI,Bakaram Road, Musheerabad, Hydrabad-500020	7879982075	teena.panthi@aisect.org
3	B. G. Infotech	Amal Das	Centre Head	Kakdihi, Mecheda, Purba, Medinipur	9434996748	bginfotech2007@gmail.com
4	INDITECH SOFTWARE WIZARD PVT. LTD	Sandip Ghosh	Course Coordinator	Mohiary Chanpiritola, P.O.- Andul-Mouri, P.S.-Domjur, Dist-Howrah-711302	9230027415	swizardrecruitment@gmail.com
5	Maa Saraswati Pvt. ITI	Tanwir Hassan Ansari	Principal	Jaynathpur (Near Hanuman Mandir), Lohardaga-835302 (Jharkhand)	9815107625	masaraswatipvtiti@gmail.com
6	Prasanthi Polytechnic	D. Prasad	Principal	Duppituru (Vill), Atchutapuram (Md). Visakhapatnam (Dist), Andhara Pradesh-531011	9849952573	prasadreddy.1279@gmail.com
7	Predulive Innovations Pvt. Ltd	Shivanshu Dwivedi	Founder & MID	1596, Avas Vikas Colony Gandhinagar Basti, UP-272001	9918443373	shivanshu@predulivelabs.in
8	NICE SHIKSHA VIKAS KENDRA	Motilal Ohdar	Secretory	Moti House, (NICE Computer Gali), Prince Chowk, Simdega,	7992489955	Vtpnice13@gmail.com

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				Jharkhand		
9	Sidhi Vinayak Academy	Neha Verma	Director	Shiv Narayan Kunj, B Block, Shivaji Nagar, Hethu, Ranchi, JH-834002	8789837772	sidhiacadmey@gmail.com
10	Surekha IT Services	Anjani K	Manager	8-3-191/84/302, Sharan Residency, Vengalrao Nagar, Hyderabad-500038, Telangana	8125134134	info@surekhaitservices.com

Annexure IV: Training Details

Training Projections:

Year	Estimated Training # of Total Candidates	Estimated training# of Women	Estimated training# of People with Disability
2024-25	500	100	20
2025-26	500	100	20
2026-27	1000	200	20

Data to be provided year-wise for the next 3 years.

Annexure V: Blended Learning

Blended Learning Estimated Ratio & Recommended Tools:

S. No.	Select the Components of the Qualification	List Recommended Tools – for all Selected Components	Offline : Online Ratio
1	☐Theory/ Lectures - Imparting theoretical and conceptual knowledge	Online interaction platforms like JitSi Meet, Bharat VC, Google Meet, MS Teams, etc.	20:80
2	☐Imparting Soft Skills, Life Skills, and Employability Skills /Mentorship to Learners	Online interaction platforms like JitSi Meet, Bharat VC, Google Meet, MS Teams, etc.	20:80
3	☐Showing Practical Demonstrations to the learners	Through Virtual Simulation Software (AUTODESK Eagle) and Online interaction platforms like JitSi Meet, Bharat VC, Google	20:80

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		Meet, MS Teams, etc.	
4	☐Imparting Practical Hands-on Skills/ Lab Work/ workshop/ shop floor training	Through Virtual Simulation Software (AUTODESK Eagle) and Online interaction platforms like JitSi Meet, Bharat VC, Google Meet, MS Teams, etc.	20:80
5	☐Tutorials/ Assignments/ Drill/ Practice	Online interaction platforms like JitSi Meet, Bharat VC, Google Meet, MS Teams, etc.	20:80
6	☐Proctored Monitoring/ Assessment/ Evaluation/ Examinations	NIELIT Remote Proctored Software	Online: 100% Theory Offline: 100% Practical
7	☐On the Job Training (OJT)/ Project Work Internship/ Apprenticeship Training	Simulated Platform	Either 100% online in a virtual environment Or 100% offline in the Industry.

Annexure VI: Detailed Assessment Criteria

Detailed PC-wise assessment criteria and assessment marks for the NOS are as follows:

NOS/Module Name	Assessment Criteria for Performance Criteria/Learning Outcomes	Theory Marks	Practical Marks	Project Marks	Assignment/ Internal Marks
NOS1: Drone Technology, Regulations & Ethical Considerations	**Understanding Drone Technology:** • Successfully define and classify drones, demonstrating knowledge of terminology. • Identify and describe drone components accurately, showing understanding of their functions. • Explain principles of aerodynamics and flight mechanics in a clear and coherent manner.	11	5	0	0
	Comprehending Drone Classification: • Classify drones effectively based on design, purpose, and size,	11	5	0	0

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	demonstrating clarity and accuracy. • Differentiate drones based on autonomy and payload capabilities with precision. • Discuss the importance of materials and size variations in drone construction, providing relevant examples.				
	Navigating Drone Regulations and Ethics: • Interpret and apply drone regulations correctly in various scenarios, demonstrating adherence to legal requirements. • Navigate the certification process for drone operation in India successfully, completing required procedures accurately. • Analyze ethical considerations and privacy concerns related to drone usage, offering insightful perspectives and recommendations.	12	5	0	0
	Total Marks	**34**	**15**	**0**	**0**
NOS2: Drone Subsystem	**Understanding Drone Subsystems**: • Demonstrate comprehensive knowledge of each drone subsystem, including their components and functionalities, through written or verbal assessments. • Successfully explain the interrelationship between different subsystems and how they collectively contribute to overall drone operation and performance. • Present clear and coherent explanations of complex subsystem concepts, facilitating understanding among peers and instructors.	11	5	0	0
	Analyzing Subsystem Components: • Identify and describe the key components of each subsystem accurately, demonstrating a deep understanding of their roles and technical specifications.	11	5	0	0

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	• Analyze the performance characteristics of subsystem components effectively, evaluating factors such as power consumption, thrust, data processing speed, etc., to assess their suitability for specific drone applications. • Discuss the importance of redundancy and safety systems in drone subsystems, highlighting their significance in ensuring reliability and mitigating potential failures.				
	Troubleshooting and Maintenance: • Successfully diagnose and resolve simulated or real-world issues related to drone subsystems within a given timeframe, employing appropriate problem-solving strategies and tools. • Perform routine maintenance tasks for each subsystem competently, following established procedures and safety guidelines to prevent accidents or damage. • Implement effective communication and collaboration skills when working in teams to troubleshoot complex subsystem issues or perform maintenance tasks, demonstrating professionalism and teamwork.	11	5	0	0
	Total Marks	**33**	**15**	**0**	**0**
NOS3: Drone Fight Controller & Peripherals	**Understanding and Configuring Drone Flight Controllers:** • Demonstrate a clear understanding of microcontroller and embedded systems concepts related to drone operations. • Explain the architecture and components of the Pixhawk flight controller and its role in managing drone functions. • Identify and process PWM and PPM signals effectively.	11	5	0	0
	Integration and Calibration of Key Components: • Set up and configure the radio controller to establish seamless communication with the flight controller. • Connect and calibrate GPS modules, ensuring accurate navigation and system synchronization.	11	5	0	0

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	• Integrate and calibrate ESCs for stable propulsion system performance.				
	Assembly and Power System Integration: • Safely attach the battery to the drone frame, ensuring proper wiring and secure mounting. • Assemble the flight controller and peripheral components into the drone structure with precision. • Verify the assembly and power system integration for operational readiness.	11	5	0	0
	Total Marks	**33**	**15**	**0**	**0**
NOS4: Drone Payload Installation and Integration Testing	**Firmware Management and Programming**: • Understanding the process of firmware upgrading and programming for the Pixhawk flight controller, specifically focusing on porting ArduPilot firmware and configuring settings. • Proficiency in downloading, flashing, and verifying ArduPilot firmware onto the Pixhawk flight controller to ensure compatibility and functionality. • Skill in troubleshooting firmware-related issues and implementing corrective actions to ensure successful firmware operation.	17	8	0	0
	Assembly, Integration, and Testing: • Competence in assembling drone frames and mounts, including soldering electronics components and devices as per specifications. • Ability to integrate sensors, receivers, and propulsion systems into the drone frame, ensuring proper wiring and connectivity. • Proficiency in conducting calibration procedures for ESCs, attaching propellers, and performing safety and legal checks before testing the drone's flight capabilities.	16	7	0	0
	Total Marks	**33**	**15**	**0**	**0**

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NOS5: Drone Programming and its Applications	**Python Programming for Drone Applications**: • Successfully demonstrate proficiency in Python syntax, data types, and control structures through coding exercises and assignments. • Develop functional Python programs using advanced concepts like functions, modules, file handling, exceptions handling, and classes to address drone-related tasks and challenges. • Apply Python programming skills to create innovative solutions for drone applications, showcasing creativity and problem-solving abilities.	12	5	0	0
	Setting up Host Environment and Hardware Integration: • Configure Raspberry Pi accurately, demonstrating understanding of its architecture and pin description. • Successfully mount Raspbian OS on an SD card and boot and configure the Raspberry Pi for integration with Pixhawk hardware. • Establish effective communication and compatibility between Raspberry Pi and Pixhawk hardware, ensuring seamless integration for programming and controlling the drone.	11	5	0	0
	Drone Applications and Case Studies: • Analyze drone applications in various fields and identify suitable solutions for specific use cases, demonstrating critical thinking and domain knowledge. • Evaluate the feasibility and effectiveness of drone applications through case studies and propose appropriate strategies to address challenges and achieve desired outcomes. • Design and execute case study-based projects to demonstrate practical implementation of drone applications, showcasing understanding and proficiency in utilizing drones for real-world scenarios.	11	5	0	0
	Total Marks	**34**	**15**	**0**	**0**
NOS6: Drone	**Drone Maintenance and Troubleshooting**:	11	5	0	0

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Equipment Safety and Maintenance	• Demonstrate understanding of the importance of maintenance and troubleshooting through written assessments or discussions. • Apply safety considerations and best practices learned to perform maintenance tasks and troubleshoot common drone issues effectively.				
	Equipment Inspection and Maintenance Procedures: • Conduct pre-flight inspections using a checklist and identify any potential issues or concerns with drone equipment. • Apply battery management knowledge to safely handle and maintain drone batteries, demonstrating proper charging, discharging, and storage practices.	11	5	0	0
	System Maintenance and Calibration: • Successfully inspect and maintain propulsion systems, including motors, propellers, and ESCs, demonstrating competence in identifying and resolving mechanical issues. • Perform sensor calibration procedures and troubleshoot flight controller and navigation system issues, ensuring accurate and stable drone operation. • Demonstrate proficiency in camera and gimbal maintenance by conducting care practices, calibrating equipment, and troubleshooting common issues to ensure optimal imaging quality and stability during flight.	11	5	0	0
	Total Marks	**33**	**15**	**0**	**0**
	Sub-Total	**200**	**90**	**0**	**0**
NOS7: Employability Skills	Employability Skills	0	0	0	50
NOS8: OJT/Major Project	Project	0	0	160	-
		200	**90**	**160**	**50**

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Grand Total	**500**

Annexure VII: Assessment Strategy

This section includes the processes involved in identifying, gathering, and interpreting information to evaluate the Candidate on the required competencies of the program.

Assessment of the qualification evaluates candidates to ascertain that they can integrate knowledge, skills and values for carrying out relevant tasks as per the defined learning outcomes and assessment criteria. The underlying principle of assessment is fairness and transparency. The evidence of the outcomes and assessment criteria. Competence acquired by the candidate can be obtained by conducting Theory (Online), Practical assessment, internal assessment, Project/Presentation/ Assignment, Major Project. The emphasis is on the practical demonstration of skills & knowledge gained by the candidate through the training. Each OUTCOME is assessed & marked separately. A candidate is required to pass all OUTCOMES individually based on the passing criteria.

About Examination Pattern:

1. The question papers for the theory exams are set by the Examination wing (assessor) of NIELIT HQS.
2. The assessor assigns the roll number.
3. The assessor carries out theory online assessments through remote proctoring methodology. Theory examination would be conducted online and the paper comprise of MCQ. Conduct of assessment are through trained proctors. Once the test begins, remote proctors have full access to candidate's video feeds and computer screens. Proctors authenticate the candidate based on registration details, pre-test image captured and I-card in possession of the candidate. Proctors can chat with candidates or give warnings to candidates. Proctors can also take screenshots, terminate a specific user's test session, or re-authenticate candidates based on video feeds.
4. An External Examiner/ Observer may be deployed including NIELIT officials for evaluation of Practical examination/ internal assessment / Project/ Presentation/. Major Project (if applicable) would be evaluated preferably by external/ subject expert including NIELIT officials.
5. Pass percentage would be 50% marks in each component.
6. Candidates may apply for re-examination within the validity of registration (only in the assessment component in which the candidate failed).

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7. For re-examination prescribed examination fee is required to be paid by the candidate only for the assessment component in which the candidate wants to reappear.

8. There would be no exemption for any paper/module for candidates having similar qualifications or skills.

9. The examination will be conducted in English language only.

Quality assurance activities: A pool of questions is created by a subject matter expert and moderated by other SME. Test rules are set beforehand. Random set of questions which are according to syllabus appears which may differ from candidate to candidate. Confidentiality and impartiality are maintained during all the examination and evaluation processes.

Annexure VIII: Acronym and Glossary

Acronym

Acronym	Description
AA	Assessment Agency
AB	Awarding Body
NCrF	National Credit Framework
NOS	National Occupational Standard(s)
NQR	National Qualification Register
NSQF	National Skills Qualifications Framework

Glossary

Term	Description
National Occupational Standards (NOS)	NOS define the measurable performance outcomes required from an individual engaged in a particular task. They list down what an individual performing that task should know and also do.
Qualification	A formal outcome of an assessment and validation process which is obtained when a competent body determines that an individual has achieved learning outcomes to given standards
Qualification File	A Qualification File is a template designed to capture necessary information of a Qualification from the perspective of NSQF compliance. The Qualification File will be normally submitted by the awarding body for the qualification.
Sector	A grouping of professional activities on the basis of their main economic function, product, service, or technology.

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