QUALIFICATION FILE–Standalone NOS

Introduction to IoT Application Development for Building Security

☐ Horizontal/Generic ☐Vertical/Specialization

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

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

NCrF/NSQF Level: 3.5

Submitted By:

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Section 1: Basic Details

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<tr><td>1.</td><td>NOS-Qualification Name</td><td colspan="2">Introduction to IoT Application Development for Building Security</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</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>National Qualification Register (NQR) Code & Version</td><td>NG-3.5-EH-02640-2024-V1-NIELIT</td><td>5. NCrF/NSQF Level: 3.5</td></tr>
<tr><td>6.</td><td>Brief Description of the Standalone NOS</td><td colspan="2">The upskilling program IoT Application Development for Building Security has been designed in collaboration with GROK Learning Pvt Ltd. to provide students with a comprehensive exploration of IoT applications in home and building automation. Students will gain practical insights into how IoT enhances comfort, convenience, and safety by studying electronics fundamentals, IoT gateways, microcontrollers, and communication protocols. The program also covers the use of AWS services and cloud computing for scalable IoT solutions. Through hands-on activities, such as developing smart appliances, automating systems, and implementing security features, students will acquire the skills needed to innovate and build their own IoT applications, advancing the future of smart building technology.</td></tr>
<tr><td>7.</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>1st year of 3-year diploma after 10th in Electronics and Commutation Engineering/ Electrical Engineering/ Computer Science/ Information Technology/ allied branches</td><td>NA</td></tr>
<tr><td>2</td><td>11 or equivalent</td><td>NA</td></tr>
<tr><td>3</td><td>10th grade pass and pursuing continuous schooling</td><td>NA</td></tr>
</table></td></tr>
</table>

		4 | 8th grade pass with two years of NTC plus 1 year NAC/CITS | NA 5 | NSQF Level 3 in Electronics and Commutation Engineering/ Electrical Engineering/ Computer Science/ Information Technology/ allied branches | 1.5 year relevant experience **b. Age: 18**
8.	**Credits Assigned to this NOS-Qualification, Subject to Assessment** *(as per National Credit Framework (NCrF))*	**2 Credits** **9. Common Cost Norm Category (I/II/III)** *(wherever applicable)***:** I (Electronics System Design)
10.	**Any Licensing Requirements for Undertaking Training on This Qualification** *(wherever applicable)*	The open source resources can be used. Annual subscription-based license to access IoT based cloud infrastructure may also be purchased.
11.	**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** **Training Delivery Mode** | **Theory (Hours)** | **Practical (Hours)** | **Total (Hours)** **Classroom (offline)** | **15** | **45** | **60** The mode of delivery shall be based on the regional demand and can be offered in any of the above modes mentioned.
12.	**Assessment Criteria**	**Theory (Marks)** | **Practical (Marks)** | **Project (Marks)** | **Viva (Marks)** | **Total (Marks)** | **Passing %age** **100** | **60** | **20** | **20** | **200** | **50** The centralised online assessment is conducted by the Examination Wing, NIELIT Headquarters.

13.	**Is the NOS Amenable to Persons with Disability**	☒ **Yes** ☐ **No** **If "Yes", specify applicable type of Disability:** **a.** Locomotor Disability: Leprosy Cured Person, Dwarfism, Muscular Dystrophy and Acid Attack Victims **b.** Visual Impairment: Low Vision	
14.	**Progression Path After Attaining the Qualification, wherever applicable**	IoT Support Engineer	
15.	**How will the participation of women 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.	
16.	**Other Indian languages in which the Qualification & Model Curriculum are being submitted**	Qualification files available in English & Hindi Language.	
17.	**Is similar NOS available on NQR-if yes, justification for this qualification**	☐**Yes** ☒ **No**	
18.	**Name and Contact Details Submitting / Awarding Body SPOC** *(In the case of CS or MS, provide details of both Lead AB & Supporting ABs)*	**From NIELIT** Name: Saket Saurabh Email: srv.saket@nielit.gov.in Contact No:011-25308300 Website: https://nielit.gov.in/ **From GROK** Name: Grok Learning Email: enquiry@grokstem.com	
19.	**Final Approval Date by NSQC: 30.05.2024**	**20. Validity Duration:** 3 years	**21. Next Review Date: 30.05.2027**

Section 2: Training Related

1.	**Trainer's Qualification and experience in the relevant sector (in years) (as per NCVET guidelines)**	B.E./B.Tech in Electrical/Electronics/IT/Comp. Sc. With 2 Years of relevant Experience and 1 year training/assessment experience. Diploma in Electrical/Electronics/IT/Comp.Sc. With 3 Years of relevant Experience and 2 year training/assessment experience.
2.	**Master Trainer's Qualification and experience in the relevant sector (in years) (as per NCVET guidelines)**	B.E./B.Tech in Electrical/Electronics/IT/Comp. Sc. With 3 Years of relevant Experience and 1 year training/assessment experience.
3.	**Tools and Equipment Required for the Training**	☒ Yes ☐No Available at Annexure-II
4.	**In Case of Revised NOS, details of Any Upskilling Required for Trainer**	Not Applicable

Section 3: Assessment Related

1.	**Assessor's Qualification and experience in relevant sector (in years)** *(as per NCVET guidelines)*	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.
2.	**Proctor's Qualification and experience in relevant sector (in years)** *(as per NCVET guidelines), (wherever applicable)*	
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 4: Evidence of the Need for the Standalone NOS

1.	**Government /Industry initiatives/ requirement (Yes/No):** Yes.
2.	**Number of Industry validation provided**: 15
3.	**Estimated number of people to be trained**: 1000 persons per year shall be trained.
4.	**Evidence of Concurrence/Consultation with Line Ministry/State Departments: NO** 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.

Section 5: 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/Supporting Document:** Standalone NOS- Performance Criteria Details Annexure/Document with PC-wise detailing as per NOS format (Mandatory- Public view)	*Available at* Annexure-VI: Performance Criteria
7.	**Annexure:** Performance and Assessment Criteria	*Available at* Annexure-VII: Detailed Assessment Criteria

	(Mandatory)	
8.	**Annexure:** Assessment Strategy *(Mandatory)*	*Available at* Annexure-VIII: Assessment Strategy
9.	**Annexure:** Acronym and Glossary *(Optional)*	*Available at* Annexure-IX: Acronym and Glossary
10.	**Supporting Document:** Model Curriculum	*Available at* Annexure-C: Model Curriculum

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	Learn how to apply IoT concepts to solve real-life Building and Security Automation Industry problems. Demonstrate electronics and software skills which are required to design and develop new IoT-based solutions or maintain and manage IoT applications in Building and Security Automation Industry.	Individuals will have knowledge of IoT architecture, working and configuration of components such as sensors, actuators and IoT Gateway	3.5
Professional and Technical Skills/ Expertise/ Professional Knowledge	Effectively apply concepts to build IoT applications for Building and Security Automation Industry. Work on new use cases to address real-life Building and Security Automation Industry challenges.	Individuals will be able to identify, select, configure and troubleshoot components involved in IoT applications for Building & Security Automation	3.5
Employment Readiness & Entrepreneurship Skills & Mind-set/Professional Skill	Understanding and awareness about emerging trends in Building & Security Automation industry. Ability to effectively communicate about ideas and possible solutions. Readiness to offer IoT services in the industry on their own	Individuals will be able to communicate and explain about IoT solutions. They can identify suitable job opportunities and apply for them. They will be able to identify opportunities to offer services in their individual capacity	3.5

Broad Learning Outcomes/ Core Skill	Individuals with IoT skills will contribute to organizational success and take up roles in the evolving landscape of Building and Security Automation industry.	This program prepares the candidates to adapt to current Building and Security Automation industry demands.	3.5
Responsibility	Ability to design new IoT applications for Building & Security Automation and able to manage and maintain existing IoT applications.	Individuals will be able to take complete responsibility for delivery and quality of own work and of the subordinates. Shares responsibility for the group tasks.	3.5

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

List of Tools and Equipment

Batch Size: 30

S. No.	Tool / Equipment Name	Specification	Quantity for specified Batch size
1	Classroom	1 (750Sq. ft to 1000 Sq. ft.)	30
2	Students Chair	30	30
3	Students Table	15 (2 students sharing 1 table)	15
4	Desktop computer with accessories / Laptop	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.	15
5	Cloud Based IoT Infrastructure	Complete stack comprising of circuit building software, no-code block level programming software, Python editor and knowledge-based modules on IoT Application Development for Building Security. IoT content with web application management interface using cloud based IoT services.	Should support multiple concurrent logins.
6	Hardware	Microprocessors and Sensors like Temperature and Humidity Sensor, LDR Sensor, Raindrop Sensor, Hall effect Sensor, Motion Sensor, Energy Meter, Camera, Keypad and components like Servo Motor, DC Motor, Buzzer, LED Module, Relay, Limit Switch.	15

7	Cloud connected working industry applications	Build solutions for Building and Security Automation Industry such as: - How to build smart appliance - Door /Curtain Automation - Smart Ac - Smart Lights - Door security using digital lock - Smart Roof Automation - Fire sprinkler Automation - Water level for building - Energy Monitoring - Complete Smart Home Automation.	10
8	Internet Connectivity	Seamless internet with at least 100Mbps without firewall	

Classroom Aids for offline and blended mode of training:

The aids required to conduct sessions in the classroom are:

1. LCD Projector/Smart Board

Annexure III: Industry Validations/ Government Recognition Summary

S. No	Organization Name	Representative Name	Designation	Contact Address	Contact Phone No	E-mail ID
1	B G Infotech	Amal Das	Centre Head	Kakdihi, Mecheda, Purba Medinipur	9434996748	bginfotech2007@gmail.com
2	EcoTec Industries	KSH Haimo	Proprietor	Khabam Lamkhai, Imphal East, Manipur-795002	9436437574	ecotecKhabarh@gmail.com
3	Elite Computers And Communications Pvt. Ltd.	Hrishikesh Sarma	Sr. sales executive	Sohum Residency, 1st Floor, R.G. Baruah Road, Near Sundarpur Bus-Stop, Above Jeep Show Room, Guwahati- 781005, Assam	9854054283	info@eccpl.co.in
4	L&T Skill Trainers	B A Damahe	Head L&T	Madh Campus	9833078355	bhuvan.damahe@larsentoubro.com

	Academy		STA	Near Custom House, Versova Creek Madh Jetty Madh, Mumbai-400061, India		
5	M/S.Peleecon Linkers	MILIND R.HEBLI	PROPRIETOR	213,"Krishna",Laxmi Industrial Complex,Pokhran Road No.1,Vartaknagar, THANE – 400 606.	98200 95454	milindhebli66@gmail.com
6	Process Precision Instruments	Jay Jain	Business Development Head	101 Diamond Industrial Estate, Navghar, Vasai Road (E), Palghar401210, Maharashtra	9930880079	jayjain@ppiindia.net
7	PRO PLATERS LLP	Rajesh Dattaram Kesarkar	Partner	PLOT NO. 5, SHIRODA INDUSTRIAL ESTATE, SHIRODA GOA - 403103	922897176	-
8	BAPL ROTOTECH PVT LTD	Santosh Sharma	Sr. Vice President	Plot 186-B, Industrial Growth Centre, Sector 1Pithampur, Dhar, Madhya Pradesh-454775	8408886301	santosh.sharma@baplrototech.com
9	The Supreme Industries Ltd.	Sudhir Kanvinde	Chief Information Officer (CIO)	1141, 1142 Solitaire Corporate park, Chakala, Andheri (East), Mumbai-400093	9167233494	kanvinde@supreme.co.in
10	Infoway IT Solutions	Prakash Chandra Tiwari	Director	UD Complex, Miao Singpho Village, Miao and Distt: Changlang (A.P)	8414859601	infowayitsolutionsmiao@gmail.com
11	M/S Placement cum Security Agency	Bamang Taniang	Proprietor	Near Tirap Festival Ground, Senki Park, Itanagar-791111, Arunachal Pradesh	9436050047	btaniang@gmail.com
12	Prasanthi Polytechnic	D Prasad	Principal	Duppituru (Vill), Aichutapuram (Md), Visakhapatnam (Dist), Andhra pradesh _ 531011	9849952573	Prasadreddy.1279@gmail.com
13	Surekha IT	Anjani K	Manager	8-3-191/84/302, Sharan	8125134134	info@surekhaitservices.com

	Services			Residency, Vengalrao Nagar, Hydrabad-500038, Telangana		
14	Tech Booster Education Private Limited	Monoj Dutta	Director	JONALI, ZOO ROAD, GUWAHATI, ASSAM	7002098953	monoj@techbooster.co.in
15	AISECTLtd.	Teena Panthi	Assistant Manager	1-1-387, 3rd Floor, Flat no. 403/404, GNR Heights, Above SBI, Bakaram Road, Musheerabad, Hyderabad - 500020	7879982075	teena.panthi@aisect.org

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Annexure IV: Training Details

Training Projections:

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

Refer NCVET "Guidelines for Blended Learning for Vocational Education, Training & Skilling" available on:

S. No.	Select the Components of the NOS	List Recommended Tools – for all Selected Components	Offline: Online Ratio
1	Theory/ Lectures - Imparting theoretical and conceptual knowledge	Online interaction platforms like Zoom,	00:100

		Google Meet	
2	Imparting Soft Skills, Life Skills and Employability Skills /Mentorship to Learners	NA	NA
3	Showing Practical Demonstrations to the learners	Online interaction platforms like Zoom, Google Meet	00:100
4	Imparting Practical Hands-on Skills/ Lab Work/ workshop/ shop floor training	PCs/Laptops, Internet, Cloud based IoT infrastructure using circuit building software, no-code block level programming software, Python direct IDE, knowledge-based modules on IoT content with mobile interface for cloud based remote management of Building and Security Automation Industry IoT applications	50:50
5	Tutorials/ Assignments/ Drill/ Practice	Online interaction platforms like Zoom, Google Meet	00:100
6	Proctored Monitoring/ Assessment/ Evaluation/ Examinations	Examination	50:50
7	On the Job Training (OJT)/ Project Work Internship/ Candidate Training	Provide a Building and Security Automation Industry IoT solution and showcase it to address practical industry issues.	100:00

Annexure VI: Standalone NOS- Performance Criteria details

1. Description:

The Standalone NOS equips students with essential skills in electronics, software, problem-solving, and entrepreneurship for the evolving Building Automation and Security IoT industry. It offers a comprehensive understanding of IoT applications in home and building automation, showcasing how IoT technology enhances comfort, convenience, and safety through practical examples. By covering fundamentals such as electronics, IoT gateways, microcontrollers, and communication protocols, students are prepared to develop sophisticated IoT solutions. They will also learn to use AWS services and cloud computing for scalable IoT deployment, understand sensor principles for smart appliances and security systems, and engage in hands-on activities like building smart appliances, automating features, and implementing smart security systems. This NOS empowers students to innovate and create their own IoT applications, shaping the future of home and building automation and security.

2. Scope:

The scope of this course entails immersive learning experiences in electronics and software skills, emphasizing practical applications of sensor principles, microcontroller utilization, communication protocols, and seamless integration of cloud computing. Through hands-on activities and projects, students will gain proficiency in developing sophisticated IoT solutions for building automation and security. By mastering these essential concepts and techniques, students will be well-equipped to address the evolving demands of the industry and contribute effectively to the advancement of smart building technologies.

3. Elements and Performance Criteria

Advanced Skills for Deploying and Managing Building Automation and Security IoT Solutions

- PC1. Ability to build industry solutions that address real Building Automation and Security Industry challenges:

Demonstrating the capacity to identify and address specific challenges in building automation and security through the development of IoT solutions, such as energy management, access control, surveillance, and emergency response, to enhance safety, efficiency, and convenience in building operations.

- PC2. Have strong analytical abilities and the capacity to troubleshoot technical problems in roles pertaining to the Internet of Things:

Possessing analytical skills to diagnose and troubleshoot technical issues that may arise in the deployment and management of building automation and security IoT solutions, ensuring reliable operation and timely resolution of issues to maintain system integrity and functionality.

- PC3. Utilize web and mobile interfaces for IoT solution execution and monitoring:

Proficiency in utilizing web and mobile interfaces to interact with and monitor IoT solutions deployed in building automation and security systems, enabling remote management, real-time monitoring, and actionable insights for building owners, operators, and security personnel.

- PC4. Ability to select a communication protocol (e.g., LoRaWAN, USB, Bluetooth) based on the Building Automation and Security Industry IoT application:

Understanding the specific requirements of building automation and security applications to select the most suitable communication protocol, considering factors like range, data rate, security, and interoperability.

- PC5. Acquire knowledge about Cloud-based IoT services supporting MQTT protocol:

Gaining knowledge of cloud platforms that support MQTT (Message Queuing Telemetry Transport) protocol, enabling seamless integration of IoT devices with cloud infrastructure for data storage, analysis, and remote management in building automation and security systems.

Programming Proficiency for Building Automation and Security IoT Development

- PC6. Proficiency in utilizing no-code block programming software tools

This skill enables rapid prototyping, customization, and deployment, eliminating the necessity for extensive coding expertise.

- PC7. Developing a working knowledge of programming languages like Python

This skill is essential for creating customized software components and scripts to augment the functionality and intelligence of building automation and security IoT applications. This includes tasks such as data analysis, pattern recognition, and automation enhancements.

Foundational Skills in IoT for Building Automation and Security

-PC8. Understand the need for Building Automation and Security IoT:

Recognizing the importance and relevance of building automation and security IoT in enhancing safety, comfort, and efficiency in buildings, including applications such as energy management, access control, surveillance, and emergency response.

- PC9. Knowledge of the essential building blocks of an IoT application:

Understanding the fundamental components and principles of IoT applications in building automation and security, including sensor technologies, communication protocols, data management techniques, and integration with existing building systems and infrastructure.

- PC10. Identify the necessary sensors for Building Automation and Security Industry like Climate Sensor, Gas sensor-Analog, IR sensor, Flow sensor, LDR Sensor, Pressure Sensor, PIR sensor, Raindrop Sensor, Sound Sensor, Soil Moisture Sensor, Temperature Sensor, Vibration Sensor, Flame Sensor, Weight Sensor, and components and learn to design proper working circuits for IoT applications using circuit building software:

Identifying the appropriate sensors and components required for specific building automation and security applications, such as environmental monitoring, occupancy detection, and threat detection, and designing functional circuits using circuit building software to integrate these sensors into IoT systems effectively, ensuring accurate data collection and actionable insights for building management and security personnel.

Knowledge and Understanding (KU):

KU1. Understanding IoT's Impact:

- Understanding the transformative impact of IoT technology on building automation and security, including its potential to enhance safety, efficiency, and convenience in building operations through data-driven insights, automation, and remote management capabilities.

KU2. Hands-On experience in IoT Application Development:

- Gaining practical experience in developing IoT applications for building automation and security, from conceptualization and design to implementation and deployment, through hands-on projects and experimentation with IoT hardware, software, and platforms.

KU3. Electronics Fundamentals and Sensor Technology:

- Developing a comprehensive understanding of electronics fundamentals and sensor technology, including circuitry, analog and digital signals, sensor characteristics, and measurement techniques, essential for designing and implementing IoT systems in building automation and security applications.

KU4. Familiarity with IoT Communication Protocols and Microcontrollers:

- Acquiring familiarity with a range of IoT communication protocols and microcontroller platforms commonly used in building automation and security IoT applications, understanding their functionalities, advantages, and limitations, and selecting the most suitable options based on application requirements and constraints.

KU5. Understanding Programming and Software Stack for IoT:

-Understanding the programming languages, software architectures, and development frameworks relevant to IoT applications in building automation and security, enabling the development and integration of software components for data processing, analysis, and interaction with connected devices and services in building automation and security IoT systems.

Generic Skills (GS):

GS1. Problem-solving:

- Enhancing problem-solving abilities to identify, analyze, and address challenges encountered in building automation and security IoT development, employing systematic approaches and critical thinking skills to optimize solutions and achieve desired outcomes.

GS2. Technical Proficiency:

- Gaining practical skills in electronics, programming, and cloud computing essential for navigating the technical complexities of building automation and security IoT development, enabling effective design, implementation, and management of IoT systems tailored to building automation and security needs

GS3. Innovation:

- Fostering creativity and innovative thinking to devise novel solutions for real-world challenges in building automation and security, leveraging IoT technologies to improve safety, efficiency, and comfort in buildings and enhance security measures and emergency response capabilities.

GS4. Project Management:

- Developing project management competencies to plan, execute, and evaluate building automation and security IoT projects effectively, considering factors such as regulatory compliance, security requirements, interoperability with existing building systems, and stakeholder engagement.

GS5. Communication:

- Improving communication skills to convey complex concepts, ideas, and project requirements effectively to diverse audiences in the building automation and security industry, including building owners, facility managers, security personnel, and technology providers, fostering collaboration and facilitating the adoption of IoT solutions to address building automation and security challenges.

Annexure VII: Assessment Criteria

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

SNOS Name & Code	Assessment Criteria for Performance Criteria	Theory Marks	Practical Marks	Project Marks	Viva Marks
Introduction to IoT Application Development for Building Security NOS Code: **NIE/ELE/N0519**	*Advanced Skills for Deploying and Managing Home and Building IoT Solutions*	**20**	**20**	**20**	**-**
	PC1. Ability to build industry solutions that address real Building Automation and Security Industry challenges.	-	-	-	-
	PC2. Have strong analytical abilities and the capacity to troubleshoot technical problems in roles pertaining to the Internet of Things.	-	-	-	-
	PC3. Utilize web and mobile interfaces for IoT solution execution and monitoring	-	-	-	-
	PC4. Ability to select a communication protocol (e.g., LoRaWAN, USB, Bluetooth) based on the Building Automation and Security Industry IoT application	-	-	-	-
	PC5. Acquire knowledge about Cloud-based IoT services supporting MQTT protocol	-	-	-	-
	Programming Proficiency for Building Automation and Security IoT Development	**30**	**40**	**-**	**-**
	PC6. Proficiency in utilizing no-code block programming software tools.	-	-	-	-
	PC7. Developing a working knowledge of programming languages like	-	-	-	-

	Python				
	Foundational Skills in IoT for Building Automation and Security	**50**		**-**	**20**
	PC8. Understand the need for Building Automation and Security IoT	-	-	-	-
	PC9. Knowledge of the essential building blocks of an IoT application.	-	-	-	-
	PC10. Identify the necessary sensors for Building Automation and Security Industry like Climate Sensor, Gas sensor-Analog, IR sensor, Flow sensor, LDR Sensor, Pressure Sensor, PIR sensor, Raindrop Sensor, Sound Sensor, Soil Moisture Sensor, Temperature Sensor, Vibration Sensor, Flame Sensor, Weight Sensor, and components and learn to design proper working circuits for IoT applications using circuit building softwar**.**	-	-	-	-
	Total Marks-200	**100**	**60**	**20**	**20**

Annexure VIII: 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 and Practical examinations.

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 assessments. Theory examination would be conducted online, and the paper comprise of MCQ.
4. The assessor carries out practical assessments. Practical examination would be conducted 100% offline creating own IoT solutions and

successful demonstration of the same.

5. Pass percentage would be 50% marks.
6. 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 IX: 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.