QUALIFICATION FILE–Standalone NOS

Essentials of IoT Application Development

☐ 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: 5

Submitted By:

NATIONAL INSTITUTE OF ELECTRONICS AND INFORMATION TECHNOLOGY (NIELIT)

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Section 1: Basic Details

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<tr><td>1.</td><td>NOS-Qualification Name</td><td colspan="2">Essentials of IoT Application Development</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-05-EH-02894-2024-V1-NIELIT</td><td>5. NCrF/NSQF Level: 5</td></tr>
<tr><td>6.</td><td>Brief Description of the Standalone NOS</td><td colspan="2">The nature of developing this course involves creating a comprehensive curriculum that addresses both theoretical concepts and practical skills essential for understanding and working with the Internet of Things (IoT). The course is designed to cover a wide range of topics, from the basic architecture and communication protocols of IoT systems to advanced subjects such as edge computing, security, and data analytics.The course aims to equip students with the knowledge and practical skills needed to design, develop, and manage IoT systems effectively.</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>2nd year of UG in Electronics and Communication Engineering/ Electrical Engineering/CS/IT/Physics/Electronics and allied branches</td><td>NA</td></tr>
<tr><td>2</td><td>3 Years of Diploma in Electronics and Communication Engineering/ Electrical Engineering/CS/IT/Physics/Electronics and allied branches after class 10th</td><td>1.5 Years</td></tr>
<tr><td>3</td><td>2 Year of diploma in Electronics and Communication Engineering/ Electrical Engineering/CS/IT/Physics/Electronics and allied branches after class 12th</td><td>NA</td></tr>
<tr><td>4</td><td>NSQF Level 4.5 in Electronics and Communication Engineering/ Electrical Engineering/CS/IT/Physics/Electronics and allied branches</td><td>1.5 Years</td></tr>
</table></td></tr>
</table>

<table>
<tr><td></td><td></td><td>
<table>
<tr><td>5</td><td>NSQF Level 4 Electronics and Communication Engineering/ Electrical Engineering/CS/IT/Physics/Electronics and allied branches</td><td>1.5 Years</td></tr>
</table>
b. Age:18 years
</td></tr>
<tr><td>8.</td><td>Credits Assigned to this NOS-Qualification, Subject to Assessment (as per National Credit Framework (NCrF))</td><td>2 Credits</td><td>9. Common Cost Norm Category (I/II/III) (wherever applicable):
Category I (Electronics System Design)</td></tr>
<tr><td>10.</td><td>Any Licensing Requirements for Undertaking Training on This Qualification (wherever applicable)</td><td colspan="2">NA</td></tr>
<tr><td>11.</td><td>Training Duration by Modes of Training Delivery (Specify Total Duration as per selected training delivery modes and as per requirement of the qualification)</td><td colspan="2">☒Offline ☐ Online ☐ Blended
<table>
<tr><th>Training Delivery Mode</th><th>Theory (Hours)</th><th>Practical (Hours)</th><th>Total (Hours)</th></tr>
<tr><td>Classroom (offline)</td><td>30</td><td>30</td><td>60</td></tr>
</table>
Training shall be conducted in any of the 3 modes depending on the regional need.

(Refer Blended Learning Annexure-V for details)</td></tr>
<tr><td>12.</td><td>Assessment Criteria</td><td colspan="2">
<table>
<tr><th>Theory (Marks)</th><th>Practical (Marks)</th><th>Project/ Presentation /Assignment (Marks)</th><th>Viva/ Internal Assessment (Marks)</th><th>Total (Marks)</th><th>Passing %age</th></tr>
<tr><td>100</td><td>60</td><td>20</td><td>20</td><td>200</td><td>50</td></tr>
</table>
The centralized online assessment is conducted by the Examination Wing, NIELIT Headquarters.</td></tr>
<tr><td>13.</td><td>Is the NOS Amenable to Persons with Disability</td><td colspan="2">☒ 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</td></tr>
<tr><td>14.</td><td>Progression Path After Attaining the Qualification, wherever applicable</td><td colspan="2">Embedded Software Engineer</td></tr>
</table>

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 file 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)*	**Name:** Rajesh M **Email:** rajesh.m@nielit.gov.in **Website:** https://nielit.gov.in/ **Name:** Anirban Jyoti Hati **Email:** anirban@nielit.gov.in **Website:** https://nielit.gov.in/ **Name:** Ankit Kumar **Email:** ankit@nielit.gov.in **Website:** https://nielit.gov.in/	
19.	**Final Approval Date by NSQC: 25.07.2024**	**20. Validity Duration: 3 years**	**21. Next Review Date: 25.07.2027**

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 Electronics/ Electronics & Communication/ Electrical/ Electrical and Electronics/Instrumentation/ Electronics & Instrumentation / Instrumentation & Control /Computer Science/Information Technology Minimum 2 year of experience in the field of Embedded System Design & IoT
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 /Computer Science/Information Technology Minimum 3 year of experience in the field of Embedded System Design & IoT
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)*	B.Tech or Equivalent as per NCrF + 3 years 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 4: Evidence of the Need for the Standalone NOS

1.	Government /Industry initiatives/ requirement (Yes/No): Yes, Available at Annexure-A: Evidence of Need
2.	Number of Industry validations provided: 8
3.	Estimated number of people to be trained: 500 persons per year shall be trained.
4.	Evidence of Concurrence/Consultation with Line/State Departments (In case of regulated sectors): 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.
5.	Latest Skill Gap Study (not older than 2 years) (Yes/No): Yes, Available in Annexure-A: Evidence of Need
6.	Latest Market Research Reports or any other source (not older than 2 years) (Yes/No): Yes, Available at Annexure-A: Evidence of Need

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: Standalone NOS- Performance Criteria details
7.	**Annexure:** Performance and Assessment Criteria *(Mandatory)*	*Available at* Annexure-VII: Detailed Assessment Criteria
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	• Acquire knowledge of various types of sensors (environmental, biomedical, motion sensors, etc.) and the criteria for selecting the appropriate sensor for a specific application. • Gain practical experience with middleware solutions like Pub/Sub, message brokers, and data processing tools. • Understand and apply regulatory compliance requirements in IoT application development, ensuring that solutions adhere to data ownership, consent, and privacy regulations.	• This outcome ensures that students can theoretically grasp the diverse nature of sensors and the critical thinking process involved in selecting the right sensor for different IoT applications. • It emphasizes the importance of middleware in the IoT ecosystem and provides students with the theoretical foundation needed to implement and utilize these tools effectively. • It prepares students to navigate the regulatory landscape and apply compliance measures in their IoT projects, ensuring that their solutions are legally sound and respect user privacy and data rights.	5
Professional and Technical Skills/ Expertise/ Professional Knowledge	• Ability to design comprehensive IoT systems that address specific application requirements and challenges. • Expertise in integrating various components such as sensors, actuators, and microcontrollers within the IoT framework. • Ensure interoperability between different IoT devices and systems by mastering various protocol standards.	• This outcome highlights the technical acumen required to conceptualize, plan, and execute IoT projects effectively, ensuring that students can design robust and tailored solutions. • It showcases the technical expertise needed to implement and manage complex IoT infrastructures, emphasizing the ability to work with diverse hardware and software components.	5
Employment Readiness & Entrepreneurship Skills & Mind-set/Professional Skill	• Ensures candidates are technically adept and can contribute to complex IoT projects immediately upon employment. • Equips entrepreneurs with the knowledge to	• This outcome prepares candidates for immediate productivity in IoT roles, whether in employment or entrepreneurship, by ensuring they possess the technical acumen to tackle challenging projects effectively.	5

	build secure IoT solutions that gain consumer trust and comply with regulations, crucial for business success. • Empowers entrepreneurs to leverage data-driven insights for business decisions, enhancing product development and market competitiveness.	• This outcome emphasizes the dual focus on technical expertise and business acumen, preparing candidates to address security challenges in IoT environments, whether in employment or entrepreneurship.	
Broad Learning Outcomes/ Core Skill	• Acquire a comprehensive understanding of IoT architecture, components, and communication models, ensuring the ability to design robust IoT systems. • Gain proficiency in integrating IoT devices, sensors, and actuators with embedded systems, considering aspects like signal conditioning, amplification, and calibration. • Develop skills to handle data collection, storage, and management using databases and time series data, ensuring efficient and reliable data handling in IoT systems.	• Understanding IoT architecture is foundational knowledge essential for designing and developing IoT systems. It forms the backbone for integrating various components and ensuring system efficiency and reliability. • Integrating IoT devices with embedded systems requires expertise in hardware-software interaction, signal processing, and data handling. • Efficient data management is a core aspect of IoT systems. Skills in data collection, storage, and management are essential for handling large volumes of data generated by IoT devices, ensuring data accuracy, accessibility, and security.	5
Responsibility	• Ensure the proper selection and integration of sensors and actuators with IoT systems. This involves considering factors such as signal conditioning, amplification, and calibration. • Address privacy challenges by ensuring data ownership and consent are managed in compliance with regulations. Develop policies and practices to safeguard user data and maintain user trust.	• Takes complete responsibility for delivery and quality of own work and output as also the subordinates. • Shares responsibility for the group tasks.	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 (750 Sq. 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	Internet Connectivity	Seamless internet connectivity with at least 100 Mbps without firewall	
6	Development Board & Tools	IoT development kits, sensors (environmental, biomedical, motion), IoT platforms (AWS IoT, Azure IoT, Google Cloud IoT), databases for data storage, machine learning libraries, and access to documentation on IoT protocols and standards.	15

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	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,	7879982075	Teena.panthi@aisect.org

				Musheerabad, Hydrabad-500020		
3	B. G. Infotech	Amal Das	Centre Head	Kakdihi, Mecheda, Purba, Medinipur	9434996748	Bginfotech2007@gmail.com
4	Devendra Nath Institute of Information Mation Technology (DNIIT)	Amit Kumar Tripathy	Director	Uska Road, Near Naveen Sabji Mandi, Tetari Bazar, Siddharth Nagar-272207	8765562815	aktjob@gmail.com
5	Inditech Software Wizard Pvt. Ltd.	Sandip Ghosh	Course Coordinator	Mohiari Chanpiritala, Po: Andul Mouri, PS: Domjur, Distt: Howrah, West Bengal-711302	9230027415	swizardrecruitment@gmail.com
6	Prasanthi Polytechnic	D. Prasad	Principal	Duppituru (Vill), Atchutapuram (Md). Visakhapatnam (Dist), Andhara Pradesh-531011	9849952573	prasadreddy.1279@gmail.com
7	Sidhi Vinayak Academy	Neha Verma	Director	Shiv Narayan Kunj, B Block, Shivaji Nagar, Hethu, Ranchi, JH-834002	8789837772	sidhiacadmey@gmail.com
8	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	200	20
2025-26	500	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:

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.	70:30
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.	70:30
3	Showing Practical Demonstrations to the learners	Through Virtual Software and Online interaction platforms like JitSi Meet, Bharat VC, Google Meet, MS Teams, etc.	70:30
4	Imparting Practical Hands-on Skills/ Lab Work/ workshop/ shop floor training	Through Virtual Software and Online interaction platforms like JitSi Meet, Bharat VC, Google Meet, MS Teams, etc.	70:30
5	Tutorials/ Assignments/ Drill/ Practice	Online interaction platforms like JitSi Meet, Bharat VC, Google Meet, MS Teams, etc.	70:30
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	Virtual Software Platform	Either 100% online in a virtual environment Or 100% offline in the Industry.

Annexure VI: Standalone NOS- Performance Criteria details

1. Description

This NOS provides a comprehensive understanding of the Internet of Things (IoT) landscape. The course covers the evolution, applications, challenges, and opportunities of IoT. It delves into IoT architecture, communication models, protocols, devices, sensors, and security measures. Students will engage in hands-on exercises with IoT platforms, middleware, and data management tools, exploring real-world case studies and developing practical IoT applications.

2. Scope

The scope of this course is to prepare students for various roles in the IoT industry, including IoT development, system integration, data analysis, and project management, fostering a deep understanding of the interconnected world of IoT.

3. Elements and Performance Criteria

IoT Architecture and Communication Models:

- Identify and explain various real-world applications of IoT across different industries.
- Describe the architecture of an IoT system and the role of each component.
- Implement basic IoT communication using one of the studied protocols in a hands-on exercise.

IoT Devices and Sensors

- Demonstrate the setup and configuration of IoT devices in a practical project.
- Design a small-scale IoT project incorporating appropriate sensors based on project requirements.
- Implement a simple edge computing solution as part of a hands-on project.

IoT Security and Privacy

- Identifying IoT Security Threats and Vulnerabilities and list common security threats and vulnerabilities in IoT systems.
- Describe advanced security measures such as blockchain, secure boot, and secure firmware updates.
- Apply advanced security techniques to an IoT project to enhance its security posture.

4. **Knowledge and Understanding (KU):**

The individual on the job needs to know and understand:

IoT Architecture and Communication Models

- Recognize and articulate the diverse applications of IoT across various industries, such as healthcare, agriculture, and smart cities.
- Gain a detailed understanding of the components of an IoT system, including sensors, actuators, gateways, and their interactions.
- Acquire practical skills in implementing basic communication using IoT protocols through hands-on exercises.

IoT Devices and Sensors

- Learn how to integrate sensors and actuators with embedded systems, focusing on signal conditioning, amplification, and calibration.
- Understand the principles of operation, characteristics, and common types of sensors used in IoT (e.g., environmental, biomedical, motion sensors).
- Develop skills to implement simple edge or fog computing solutions in IoT projects.

IoT Security and Privacy

- Understand common security threats and vulnerabilities associated with IoT systems.
- Learn about key IoT standards and protocols and their applications in ensuring interoperability and security.
- Acquire practical skills to apply advanced security measures in IoT projects to enhance overall security and privacy.

5. Generic Skills (GS):

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

Problem-Solving and Analytical Skills

- Develop the ability to analyze complex problems, identify key issues, and devise effective solutions in the context of IoT.
- Enhance skills in diagnosing and resolving technical issues related to IoT devices, communication protocols, and network configurations.
- Gain proficiency in analyzing IoT data, using statistical and analytical tools to derive meaningful insights and make data-driven decisions.

Technical Communication Skills

- Learn to document IoT system architectures, design choices, and implementation details clearly and concisely.
- Develop skills to prepare comprehensive reports and presentations on IoT projects, including technical specifications, performance metrics, and outcomes.

- Improve the ability to communicate technical information effectively to both technical and non-technical stakeholders, fostering collaboration and teamwork.

Project Management Skills

- Gain skills in planning and organizing IoT projects, including setting goals, defining deliverables, and managing timelines.
- Learn to allocate and manage resources effectively, including hardware, software, and human resources, to ensure project success.
- Develop the ability to identify potential risks in IoT projects and implement strategies to mitigate them, ensuring project continuity and success.

Annexure VII: Assessment Criteria

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

NOS/Module Name	Assessment Criteria for Performance Criteria	Theory Marks	Practical Marks	Project /Presentation /Assignment Marks	Viva/ Internal Assessment (Marks)
NOS1: Essentials of IoT Application Development NOS Code: NIE/ELE/N0522	*IoT Architecture and Communication Models:*	**30**	**20**	-	**6**
	Identify and explain various real-world applications of IoT across different industries.	-	-	-	-
	Describe the architecture of an IoT system and the role of each component.	-	-	-	-
	Implement basic IoT communication using one of the studied protocols in a hands-on exercise.	-	-	-	-
	IoT Devices and Sensors	**40**	**20**	-	**7**
	Demonstrate the setup and configuration of IoT devices in a practical project.	-	-	-	-
	Design a small-scale IoT project incorporating appropriate sensors based on project requirements.	-	-	-	-

	Implement a simple edge computing solution as part of a hands-on project.	-	-	-	-
	IoT Security and Privacy	**30**	**20**	-	**7**
	Identifying IoT Security Threats and Vulnerabilities and list common security threats and vulnerabilities in IoT systems.	-	-	-	-
	Describe advanced security measures such as blockchain, secure boot, and secure firmware updates.	-	-	-	-
	Apply advanced security techniques to an IoT project to enhance its security posture.	-	-	-	-
		100	**60**	**20**	**20**
NOS Total		**200**			

Annexure VIII: Assessment Strategy

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 and practical exams are set by the Examination wing (assessor) of NIELIT HQS.

2. The assessor assigns 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).

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 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.