QUALIFICATION FILE–Standalone NOS

Essentials of Embedded System for Automotive Electronics

☐ **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

1.	**NOS-Qualification Name**	**Essentials of Embedded System for Automotive Electronics**	
2.	**Sector/s**	Electronics	
3.	**Type of Qualification** ☒ **New** ☐ **Revised**	**NQR Code & version of the existing /previous qualification:** NA	**Qualification Name of the existing/previous version:** NA
4.	**National Qualification Register (NQR) Code & Version**	NG-05-EH-02898-2024-V1-NIELIT	**5. NCrF/NSQF Level: 5**
6.	**Brief Description of the Standalone NOS**	This comprehensive NOS delves into Embedded Automotive Applications, covering hardware development platforms, automotive requirements, and challenges. Students explore Development Boards, Automotive Sensors, and hardware tools and software suites while mastering Automotive Power Management and Compliance Standards. The course also provides an in-depth understanding of AutoSAR, focusing on its significance in automotive embedded systems and utilizing AutoSAR Configuration Tools for seamless integration.	
7.	**Eligibility Criteria for Entry for a Student/Trainee/Learner/Employee**	**a. Entry Qualification & Relevant Experience:**	

S. No.	Academic/Skill Qualification (with Specialization - if applicable)	Relevant Experience (with Specialization - if applicable)
1	2nd year of UG in Electronics and Communication Engineering/ Electrical Engineering/CS/IT/Physics/Electronics and allied branches	NA
2	3 Years of Diploma in Electronics and Communication Engineering/ Electrical Engineering/CS/IT/Physics/Electronics and allied branches after class 10th	1.5 Years
3	2 Year of diploma in Electronics and Communication Engineering/ Electrical Engineering/CS/IT/Physics/Electronics and allied branches after class 12th	NA
4	NSQF Level 4.5 in Electronics and Communication Engineering/ Electrical Engineering/CS/IT/Physics/Electronics and allied	1.5 Years

	branches	
5	NSQF Level 4 Electronics and Communication Engineering/ Electrical Engineering/CS/IT/Physics/Electronics and allied branches	1.5 Years

b. Age:18 years

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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)*: Category I (Electronics System Design)
10.	**Any Licensing Requirements for Undertaking Training on This Qualification** *(wherever applicable)*	NA	

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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)	30	30	60

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

(Refer Blended Learning Annexure-V for details)

12. Assessment Criteria

Theory (Marks)	Practical (Marks)	Project/ Presentation /Assignment (Marks)	Viva/ Internal Assessment (Marks)	Total (Marks)	Passing %age
100	60	20	20	200	50

The centralized online assessment is conducted by the Examination Wing, NIELIT Headquarters.

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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**	Embedded Software 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 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 Systems & Automotive Electronics
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 Systems & Automotive Electronics
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	• Graduates should possess a deep theoretical knowledge of the specific requirements and challenges associated with developing embedded systems for automotive applications. • Students should demonstrate a theoretical understanding of the AutoSAR standard and its importance in automotive embedded systems. • Individuals should have a solid theoretical grasp of safety-critical aspects of automotive hardware development, as well as compliance testing and certification requirements.	• This outcome emphasizes the acquisition of in-depth theoretical knowledge of the specific requirements and challenges associated with developing embedded systems for automotive applications. • This outcome focuses on students demonstrating a theoretical understanding of the AutoSAR standard and its importance in automotive embedded systems. This involves grasping the theoretical underpinnings of AutoSAR, including its structure, functionality.	5
Professional and Technical Skills/ Expertise/ Professional Knowledge	• Ability to develop embedded automotive applications utilizing various hardware development platforms and boards. • Proficiency in conducting compliance testing and preparing systems for certification requirements. • Ability to integrate AutoSAR components and configure systems for optimal performance and reliability in automotive applications.	• Skilled in practical development and implementation, from prototyping to final deployment, ensuring functional and robust automotive embedded systems. • Skilled in using various testing tools and methodologies to ensure systems meet required safety and performance standards. • Proficient in configuring systems to meet AutoSAR standards, ensuring compatibility and performance optimization.	5

Employment Readiness & Entrepreneurship Skills & Mind-set/Professional Skill	• Develop an in-depth knowledge of embedded automotive applications, including the role of hardware development platforms and automotive-specific requirements. • Gain proficiency in automotive-specific hardware development tools, software suites, and simulation/testing tools to ensure reliable and efficient system performance. • Ensure all automotive embedded systems are designed and implemented in compliance with safety-critical aspects and certification requirements.	• Developing in-depth knowledge of embedded automotive applications and understanding the role of hardware development platforms equips individuals with specialized expertise sought after by automotive companies. • Gaining proficiency in automotive-specific hardware development tools, software suites, and simulation/testing tools enhances individuals' technical skills and readiness for employment. • The focus on ensuring compliance with safety-critical aspects and certification requirements is crucial for entrepreneurship and employment readiness in the automotive sector.	**5**
Broad Learning Outcomes/ Core Skill	• Effectively utilize development board's specific to automotive applications, ensuring integration with sensors, interfaces, and power management systems. • Ensure all designs and implementations meet certification requirements for automotive systems, maintaining industry standards and regulatory compliance. • Utilize automotive simulation and testing tools to validate the performance and reliability of embedded systems, identifying and resolving issues pre-deployment.	• Ability to troubleshoot and resolve issues related to sensor integration and power management on development boards. • Skilled in quality assurance practices to verify that systems meet all necessary certification criteria. • Ability to proactively identify and resolve issues before deployment, ensuring system reliability and performance.	**5**
Responsibility	• Demonstrate a strong sense of responsibility in understanding and adhering to safety-critical aspects of automotive hardware development. • Candidates should exhibit responsibility in understanding and addressing automotive-specific requirements and challenges. • Graduates should be responsible for understanding and adhering to the AutoSAR standard and its significance in automotive	• Demonstrating a strong sense of responsibility in understanding and adhering to safety-critical aspects of automotive hardware development is crucial for ensuring the safety and reliability of automotive systems. • Exhibiting responsibility in understanding and addressing automotive-specific requirements and challenges involves taking ownership of designing	**5**

embedded systems.	solutions that meet the unique needs of the automotive industry. • This outcome is essential for ensuring interoperability and compatibility in automotive software development.

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	Automotive development boards, automotive sensors and interfaces, AutoSAR configuration tools, compliance testing equipment, automotive-specific hardware development tools, and access to relevant documentation 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, 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	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 comprehensive NOS delves into Embedded Automotive Applications, covering hardware development platforms, automotive requirements, and challenges. Students explore Development Boards, Automotive Sensors, and hardware tools and software suites while mastering Automotive Power Management and Compliance Standards. The course also provides an in-depth understanding of AutoSAR, focusing on its significance in automotive embedded systems and utilizing AutoSAR Configuration Tools for seamless integration.

2. Scope

The scope of the course is designed to equip students with a thorough understanding of the theoretical and practical aspects of embedded automotive applications, empowering them to apply this knowledge to meet the unique requirements and challenges of the automotive industry.

3. Elements and Performance Criteria

Automotive Sensors and Interfaces

- Students should be able to analyze automotive system requirements and choose appropriate sensors based on factors such as accuracy, speed, and compatibility with microcontrollers.
- Students should successfully implement communication protocols for sensors to interface with microcontrollers, demonstrating the ability to acquire, process, and transmit sensor data effectively.
- Students should showcase the ability to troubleshoot common issues related to sensor integration, such as signal noise, data accuracy, or compatibility issues, and effectively resolve them to ensure smooth sensor operation.

AutoSAR Standard Overview

- Students should demonstrate a clear understanding of the AutoSAR standard architecture, including its layers, components, and communication mechanisms, to explain how it facilitates software development in automotive embedded systems.
- Students should be able to apply AutoSAR concepts in designing software architectures for automotive systems, showcasing how these concepts enhance scalability, reusability, and interoperability in their designs.
- Students should evaluate the benefits of adopting the AutoSAR standard in automotive embedded systems, articulating how it improves system reliability, maintainability, and adaptability, based on real-world case studies or examples.

Compliance Testing and Certification Requirements

- Students should conduct compliance testing procedures on automotive hardware components, ensuring adherence to safety standards and regulatory requirements, and generate accurate test reports to verify compliance.
- Students should document the compliance testing and certification processes followed, including test plans, protocols, results, and any corrective actions taken, demonstrating systematic and thorough compliance management.
- Students should prepare for compliance audits by organizing relevant documentation, demonstrating a clear understanding of compliance requirements, and presenting compliance measures implemented in their automotive hardware development projects.

4. **Knowledge and Understanding (KU):**
   The individual on the job needs to know and understand:

- Understanding different types of automotive sensors, their principles of operation, applications in vehicles, and considerations for sensor selection based on specific requirements.
- Knowledge of the structure, concepts, and benefits of the AutoSAR standard in automotive embedded systems, including familiarity with AutoSAR architecture, software components, and communication interfaces.
- Understanding safety-critical aspects of automotive hardware development, compliance testing procedures, certification requirements, and industry-specific safety standards like ISO 26262 for automotive functional safety

5. Generic Skills (GS):

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

Communication Skills:

Effectively conveying technical information, such as sensor specifications, AutoSAR architecture, and compliance documentation, to team members, stakeholders, or regulatory authorities, and engaging in clear and concise dialogue about automotive embedded system concepts.

Critical Thinking:

Leveraging critical thinking skills to evaluate the suitability of different sensors for specific automotive applications, assess the impact of AutoSAR implementation on system scalability, and critically analyze compliance testing results to ensure system safety and regulatory adherence.

Project Management:

Organizing and managing tasks related to sensor integration, AutoSAR implementation, and compliance testing within automotive hardware development projects, exercising effective time management, and meeting project milestones and deadlines.

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 Embedded System for Automotive Electronics **NOS Code: NIE/ELE/N1702**	*Automotive Sensors and Interfaces*	30	20	-	6
	• Students should be able to analyze automotive system requirements and choose appropriate sensors based on factors such as accuracy, speed, and compatibility with microcontrollers.	-	-	-	-
	• Students should successfully implement communication protocols for sensors to interface with microcontrollers, demonstrating the ability to acquire, process, and transmit sensor data effectively.	-	-	-	-
	• Students should showcase the ability to troubleshoot common issues related to sensor integration, such as signal noise, data accuracy, or compatibility issues, and effectively resolve them to ensure smooth sensor operation.	-	-	-	-
	AutoSAR Standard Overview	40	20	-	7

	• Students should demonstrate a clear understanding of the AutoSAR standard architecture, including its layers, components, and communication mechanisms, to explain how it facilitates software development in automotive embedded systems.	-	-	-	-
	• Students should be able to apply AutoSAR concepts in designing software architectures for automotive systems, showcasing how these concepts enhance scalability, reusability, and interoperability in their designs.	-	-	-	-
	• Students should evaluate the benefits of adopting the AutoSAR standard in automotive embedded systems, articulating how it improves system reliability, maintainability, and adaptability, based on real-world case studies or examples.	-	-	-	-
	Compliance Testing and Certification Requirements	30	20	-	7
	• Students should conduct compliance testing procedures on automotive hardware components, ensuring adherence to safety standards and regulatory requirements, and generate accurate test reports to verify compliance.	-	-	-	-
	• Students should document the compliance testing and certification processes followed, including test plans, protocols, results, and any corrective actions taken, demonstrating systematic and thorough compliance management.	-	-	-	-
	• Students should prepare for compliance audits by organizing relevant documentation, demonstrating a clear understanding of compliance requirements, and presenting compliance measures implemented in their automotive hardware development projects.	-	-	-	-
		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.