QUALIFICATION FILE–Standalone NOS

Essentials of Real Time Operating Systems for Embedded Application

☐ 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)

NIELIT Bhawan, Plot No. 3, PSP Pocket, Sector-8,
Dwarka, New Delhi-110077,
Phone:- 91-11-2530 8300
e-mail:- contact@nielit.gov.in

Table of Contents

Section 1: Basic Details

<table>
<tr><td>1.</td><td>NOS-Qualification Name</td><td colspan="2">Essentials of Real Time Operating Systems for Embedded Application</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-02890-2024-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 course on Embedded RTOS covers theoretical foundations like characteristics, constraints, and RTOS features. It includes practical applications such as task scheduling algorithms, memory management, and power strategies, along with comparative analysis of RTOS with general-purpose systems. Hands-on exercises and industry-relevant content ensure comprehensive understanding and skill development in real-time embedded systems.</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:
b.
<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>

		5 | NSQF Level 4 Electronics and Communication Engineering/ Electrical Engineering/CS/IT/Physics/Electronics and allied branches | 1.5 Years **c. Age:18 years**
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
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.
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 Development
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 Real Time systems
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-	*Available at* Annexure-VI: Standalone NOS- Performance Criteria details

	wise detailing as per NOS format (Mandatory- Public view)	
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	• Proficient comprehension of real-time systems, including their characteristics, requirements (hard and soft real-time), constraints, and response times. • Ability to understand and work with RTOS features such as task scheduling, interrupt handling, resource management, memory allocation, and deallocation. Familiarity with task scheduling algorithms like priority-based, round-robin, and rate-monotonic scheduling is essential. • Capability to analyze real-time embedded systems, design considerations, and power management strategies.	1. Theoretical understanding of real-time constraints, deadlines, and response times enables professionals to analyze system requirements accurately. 2. Theoretical knowledge about inter-task communication, synchronization techniques, memory management, and device drivers is fundamental for designing robust real-time embedded systems.	5
Professional and Technical Skills/ Expertise/ Professional Knowledge	• Proficiency in real-time operating systems (RTOS) and their characteristics, including task scheduling, interrupt handling, and resource management, for effective embedded system development. • Competence in analyzing real-time constraints, deadlines, and response times, and implementing appropriate task scheduling algorithms like priority-based scheduling and round-robin scheduling in an RTOS environment.	1. Possesses specialized professional and technical skills; displays clarity of 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	5

	• Ability to design, implement, and optimize real-time embedded systems, including memory management, interrupt handling, device drivers, inter-task communication, and synchronization, while considering power management strategies for efficient system operation.		
Employment Readiness & Entrepreneurship Skills & Mind-set/Professional Skill	• Ability to apply real-time system design principles, including task scheduling, interrupt handling, and memory management, in industrial settings. • Entrepreneurial mindset to evaluate real-time system design considerations, power management strategies, and system requirements, leading to the development of innovative solutions and products. • Ability to apply critical thinking and creativity in analyzing real-time system constraints and deadlines, fostering entrepreneurship by developing novel approaches to address system performance and reliability challenges.	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	• Ability to design and implement real-time systems, considering factors like real-time constraints, deadlines, response times, and task scheduling algorithms. • Competence in working with real-time operating systems (RTOS), including understanding task management, interrupt handling, resource management, and memory allocation in an RTOS environment. • Knowledge and skills in embedded systems development, including device drivers, inter-task communication, synchronization techniques, and power management strategies specific to embedded systems.	1. Ability to design and implement real-time systems while considering real-time constraints, deadlines, response times, and task scheduling algorithms showcases a core skill in real-time system design. 2. Competence in working with real-time operating systems (RTOS) reflects a core skill in RTOS usage, including understanding task management, interrupt handling, resource management, and memory allocation.	5

Responsibility	• Responsibility for Designing real-time systems with appropriate task scheduling algorithms and memory management techniques. • Implementing real-time systems on embedded platforms with a focus on interrupt handling, device drivers, and inter-task communication.	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

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	Embedded development board compatible with RTOS, RTOS software development kit, compiler toolchain, debugger, and documentation on RTOS concepts and APIs.	15

Classroom Aids for offline and blended mode of training:

The aids required to conduct sessions in the classroom are:

1. LCD Projector/Smart Boa

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

The course delves into Real-Time Systems, covering key concepts such as hard and soft real-time requirements, RTOS characteristics like task scheduling and interrupt handling, and memory management in RTOS environments. It also explores power management strategies for embedded systems and real-time system design considerations through hands-on projects, fostering a comprehensive understanding of real-time embedded systems development.

2. Scope

This course encompasses an introduction to real-time systems and their distinctive characteristics like hard real-time and soft real-time requirements. It delves into real-time constraints, deadlines, and response times, exploring Real-Time Operating Systems (RTOS) and their pivotal role in embedded applications. Students will gain insights into task scheduling and management, interrupt handling, device drivers, inter-task communication, memory management, and power management strategies specific to real-time embedded systems. The course also includes practical exercises and projects focusing on RTOS-based applications to reinforce learning and application skills.

3. Elements and Performance Criteria

Real-Time Systems Overview:

- Ability to differentiate between hard and soft real-time requirements and understand their implications on system design.
- Demonstrate knowledge of real-time constraints, deadlines, and response times in various application scenarios.
- Analyze and assess real-world examples to determine the appropriate real-time system characteristics required for different applications.

Real-Time Operating Systems (RTOS):

- Successfully implement and evaluate task scheduling algorithms such as priority-based, round-robin, and rate-monotonic scheduling.
- Demonstrate proficiency in handling interrupts, managing system resources effectively, and optimizing memory allocation in an RTOS environment.
- Design and develop real-time applications using RTOS principles, including task creation, management, synchronization, and resource utilization.

Real-Time System Design:

- Evaluate and compare power management strategies and techniques for embedded systems, considering trade-offs between performance and energy efficiency.
- Apply context switching and task synchronization techniques in practical scenarios, ensuring system stability and real-time responsiveness.
- Successfully complete hands-on exercises and projects that involve designing and implementing real-time systems using RTOS, demonstrating effective problem-solving and practical application of theoretical knowledge.

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

The individual on the job needs to know and understand:

1. **Real-Time Systems Overview:**
   - Understanding of real-time system characteristics, including hard and soft real-time requirements, deadlines, and response times.
2. **Real-Time Operating Systems (RTOS):**
   - Familiarity with memory management techniques, inter-task communication, synchronization methods, and power management strategies specific to RTOS environments.
3. **Real-Time System Design:**
   - Ability to analyze real-time embedded systems requirements, design efficient real-time applications, and implement hands-on projects using RTOS principles.

5. Generic Skills (GS):

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

Problem-Solving Skills:

- Ability to analyze and solve complex problems related to real-time system design, task scheduling, and resource management.

Communication Skills:

- Effective communication of real-time system design considerations, task scheduling strategies, and memory management techniques.

Technical Skills:

- Proficiency in using real-time operating systems, including task creation, scheduling, and synchronization.

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 Real Time Operating Systems for Embedded Application NOS Code: NIE/ELE/N0225	*Real-Time Systems Overview*	**30**	**20**	**-**	**6**
	• Ability to differentiate between hard and soft real-time requirements and understand their implications on system design.	-	-	-	-
	• Demonstrate knowledge of real-time constraints, deadlines, and response times in various application scenarios.	-	-	-	-
	• Analyze and assess real-world examples to determine the appropriate real-time system characteristics required for different applications.	-	-	-	-

	Real-Time Operating Systems (RTOS):	**30**	**20**	-	**7**
	• Successfully implement and evaluate task scheduling algorithms such as priority-based, round-robin, and rate-monotonic scheduling.	-	-	-	-
	• Demonstrate proficiency in handling interrupts, managing system resources effectively, and optimizing memory allocation in an RTOS environment.			-	-
	• Design and develop real-time applications using RTOS principles, including task creation, management, synchronization, and resource utilization.	-	-	-	-
	Real-Time System Design:	**40**	**20**	-	**7**
	• Evaluate and compare power management strategies and techniques for embedded systems, considering trade-offs between performance and energy efficiency.	-	-	-	-
	• Apply context switching and task synchronization techniques in practical scenarios, ensuring system stability and real-time responsiveness.	-	-	-	-
	• Successfully complete hands-on exercises and projects that involve designing and implementing real-time systems using RTOS, demonstrating effective problem-solving and practical application of theoretical knowledge.				
		100	**60**	**20**	**20**
	NOS Total	**200**			

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 (Online) examination.

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 roll number.

3. The assessor carries out theory online assessments. Theory examination would be conducted online and the paper comprise of MCQ

4. Pass percentage would be 50% marks.

5. 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.