

## QUALIFICATION FILE SUMMARY

<b>Qualification Title</b>	Certificate course in Arduino based Embedded System Design
<b>Qualification Code</b>	NIELIT/ES/6/42
<b>Body/Bodies which will Assess Candidates</b>	<b>Examination Cell,</b> National Institute of Electronics and Information Technology, 6-CGO Complex, Electronics Niketan, Lodhi Road, New Delhi. 110003.
<b>Body/Bodies which will Award the Certificate for the Qualification.</b>	<b>Certification Division,</b> National Institute of Electronics and Information Technology, 6-CGO Complex, Electronics Niketan, Lodhi Road, New Delhi. 110003.
<b>Body which will Accredite Providers to offer the Qualification.</b>	<b>Accreditation Division,</b> National Institute of Electronics and Information Technology, 6-CGO Complex, Electronics Niketan, Lodhi Road, New Delhi. 110003.
<b>Occupation(s) to which the Qualification Gives Access</b>	Specialized in Embedded system Design using Arduino
<b>Proposed Level of the Qualification in the NSQF.</b>	Level 4
<b>Notional Learning Hours</b>	300 Hours. (3 Month Full Time)
<b>Entry Requirements / Recommendations.</b>	<ul style="list-style-type: none"> <li>• Diploma in Electronics/Electronics &amp; Communication/Electrical/Electrical &amp; Electronics/Instrumentation/ Biomedical /Computer Science/Information Technology</li> <li>• BSc in Electronics/Instrumentation/Computer Science/Information Technology.</li> </ul>
<b>Progression From the Qualification.</b>	Embedded System Specialist ↓ Specialist in Arduino based Embedded System Design ↓ Embedded System Engineer
<b>Planned Arrangements for RPL.</b>	<ul style="list-style-type: none"> <li>• Presently only candidates who undergo training shall be assessed.</li> <li>• It will be incorporated once RPL strategy is finalized</li> </ul>

<b>Formal Structure of the Qualification</b>				
<b>Module Code</b>	<b>Title of Unit or other Component (include any identification code used)</b>	<b>Mandatory / Optional</b>	<b>Estimated Size (Learning Hours)</b>	<b>Level</b>
CES-01	Embedded System Design: Basics	Mandatory	50	4
CES-02	Learning Arduino Platform	Mandatory	50	
CES-03	The Basics of Sensors and Actuators using Arduino	Mandatory	60	
CES-04	Controlling Embedded System Based Devices using Arduino	Mandatory	60	
CES-05	Project: based on Embedded System Design using Arduino Board	Mandatory	60	
CES-06	Enhancing Communication & Soft Skill	Mandatory	20	

Please Attach any Document giving Further Detail about the Structure of the Qualification – e.g. a Curriculum or Qualification Pack. Detailed Curriculum:

## **SECTION 1** **ASSESSMENT**

### **Name of Assessment Body:**

#### **Examination Cell**

National Institute of Electronics and Information Technology  
6-CGO Complex, Electronics Niketan,  
Lodhi Road, New Delhi. 110003.

### **Will the Assessment Body be Responsible for RPL Assessment?**

Yes. We will conduct Online/Entrance Test/Interview of the Participants for Admission. Entrance test will be based on Aptitude (20%), Logical reasoning (20%), C Language (20%) and Basic electronics (40%). Basic Electronics includes topics of Digital, Analog, Microprocessor/Microcontroller, Computer Organization, Signals and Systems. At the course end, we will conduct Theory and Practical Examination for each module except the Final Module of Project Work.

Finally, Project Work will be assessed by oral presentation and live demo of project to be given by candidates. Certificates will be awarded to only successful Candidates.

**Describe the overall assessment strategy and specific arrangements which have been put in place to ensure that assessment is always valid, consistent and fair and show that these are in line with the requirements of the NSQF:**

The emphasis is on practical demonstration of skills & knowledge based on the performance criteria. Each OUTCOME is assessed & marked separately. Student is required to pass in all OUTCOMES individually and marks are allotted. Following assessment methodologies are used.

- A. Written Assessment (MCQ-Type – Online Examination)
- B. Practical Assessment
- C. Presentation & Viva Voce Assessment

**Assessment Evidences**

1. The assessor collects a copy of the attendance for the training done under the scheme. The attendance sheets are signed and stamped by the Examination Superintendent/ Head of Institution.
2. The assessor verifies the authenticity of the candidate by checking the photo ID card/Hall Ticket issued by the institute as well as any one Photo ID card issued by the Central/Government. The same is mentioned in the attendance sheet.
3. The Registration/Examination Division assigns roll number.
4. The assessor takes photograph of all the students along with the assessor standing in the middle and with the centre name/banner at the back as evidence.

**Please attach any documents giving further information about assessment and/or RPL.**  
**ASSESSMENT EVIDENCE**

**Complete the following grid for each grouping of NOS, assessment unit or other component as listed in the entry on the structure of the qualification on page 1.**

**Job Role**

Specialized Embedded System Engineer

**Title of Unit/Component:****(Detailed Curriculum attached As Annexure-III)**

Assessable Outcomes	Assessment criteria for the outcome	Total Mark	Written	Practical	Internal/ Viva-voce
<b>1.</b> To familiarize with Embedded System Design	Develop Concept of Embedded System Components	<b>100</b>	10	5	5
	Identify Embedded System Classifications and Components		15	10	10
	Learn how to use Processors and other Elements of Embedded System		15	5	5
	Use of Embedded System's Software and its applications		10	5	5
		<b>Total</b>	<b>50</b>	<b>25</b>	<b>25</b>
<b>2</b> Explain and practice of Arduino Platform	Practice of Programming Microcontroller	<b>100</b>	5	5	5
	Recognize Arduino Board and its component		5	5	5
	Create Arduino Standard Library		10	5	5
	Create Arduino Development Environment		15	5	5
	Use concepts for writing Arduino Sketches		15	5	5
		<b>Total</b>	<b>50</b>	<b>25</b>	<b>25</b>
<b>3</b> Develop Basic Concept of	How to Connect and Work With different sensors such as: Humidity, Heat/Temperature, proximity, IR	<b>100</b>	30	15	15

Sensors and Actuators	Motion, Accelerometer, Sound , Light, distance, Pressure, Thermal, Infrared, LDR etc. to Arudino Board				
	Reading Various Sensor data on Serial Monitor and LCD Display		10	5	5
	Explain Functioning of Actuators		10	5	5
		<b>Total</b>	<b>50</b>	<b>25</b>	<b>25</b>
<b>4</b> Learn and Practice Controlling of Embedded System Based Devices using Arduino	Reading Data from Analog and Digital Sensors on Serial Monitor/LCD monitor	<b>100</b>	10	5	5
	Work With LED controlled by Switch/Potentiometer, 7 Segment LED Display/Control		20	10	10
	How To Connect Relays and Servomotors to Arduino Board And Work With 5V/3V Power Supply using voltage regulator ICs(7805/7803)		20	10	10
		<b>Total</b>	<b>50</b>	<b>25</b>	<b>25</b>
<b>5</b> <b>Practical</b> Project: based on Embedded System Design using Arduino Board	Project Based on, <ul style="list-style-type: none"> <li>Analog/digital input using POT</li> <li>Electronic Voting Machine using LCD Serial Display</li> <li>Fire Detection Module</li> <li>Smart Class Room</li> <li>Smart Street Light Prototype</li> <li>Agriculture (Using Humidity/ Temperature Sensors)</li> </ul>	<b>150</b>	<b>150</b>		
		<b>Total</b>	<b>150</b>		
<b>6</b> Enhancing Communication & Soft Skill	Develop Communication Skill	<b>50</b>	10	<b>NA</b>	<b>NA</b>
	Managing career, staff and professional relationships		20	<b>NA</b>	<b>NA</b>
	Ready for interview		20	<b>NA</b>	<b>NA</b>
		<b>Total</b>	<b>50</b>	<b>NA</b>	<b>NA</b>
<b>Grand Total</b>		<b>600</b>	<b>350</b>	<b>125</b>	<b>125</b>

#### Means of assessment 1

Proctored online assessments (LAN and Web based), carried out using a variety of question formats applicable for linear / adaptive methodologies; performance criteria being assessed via tests, simulations, and multiple choice questions etc.