NSDA Reference

To be added by NSDA

CONTACT DETAILS OF THE AWARDING BODY FOR THE QUALIFICATION

Name and address of awarding body:

National Institute of Electronics and Information Technology

6-CGO Complex, Electronics Niketan

Lodhi Road, New Delhi. 110003.

Name and contact details of individual dealing with the submission

Name: Manoj N

Designation: Senior Technical Officer

Mobile: 9446783170

Email: manoj.n@nielit.gov.in, manoj@calicut.nielit.in

List of documents submitted in support of the Qualifications File

1. Annexure I – Course Curriculum
2. Annexure II – Evidence of Job Market / Requirement in Industry
3. Annexure III – Industry validation

QUALIFICATION FILE – Embedded System Design using 8-bit Microcontrollers

SUMMARY

Qualification Title:	Embedded System Design using 8-bit Microcontrollers
Qualification Code	NL/M/L5/C016 NIELIT/EM/L5/012
Nature and purpose of the qualification:	Nature of the qualification: Modular employable skills award Purpose: To allow people in embedded system sectors to learn programming/Interfacing peripherals to microcontroller and learn troubleshooting of microcontroller based Embedded electronic systems/products.
Body /bodies which will award the qualification:	National Institute of Electronics and Information Technology 6-CGO Complex, Electronics NiketanLodhi Road, New Delhi. 110003.
Body which will accredit providers to offer courses leading to the qualification:	National Institute of Electronics and Information Technology 6-CGO Complex, Electronics NiketanLodhi Road, New Delhi. 110003.
Body /bodies which will Be responsible for assessment:	**Examination Cell,** National Institute of Electronics and Information Technology 6-CGO Complex, Electronics NiketanLodhi Road, New Delhi. 110003.
Occupation(s) to which the qualification gives access:	Embedded Technician Hardware support for any embedded development based on ARM cortex microcontrollers and improving the existing designs and new ones. And also able to troubleshooting of ARM based Embedded electronic systems/ products
Licensing Requirements	N/A

QUALIFICATION FILE – Embedded System Design using 8-bit Microcontrollers

Proposed level of the qualification in the NSQF	Level 5
Anticipated volume of training/learning required to complete the qualification	400 hours
Entry requirements/ Recommendations	3 Year Diploma in Electronics/Electronics & Communicatio Electronics/Instrumentation Basic knowledge about microprocessors/ microcontrollers system field are required to be successful in the qualificati entry requirement
Progression from the Qualification	**Professional:** Embedded Technician -> Senior Embedded Technician-> Entrepreneur **Academic:** 8 bit microcontroller Course→ Post Diploma in Electronic Product Design(aligned) (Level 6)
Planned arrangements for RPL.	➢ Presently only candidates who undergo training shall be assessed. ➢ It will be incorporated once RPL strategy is finalized
International Compatibility where Known.	NA
Date of Planned review of the Qualification	After Every 2 Years

Formal structure of the qualification

Title of component and identification code.	Mandatory/ Optional	Estimated size (learning hours)	Level
Embedded C with 8051	M	40	5

8051 Architecture	M	10	5
8051 internal Peripheral interface	M	75	5
Interfacing 8051 to peripheral devices	M	75	5
Embedded C with PIC	M	40	5
PIC Architecture	M	10	5
PIC internal Peripherals	M	75	5
Interfacing PIC to peripheral devices	M	75	5

Curriculum attached as Annexure –I

SECTION 1

ASSESSMENT

Body/Bodies which will carry out assessment:

Examination Cell, National Institute of Electronics and Information Technology
6-CGO Complex, Electronics Niketan
Lodhi Road, New Delhi 1110003

Main body/bodies responsible for assessing candidates against the learning outcomes and assessment criteria of the qualification:

Examination Cell, National Institute of Electronics and Information Technology
6-CGO Complex, Electronics Niketan
Lodhi Road, New Delhi 1110003

Main body/bodies responsible for checking or verifying assessments.

Examination Cell, National Institute of Electronics and Information Technology
6-CGO Complex, Electronics Niketan
Lodhi Road, New Delhi 1110003

How will RPL assessment be managed and who will carry it out?

RPL Policy will be described as and when available

ASSESSMENT POLICY

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:

ASSESSMENT GUIDELINE

- Criteria for assessment based on each learning outcome, will be assigned marks proportionately to its importance.
- The assessment for the theory & practical part is based on knowledge bank of questions
  created by field experts and approved by NIELIT
- For each Individual batch, Examination cell will create unique question papers for theory part as well as practical for each examination.
- To pass the Qualification, every trainee should score a minimum of 50%

cumulatively (Theory and Practical)

- Assessment comprises the following components:
  - Exercises carried out in labs, internship
  - Assignments
  - Theory and practical exam
  - Attendance and punctuality

Examination	No's of Questions	Time (Minutes)	Max Marks	Min Pass Marks	Mode of Examination
Online Theory Examination	80	120	80	32 (40%)	ON-LINE
Practical & Viva Voice	--	180	50	20 (40%)	OFF-LINE
Internal Assessment			20	--	Awarded by TP
Grand Total			150	75 (50%)	

ASSESSMENT EVIDENCE

Title of Unit/Component: Embedded System Design using 8-bit Microcontrollers

(Detailed Curriculum attached as Annexure – I)

Job Role	**Embedded Technician**				
Outcome to be assessed	**Assessment Criteria for the out come**	**Total Marks (100)**	**Out Of**	**Theory**	**Skills Practical**
Embedded System Design using 8-bit Microcontrollers					
Will be able to write Programs using 8051 instructions & Interfacing with external	Develop an application using C program.		6	2	4
	Identify various Pins and familiar with the pin function of 8051.		4	4	0
	Programming and debug applications using Embedded 'C' on 8051 platform i.e. following the complete system architecture including memory, memory blocks, timers, interrupts and power management		6	2	4
	Configuring Timers on 8051 Microcontrollers		6	2	4

peripherals	Configuring Interrupts on 8051 Microcontrollers		6	2	4
	Configuring Serial Port on 8051		6	2	4
	Interfacing LCD with 8051 Microcontrollers		6	2	4
	Interfacing key board with 8051 Microcontrollers		5	2	3
	Interfacing stepper motor with 8051 Microcontrollers		5	2	3
Will be able to write Program on PIC microcontroller and Interfacing with external peripherals	Demonstrate the ability to apply Knowledge on PIC Architectural Concepts		4	4	0
	Programming and debug applications using Embedded 'C' on PIC platform		6	2	4
	Configuring Timers of PIC Microcontrollers		7	3	4
	Configuring Interrupts on PIC Microcontrollers		7	3	4
	Configuring Serial Port on PIC Microcontroller.		7	2	5
	Interfacing LCD with PIC Microcontrollers		7	2	5
	Interfacing key board with PIC Microcontrollers		7	2	5
	Interfacing stepper motor with PIC Microcontrollers		5	2	3
	Total		**100**	**40**	**60**

Means of Assessment:

Online assessments (LAN and Web based), carried out using a variety of question formats applicable for the course.

Pass/Fail

Following Grading Scheme (on the basis of total marks& individual marks) will be followed:

Grade	Marks Range (in %)
Pass	>=40 each in online Theory Examination & Practical

	>=50 in aggregate (Internal, Theory & Practical)
Fail	<40 each in online Theory Examination & Practical <50 in aggregate (Internal, Theory & Practical)

QUALIFICATION FILE – Embedded System Design using 8-bit Microcontrollers

SECTION 2

EVIDENCE OF LEVEL:

Title : Embedded System Design using 8-bit Microcontrollers			**Level : 5**
NSQF Domain	**Outcomes of the Qualification/Component**	**How the job role relates to the NSQF Level Descriptors**	**NSQF Level**
Process required	Implement the embedded C coding skills and 8 bit micro controller based system design skills for solving real life problems while interfacing peripherals to 8051 and PIC microcontrollers.	Job that requires well developed skill, with clear choice of procedures in familiar context.	**5**
Professional knowledge	knowledge about:- Embedded C syntax, coding principles, micro controller based system design concepts, Development and debugging tools etc.	Knowledge of facts, principles, processes and general concepts, in a field of work or study.	**5**
Professional skill	Embedded C programming and micro controller based system design Skills for translation of specification to prototype	A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information	**5**
Core skill	Requires knowledge of language, good communication skills to interact with the team of workers. Requires documentations skill for coding documentation. Interacting with superior briefing them on status of work-completion and pending targets. Maintain good peer group relation and capability of learning from their technical and behavioral experiences.	Desired mathematical skill; understanding of social, political; and some skill of collecting and organizing information, communication.	**5**
Responsibility	Candidate will be able to work independently with responsibility in the embedded design industry, he/she also can supervise others work and help them learn.	Responsibility for own work and learning and some responsibility to other's works and learning.	**5**

SECTION 3

EVIDENCE OF NEED

What evidence is there that the qualification is needed?

This course has been designed to meet the increasing man power requirements in the Embedded sector.

1. Report of taskforce to suggest measures to stimulate the growth of IT, ITES, and Electronics Hardware manufacturing Industry in India – Dec 2009.
2. Challenges and Solutions in bridging the gap of Skilled human Resource (HR) in Electronics System Design and Manufacturing System. Workshop report Feb 2012.
3. Proposal to NSDC on the formation of Sector Skills Council: Electronics.
4. Employability and skills set of newly graduated Engineers in India – Andreas Blom, Hiroshi Sakei policy research working paper (5640). World Bank.
5. Human Resource and skill Requirements in the Electronics and IT Hardware Industry.
   "Study on mapping of human resource Skill gaps in India till 2022" – NSDC / ICRA management Consulting Services Limited. (IMACS)
6. *View Point* – Make in India – *"A Way to Boost Manufacturing and Employment opportunities" Electronics for You, June 2016.*

What is the estimated uptake of this qualification and what is the basis of this estimate?

Estimated uptake is 40 students / Batches with 2 Batches / Year and on the basis of identified skill gap in the following report

Human Resource and skill Requirements in the Electronics and IT Hardware

Industry.

"Study on mapping of human resource Skill gaps in India till 2022" – NSDC / ICRA management Consulting Services Limited. (IMACS)

What steps were taken to ensure that the qualification(s) does/do not duplicate already existing or planned qualifications in the NSQF?

The Qualification does not exist as per the information available in public domain.

What arrangements are in place to monitor and review the qualification(s)? What data will be used and at what point will the qualification(s) be revised or updated?

Based on feedback by participants, employers and market survey the qualification will be reviewed, revised and updated in every 2 years.

SECTION 4

EVIDENCE OF PROGRESSION

What steps have been taken in the design of this or other qualifications to ensure that there is a clear path to other qualifications in this sector?

This QF is a specialised training in microcontrollers and comprises of much relevant topics in all aspects of the industrial requirement in the field of Embedded system design using 8 bit Microcontroller. Hence an incumbent can possibly get higher job roles in this field and after acquiring some experience incumbent can start Developing small electronic gadgets based on Microcontroller & can become Entrepreneur. And ensure that the design of the course will timely be modified as per the industrial demands. However incumbent can do any higher level course in the related field.

SECTION 5

EVIDENCE OF INTERNATIONAL COMPARABILITY

List any Comparisons which have been established – NIL