

Qualification File:PG Diploma in Electronic System Design and Manufacturing (Level 8)

NSDA REFERENCE

To be added by NSDA

QUALIFICATION FILE – CONTACT DETAILS OF SUBMITTING BODY

Name and address of submitting body:

NATIONAL INSTITUTE OF ELECTRONICS AND INFORMATION TECHNOLOGY (NIELIT),
NIT CAMPUS POST,
CALICUT, KERALA.
PIN – 673601.

Name and contact details of individual dealing with the submission

Name: Nandakumar R
Designation: Scientist/ Engineer 'C'
Mobile: 9995427802
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List of documents submitted in support of the Qualifications File

- a) Annexure I – Course Curriculum
- b) Annexure II – Candidates trained
- c) Annexure III – Placement Details
- d) Annexure IV – Industry Validation
- e) Annexure V – Occupational Map as identified by SSC– mapped to Jobroles.
- f) Evidence of job market / Industry requirement – Attached in Section3

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SUMMARY

Qualification Title:	PG Diploma in Electronic System Design and Manufacturing
Qualification Code	
Nature and purpose of the qualification:	<ul style="list-style-type: none"> ➤ This Qualification is aligned to Level 8 ➤ The purpose of this qualification is to train the students to be ready for Electronic Design Engineering Job.
Body /bodies which will award the qualification:	National Institute of Electronics and Information Technology 6-CGO Complex, Electronics Niketan Lodhi 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 Niketan Lodhi 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 Niketan Lodhi Road, New Delhi. 110003.
Occupation(s) to which the qualification gives access:	Electronic Design Engineer
Licensing Requirements	N/A
Proposed level of the qualification in the NSQF	Level 8
Anticipated volume of training/learning required to complete the qualification	840 Hours
Entry requirements/ Recommendations	<ul style="list-style-type: none"> ➤ B.E./B.Tech in Electronics/Electronics & Communication/Electrical/ Electrical and Electronics/Instrumentation/ Biomedical /Computer Science/IT. ➤ MSc in Electronics/ Instrumentation/ Computer Science/Information Technology Science/Information Technology.

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Progression from the Qualification	<p>Professional : Electronic Design Engineer->Senior Electronic Design Engineer-> Principal Design Engineer-> Technical Leader</p> <p>Academic: M.Tech in VLSI / Embedded System Design / Electronics System Design → Integrated PhD involving application research.</p>
Planned arrangements for RPL.	<ul style="list-style-type: none"> ➤ Presently only candidates who undergo training shall be assessed. ➤ It will be incorporated once RPL strategy is finalized
International Compatibility where Known.	Not Known Yet
Date of Planned review of the Qualification	After Every 2 Years

Formal Structure of the Qualification			
This course contains total nine modules. After completing the first eight modules, the students have to do a six weeks project using any of the topics studied to earn the PG Diploma			
Title of Component and Identification Code	Mandatory/ Optional	Estimated Size (Learning hours)	Level
Fundamentals of Electronics	Mandatory	105	8
Electronics System Packaging and Manufacturing	Mandatory	70	8
Industrial Electronic Product Design	Mandatory	70	8
Processor based System Design	Mandatory	105	8
Embedded Software Development	Mandatory	70	8
FPGA based System Design	Mandatory	70	8
Communication interface of Electronics Products	Mandatory	70	8

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Internet of Things (IoT)	Mandatory	70	8
Project Work	Mandatory	210	8

Detailed Curriculum attached as – **Annexure I**

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.

Name of body checking or verifying Assessments:

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

Name of Qualification Awarding body:

National Institute of Electronics and Information Technology.

Will the assessment body be responsible for the RPL assessment?

RPL Policy will be described as and when available

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 NSQF:

This course would lay more emphasis on developing the practical skills of the student. His overall knowledge shall be tested based on a comprehensive written assessment, his practical skills shall be equally measured with a detailed practical assessment. The communication/technical skills of the student and his ability to express himself shall

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be tested in Viva Voce Assessment. Each assessment shall define an OUTCOME and marked separately. Student shall be required to pass in all OUTCOMES individually and marks shall be allotted for each OUTCOME along with final aggregate marks in course. Following assessment methodologies may be used:

- A. Written Assessment
- B. Practical Assessment
- C. Viva Voce Assessment

Supporting evidences for Assessment

The assessment results are backed by following 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 In charge / Head of the Training Centre.
2. The assessor verifies the authenticity of the candidate by checking the photo ID card 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

ASSESSMENT EVIDENCE

Job Role: Electronic Design Engineer

Title of Unit/Component: PG Diploma in Electronic System Design and Manufacturing

Outcomes	Assessment Criteria for the outcome	Means of Assessment			
		Total Marks	Written	Practical	Project
Ability to design Electronic circuit	Candidate shall be able to provide solutions involving; <ul style="list-style-type: none"> a) Analyze the various electronic components with their properties b) Explain about 	50	50		

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	electronic circuit design.				
PCB design and fabrication ability	Candidate shall be able to provide design solutions involving; a) Practice quality principles and tools in product development process b) Develop a conceptual design, PCB design, PCB assembly, testing, integration	50		50	
Ability of Product designing	Candidate shall be able to provide design solutions involving; a) Analyze and synthesize the product by computer designing b) Industrial product development planning and process	50		50	
Embedded processor based design ability	Candidate shall be able to provide design solutions involving; a) Develop Embedded application using Embedded C programming b) Use ARM Cortex M with Embedded C programming for	50		50	

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	Application Development.				
Ability of Embedded Linux programming	<p>Candidate shall be able to program Linux based solutions involving;</p> <p>a) Implement embedded systems with embedded operating systems.</p> <p>b) Develop applications with embedded Linux.</p> <p>c) Develop an Embedded real time software that is required to run embedded systems</p>	50		50	
Verilog RTL Design ability	<p>Candidate shall be able to program Verilog HDL solutions involving;</p> <p>a) Implement Digital circuits on Xilinx FPGAs using VHDL</p> <p>b) Apply VHDL for FPGA Programming</p>	50		50	
Knowledge of communication protocols	<p>a) Explain Capturing Packets, Interpreting results, Testing & Validating Communication Protocols</p> <p>b) Execute</p>	50		50	

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	Embedded protocols and its application level programming				
Knowledge of IoT Architecture	a) Apply concepts of IOT Architecture and layering b) Implementing IOT applications using proper hardware and software platforms c) Develop IOT Applications with Raspberry pi and other platforms	50		50	
Perform System Design	Candidate shall be able to demonstrate working knowledge in the entire flow from electronic system design life cycle	200			200
	Grand Total	600			

Pass/Fail

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

Grade	S	A	B	C	D	E	Fail
Marks Range (in %)	$\geq 90\%$	80%-89%	70%-79%	60%-69%	50%-59%	40-49%	<40%

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SECTION 2

EVIDENCE OF LEVEL

Title/Name of qualification: PG Diploma in Electronic System Design and Manufacturing

Title : P G Diploma in Electronic System Design and Manufacturing			Level : 8
NSQF Domain	Outcomes of the Qualification/Component	How the job role relates to the NSQF Level Descriptors	NSQF Level
Process required	The candidate is required to apply the Electronic System Design Knowledge for the Design and fabrication of Circuits	The candidate is expected to possess Comprehensive, cognitive, theoretical knowledge and practical skills to develop creative solutions to abstract Problems The candidate will be able to Undertake self-study; demonstrates intellectual independence, analytical rigour and good communication skills after undergoing the program	8
Professional knowledge	Learn and practice Electronic product design to gain practical and theoretical knowledge in system design. In addition the mini project work which will enable the candidate to compete as an Electronic Design Engineer.		8
Professional skill	Develop practical skills for implementing Product Design strategies for System Design projects. Will be able to solve the problems and will be effectively communicate.		8
Core skill	Candidate will be able to work independently in ESDM Sector with management and Supervisory responsibilities in the industry.	Exercise management and supervision in the context of work/study having	8

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Responsibility	He/she can also lead projects and teams	unpredictable changes; responsible for the work of others.	8
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SECTION 3

EVIDENCE OF NEED

What evidence is there that the qualification is needed?

1. Report of taskforce to suggest measures to stimulate the growth of IT, ITES, and Electronics Hardware manufacturing Industry in India – Dec 2009.

RECOMMENDATIONS

The Government of India would do well to foster a globally competitive industry.

The industry needs to focus on the following:

- Increased value addition
- Implementation of best practices
- Catering to the needs of domestic and global markets by creating innovative product designs and R&D
- Driving cost competitiveness

The government can catalyze this growth by the following measures:

1	Establish 'National Electronics Mission'	Establish 'National Electronics Mission' – a nodal agency for the electronics industry within DIT and with direct interface to the Prime Minister's Office (PMO). The nodal agency will help in the synchronized functioning of the industry. It will enhance the ease of doing business.
2	Promote existing clusters and create new ones	Create islands of excellence by encouraging and planning for the expansion of existing centers such as Sriprembudur, Noida, etc. and identify more locations to set up clusters to create a complete ecosystem where all the segments of the value chain are available at one location. Provide contiguous land and Infrastructure to the industry to these clusters.
3	"Made for India" Goods	Encourage products specifically designed for India. Developmental sector can benefit from biometric readers, smart meters, micro payment devices, and low cost devices.
4	Creation of a R&D fund	A fund may be created to incentivize R&D, where the government and the industry bodies are stake holders.
5	Creation of a manufacturing value addition fund	A separate fund may also be created to provide interest linked subsidy to promote value added manufacturing and create products for India.
6	Rationalization of tax structure	Stable tax structure needs to be put in place in order to encourage long term investment by the companies.
7	Promote skill development	Government needs to focus on skill development, regulations around over-time and contracts need to be flexed.

2. Challenges and Solutions in bridging the gap of Skilled human Resource (HR)

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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)

<https://www.scribd.com/document/74364619/Media-Entertainment-Human-Resource-Skill-Gaps-India-2012>

6. *View Point – Make in India – “A Way to Boost Manufacturing and Employment opportunities” Electronics for You, June 2016.*

Evidence of qualification Requirement in the Industry – Job requirements involving the skills imparted through this program, as advertised by core companies in the field are listed below

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Principal Engineer

Microchip Technology
Bangalore


- Excellent RTL coding and FSM design experience •
- Experience in Digital Design and Verification with strong RTL coding background... definitions, RTL coding, system level verification, synthesis/STA/DFT support, verification/validation support, analog design support..

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Siemens Limited

 Bengaluru

Keyskills: modeling, embedded, project management, thermal, simulation, ideas...



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RTL-2-GDSII Design

MOBIVEIL TECHNOLOGIES INDIA PRIVATE LIMITED

KEYSKILLS > RTL 2 GDSII Design Sub-micron Physical design Physical Verification
Synopsys Flow Clock tree design

 Chennai

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Lead Application Engineer



Cadence Design Systems

San Jose, CA, US

...: Technical Field Application Engineer for Cadence Digital... ENTRY LEVEL POSITION We offer a very aggressive.

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RTL PHY Design DDR / LPDDR / Memory controller

MOBIVEIL TECHNOLOGIES INDIA PRIVATE LIMITED

KEYSKILLS > RTL coding PHY Design creating Verilog based designs

 Chennai

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FPGA with Optical Tech

Infinite Computer Solutions India Ltd.

 Bengaluru, Chennai, Gurgaon



Keyskills: Verilog, VHDL, SDH, FPGA **Design, RTL Design**, DWDM, Sonet, Roadm, Xilinx...

Job Description: Work location: Infinite, Chennai or Bangalore

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Rtl Design Engineer

Universal Hunt Private Limited

Chennai

complex IP and or ASIC blocksExperience creating Verilog based **designs** from ScratchExperience developing AXI based IPs BlocksGood...

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Senior Asic/ip Verification Engineer

Synopsys  Bengaluru



Keyskills: System Verilog, Axi, C, **RTL** Coding, ASIC, Perl, Verification, Synthesis...


Job Description: Job role: The candidate will be part of the Solutions Group at our Bangalore **Design** Center, India. ...

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Embedded Systems Design Engineers

Funambolo Technologies Private Limited

 Bengaluru

Keyskills: C, FPGA, Verilog, Firmware, Embedded Systems, PCB Layout...

Job Description: Responsibilities include Working closely with **design engineers in design**, ...

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Electronic Manufacturing Technician

Elizabethtown, NC

Electronic component identification. Electronics Manufacturing Technician will be responsible for developing, maintaining, and fine tuning programs for all...

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

Estimated uptake is 40 students / Batch with 2 Batches / Year and on the basis of market Survey /other reports and our infrastructure capabilities.

There is a huge uptake for this qualification in industry. Proof from surveys

Market Survey – Make in India – *“The Internet of Things Growth Path” Electronics for You, June 2016.*

View Point – Make in India – “A Way to Boost Manufacturing and Employment opportunities” Electronics for You, June 2016.

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.

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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 based on market survey the qualification will be reviewed 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 course structure is designed in such a way that, the qualification acquired will meet the prerequisites of higher level courses in this domain like MTech in VLSI, Embedded System Design, Electronics System Design and Integrated PhD involving application research.

SECTION 5

EVIDENCE OF INTERNATIONAL COMPARABILITY

List any Comparisons which have been established – NIL