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| **Course** | **:** | **Certificate Course on Printed Circuit Board Design, Analysis and Manufacturing Technique** |
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| **Course Details** |  |  |
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| Course ID | : | NIELIT/EM/L4/014 |
| Candidate Eligibility | : | Diploma/B.Sc. in Electronics /Telecommunication/ Instrumentation /Electrical |
| No. of NOS (if QP) | : | NA |
| NSQF Level | : | 4 |
| Cost Category | : | 1 |
| Course Duration | : | 250 |
| a) Theory Duration | : | 150 |
| b) Practical Duration | : | 100 |
| a) OJT Duration | : | 0 |

**Trainer Qualification Work Experience**

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| **Trainer Qualification** | **Work Experience** |
| **Essential Qualification:** | Atleast 1 year teaching experience in relevant field. |
| B.E/B.Tech (Electronics & Comm. Engineering) |
| **Desirable Qualification:** |
| M.E/M.Tech (Electronics & Comm. Engineering) |

**CONTACT DETAILS OF THE BODY SUBMITTING THE QUALIFICATION FILE**

**Name and address of submitting body:**

National Institute of Electronics & Information Technology, Patna

**Name and contact details of individual dealing with the submission**

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| **Name** | : | Satya Prakash Tiwari |
| **Position in the organization** | : | Joint Director |
| **Tel number(s)** | : | 0612-2219134 |
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| **Qualification Title** | **Certificate Course on Printed Circuit Board Design, Analysis and Manufacturing Techniques.** |
| **Qualification Code** | **NIELIT/EM/L4/014** |
| **Nature and purpose of the qualification** | **Nature: Certificate Course**  **Purpose:**   1. PCB Service Technician, 2. Supervisor-Electronics Product Assembly Section 3. Supervisor-PCB Manufacturing / testing Section 4. Technicians/ Electronic Lab Incharge in Academic Institute |
| **Body/bodies which will award the qualification** | National Institute of Electronics & Information Technology (NIELIT)  Near IIT Patna, Amhara, Bihta, Patna (Bihar)-801106 |
| **Body which will accredit providers to offer courses leading to the qualification** | National Institute of Electronics & Information Technology (NIELIT)  Near IIT Patna, Amhara, Bihta, Patna (Bihar)-801106 |
| **Body/bodies which will carry out assessment of learners** | Examination Cell,  National Institute of Electronics & Information Technology (NIELIT), Near IIT Patna, Amhara, Bihta, Patna (Bihar)-801106 |
| **Occupation(s) to which the qualification gives access** | Certificate Course on Printed Circuit Board Design, Analysis and Manufacturing Techniques. |
| **Licensing requirements** | **Not Applicable** |
| **Level of the qualification in the NSQF** | **4** |
| **Anticipated volume of training/learning required to complete the qualification** | **400** |
| **Entry requirements and / or recommendations** | Diploma/B.Sc. in Electronics /Telecommunication/ Instrumentation /Electrical  **.**  **Age 18 years to 35 years** |
| **Progression from the qualification** | **Professional:**  Lab Technician of PCB, PCB Design Engineer, PCB Fabrication Engineer, Supervisor, Design Head |
| **Planned arrangements for the Recognition of Prior learning (RPL)** | **Yes** |
| **International comparability where known** | **N/A**  **CNC** |
| **Date of planned review of the qualification.** | **N/A** |

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| --- | --- | --- | --- |
| **Formal structure of the qualification** | | | |
| **Title of component and identification code** | **Mandatory/ Optional** | **Estimated size (learning hours)** | **Level** |
| M1- Printed Circuit Board Design and Analysis Techniques | M | 50 | **4** |
| M2- PCB Manufacturing Techniques | M | 50 |
| M3- PCB Assembly Techniques | M | 50 |
| Practical | M | 100 |
|  | **TOTAL-** | **250** |  |

**ASSESSMENT**

**Body/Bodies which will carry out assessment:**

Examination cell - National Institute of Electronics & Information Technology, Patna

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

*YES. Learners who have met the requirements of any Unit Standard that forms part of this qualification may apply for recognition of prior learning to the relevant Education body. The applicant must be assessed against the specific outcomes and with the assessment criteria for the relevant Unit Standards.*

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

**1. ASSESSMENT GUIDELINE:**

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

Written Assessment (Multiple Choice Questions)

A. Practical Assessment

B. Viva Voce 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.
3. The assessor 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.

**2. ASSESSORS:**

NIELIT Patna faculty teaching the course, also assesses the students as per guidelines set by Examination cell of NIELIT Patna.

**3. ELIGIBILITY TO APPEAR IN THE EXAM:**

Minimum 75% attendance is compulsory for the students to appear for the assessments.

**4. MARKING SCHEME:**

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| --- | --- | --- | --- | --- |
| **Assessable Outcomes** | **Assessment criteria for the outcome** | **Total Mark** | **Theory Marks** | **Practical Marks** |
| **1.Module-1** | Define Information packages of | **100** | **50** | **50** |
| Familiarize with the basic knowledge of Electronic components like types of PCBs and history of PWBs/PCBs. DFM And DFA concept | Electronic components, types of PCBs and history of PWB/PCBs. |
| Describe the rules before PCB Designing. |
| Demonstration of Flow of computer aided design packages. |
| Importance of manufacturing documents. |
| Basic concept of thermal analysis |
| Design PCB for Manufacturing as per procedure and assembly point of view. |
| **Total** | | **100** | **50** | **50** |
| **1.Module-2** Will learn skills of Manufacturing process of PCB and fault finding methods | Execute and Demonstrate the process of Film Master generation, material used for manufacturing, cleaning methods of base material. Analysis the manufacturing process of PCB and fault finding methods | 100 | 50 | 50 |
| **Total** | | **100** | **50** | **50** |
| **Assessable Outcomes** | **Assessment criteria for the outcome** | **Total Mark** | **Theory Marks** | **Practical Marks** |
| **Module-3** Will acquire skills of Assembly methods, Soldering Tools and Soldering Technology for leaded and SMD. | Implement assembly techniques for leaded and SMDs. Use of various tools during assembly. Methods of soldering of PCBs, material used in soldering process. | **100** | **50** | **50** |
| **Total** | | **100** | **50** | **50** |

**5. PASSING MARKS:**

Passing criteria is based on marks obtain in attendance record, term works , assignments, practical’s performance, viva or oral exam, module test, class test, practical exam and final exam

Minimum Marks to pass practical exam – 70%

Minimum Marks to pass theory exam – 30%

Grade Equivalents:-

>85% Ex

>65% & <85% A

>50% & <65% B

>35% & <50% C

<35% D

**6. RESULTS AND CERTIFICATION:**

The assessment results are backed by evidences collected by assessors. Successful trainees are awarded the certificates by NIELIT, Patna.