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| **Course** | **:** | **Solar-LED Lighting Product ( Design and Manufacturing)** |
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| **Course Details** |  |  |
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| Course ID | : | NIELIT/RE/2/89 |
| Candidate Eligibility | : | ITI/12th Pass |
| No. of NOS (if QP) | : | NA |
| NSQF Level | : | 4 |
| Cost Category | : | 1 |
| Course Duration | : | 350 |
| a) Theory Duration | : | 200 |
| b) Practical Duration | : | 150 |
| a) OJT Duration | : | 0 |

**Trainer Qualification Work Experience**

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| **Trainer Qualification** | **Work Experience** |
| **Essential Qualification:** | Minimum One Year Experience in Solar –LED Based Designing Products  Or  Minimum One Year Experience in Assemble & Maintaining of LED – Solar Based Lightning Products |
| B.E/B.Tech (Electronics & Comm. Engineering) |
| **Desirable Qualification:** |
| 1. M.E/M.Tech (Electronics & Comm. Engineering) 2. Complete Trained in Solar – LED Design & Manufacturing |

**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 |
| **Mobile** | : | 9431021577 |
| **E-mail address** | : | sptiwari@nielit.gov.in |

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| **Qualification Title** | Solar-LED Lighting Product ( Design and Manufacturing) |
| **Qualification Code** | **NIELIT/RE/2/89** |
| **Nature and purpose of the qualification** | **Nature: Certificate Course**  **Purpose:**  Technician (in design, supply, installation, Civil work, testing, commissioning of Solar LED Street Lighting System etc.)  Senior Technician Service Engineer  Designer Entrepreneur (of low cost LED products for common use like Lanterns, table lamps, etc.) |
| **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** | Solar-LED Lighting Product ( Design and Manufacturing |
| **Licensing requirements** | **Not Applicable** |
| **Level of the qualification in the NSQF** | **4** |
| **Anticipated volume of training/learning required to complete the qualification** | **280** |
| **Entry requirements and / or recommendations** | ITI/12th  **.**  **Age 18 years to 35 years** |
| **Progression from the qualification** | **Professional:**  Technician (in design, supply, installation, Civil work, testing, commissioning of Solar LED Street Lighting System etc.)  Senior Technician Service Engineer  Designer Entrepreneur (of low cost LED products for common use like Lanterns, table lamps, etc.) |
| **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** |
| Introduction of light sources and their characteristics | M | 70 | **4** |
| Study of led and light sources | M | 70 |
| Design of led based products | M | 70 |
| Introduction of solar photo voltaic cells | M | 70 |
| Installation and maintenance of solar panel | M | 70 |
|  | **TOTAL-** | **350** |  |

**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** | **Written** | **Practical** | **Vivo voce** |
| **1.**  Will be able to connect multiple LEDS. | Outline fundamentals of LED & describe types of lighting sources.  Measurement of various light units.  Types, Behaviour of LEDs. | 100 |  |  |  |
| Connection of Multiple LEDs, wiring of multiple LEDs in series and parallel, white light production from LED | **Total** | **50** | **30** | **20** |
| **2**  Designing of  LEDs  considering reliability parameters | Types of LED and Light sources | 100 |  |  |  |
| Design of LED by following various Reliability parameters like Heating problem, poor electronics, fitting types, environmental factors dimming of LED, space flexibility, enhanced safety, increased, productivity, efficacy, | **Total** | **50** | **30** | **20** |
|  | illumination, light quality, response timing, dimming, glare, light colour and colour rendering |  |  |  |  |
| 3 will be able to design LED  based products | Design of Single transistor constant current driver, with voltage regulation, an alternative to zener diode, LED switching using LDR. | 100 |  |  |  |
| Use of various tools like temperature meter, resistance thermometer, magnifying glass etc. Benefits of LED assembly, application of LED assembly, LED bulb light, LED spotlight assembly, LED tube light. | **Total** | **50** | **30** | **20** |
| 4 Use & connection of solar photo  voltaic cells | Adv of Solar energy as renewable source. Historical Perspective of using solar energy.  Concepts of solar photo voltaic cells | 100 |  |  |  |
| Working of SPV’s, ratings and specifications of SPV peak voltage and voltage/current on load, ratings of PV module, specification of PV module. | **Total** | **50** | **30** | **20** |
| **5.** Installation and maintenance of solar panel | Use of tools involved in installation of systems.  Follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements and according to site policy.  Avoid waste and dispose waste as per procedure.  Take opportunities to use energy and materials in an environmentally friendly manner  Design and Installation of solar PV system considering sizing, site surveying methods and evaluation parameters, sunlight’s and direction assessment. | 100 |  |  |  |
| Installation of solar plates on holding clamp, wiring multiple PV module,  wiring of solar panel to inverter, | **Total** | **50** | **30** | **20** |
| Maintenance Criteria of solar panels | **500** | **250** | **150** | **100** |

**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.