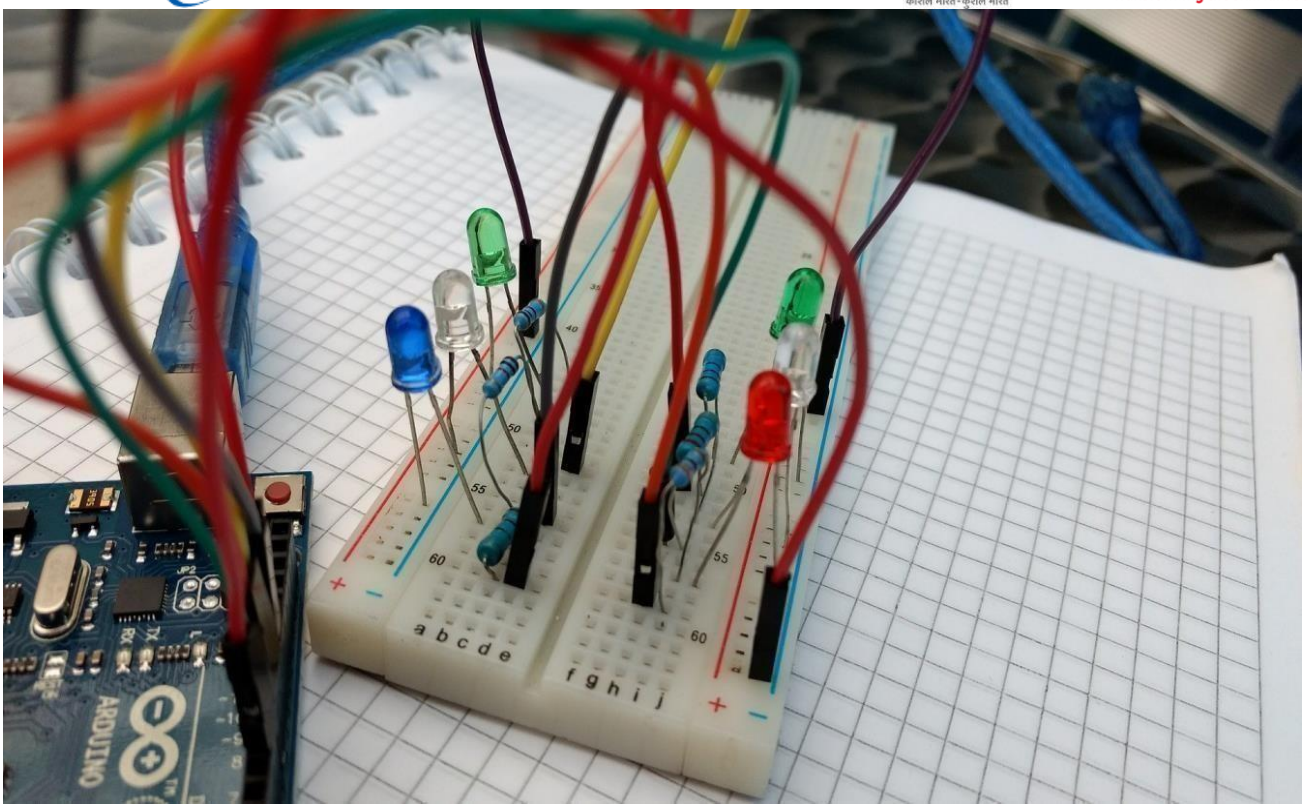

Model Curriculum

QP Name: LED Luminary Mechanical Assembly and Testing Technician

QP Code: ELE/Q5803

QP Version: 3.0

NSQF Level: 4

Model Curriculum Version: 3.0

Electronics Sector Skills Council of India || 155, 2nd Floor, ESC House, Okhla Industrial Area - Phase 3, New Delhi – 110020

Table of Contents

Training Parameters

Sector	Electronics
Sub-Sector	Solar & LED
Occupation	Assembly-S&L
Country	India
NSQF Level	4
Aligned to NCO/ISCO/ISIC Code	NCO-2015/3113.1001
Minimum Educational Qualification and Experience	8th Grade Pass + NTC (2 years after 8th) + 2 Year NAC/relevant Experience) OR 10th Grade pass + 2 Year NTC/NAC/ relevant experience OR Certificate-NSQF (Level-3 in Maintenance Technician) with 2 Years of relevant Experience OR 12th Class and 18 Years
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 Years
Last Reviewed On	24/02/2022
Next Review Date	24/06/2025
NSQC Approval Date	24/02/2022
QP Version	3.0
Model Curriculum Creation Date	24/02/2022
Model Curriculum Valid Up to Date	24/06/2025
Model Curriculum Version	3.0
Maximum Duration of the Course	600 Hours

Program Overview

This section summarizes the end objectives of the program along with its duration.

Training Outcomes

At the end of the program, the learner should have acquired the listed knowledge and skills.

- Perform assembly of the base for LED luminary as per standard operating procedure (SOP).
- Perform heat sink assembly for LED luminary as per standard work procedure.
- Join base assembly with heat sink assembly in adherence with standard work practices.
- Perform preparation of the LED luminary assembly for manufacturing.
- Follow work instructions to pack the final product for manufacturing.
- Test the LED luminary to evaluate performance parameters as per SOP.
- Adhere to industry work practices during the entire assembling process.
- Interact and coordinate with the supervisor and colleagues etc.
- Follow safe and healthy work practices.

Compulsory Modules

The table lists the modules and their duration corresponding to the Compulsory NOS of the QP.

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
Bridge Module	**21:00**	**09:00**	**00:00**	**00:00**	**30:00**
Module 1: Introduction to the role of LED Luminary Mechanical Assembly and Testing Technician	21:00	09:00	00:00	00:00	30:00
ELE/N5803 – Assemble various parts of LED luminary according to standard practices	**60:00**	**90:00**	**60:00**	**00:00**	**210:00**
Module 2: Assemble LED Luminary	60:00	90:00	60:00	00:00	210:00
ELE/N5804 – Test the LED luminary using various equipment	**60:00**	**120:00**	**90:00**	**00:00**	**270:00**
Module 3: Test the LED Luminary	60:00	120:00	90:00	00:00	270:00
ELE/N1002 – Apply Health and Safety Practices at the Workplace	**15:00**	**15:00**	**00:00**	**00:00**	**30:00**

Module 4: Basic Health and Safety Practices	15:00	15:00	00:00	00:00	30:00
DGT/VSQ/N0102 – Employability Skills (60 Hours)	**24:00**	**36:00**	**00:00**	**00:00**	**60:00**
Module 5: Employability Skills (60 Hours)	24:00	36:00	00:00	00:00	60:00
Total Duration	**180:00**	**270:00**	**150:00**	**00:00**	**600:00**

Module Details

Module 1: Introduction to the role of LED Luminary Mechanical Assembly and Testing Technician

Bridge module

Terminal Outcomes:

- List the role and responsibilities of a LED Luminary Mechanical Assembly and Testing Technician.

Duration: *21:00*	**Duration**: *09:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Describe the size and scope of the electronics industry and its various sub-sectors. • Discuss the various opportunities for a LED Luminary Mechanical Assembly and Testing Technician in the electronics industry. • Define the basics of electronics and related concepts. • Discuss the role and responsibilities of a LED Luminary Mechanical Assembly and Testing Technician. • Discuss organisational policies on incentives, delivery standards, personnel management and public relations (PR).	
Classroom Aids:	
Laptop, white board, marker, projector	
Tools, Equipment and Other Requirements	
NA	

Module 2: Assemble LED Luminary

Mapped to ELE/N5803

Terminal Outcomes:

- Assemble the base for LED luminary
- Heat sink assembly for LED luminary
- Join base assembly with heat sink assembly in adherence with standard work practices.
- Perform preparation of the LED luminary assembly for manufacturing.
- Follow work instructions to pack the final product for manufacturing.

Duration: *60:00*	**Duration**: *90:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Discuss the basics of product designing for electronic assembly. • List the various types of LED luminary available in the market. • Explain the process to rivet the mechanical frame as per luminary design. • List tools and equipment to be used for assembling the luminary. • Discuss the processes to be followed for LED luminary assembly. • Discuss application and importance of applying a barrier film/tape to the underside. • List the key considerations for the placement of the LED PCB assembly on the heat sink. • Discuss the techniques to be followed for establishing proper connections in the assembly. • Describe correct soldering technique used for PCB assembly. • List the inspection techniques used for identifying errors and defects within the assembly. • Discuss various methods for cleaning parts and equipment such as heat sink, glass shell and base, as per assembly requirements. • Describe the curing process and labelling for LED assembly. • Explain the procedure for packaging the assembled LEDs and PCBs. • Discuss the different standards used for the Assembly and testing like International Protection (IP) rating, CREE standards, and 5S standards (sorting, setting, standardise, sustain, shining).	• Demonstrate setting up the frame as per luminary design and assembly requirements. • Demonstrate the steps to assemble LED luminary by wrapping, routing wires, securing base, flipping, curing and finally, cleaning the LED circuit board. • Demonstrate the assembly of using the defined processes for placement of LED PCB, alignment of base, joining base and wires, and fixing the base. • Demonstrate the steps of Visual inspection using magnifying glass to identify errors and rectify the same. • Demonstrate labelling the packed LED Luminary as per the SOP.

Classroom Aids:
Whiteboard, marker pen, computer or laptop attached to LCD projector, scanner, computer speakers
Tools, Equipment and Other Requirements
LED luminary; machine tools for assembling the luminary (such as wire stripper, screw driver, Allen key set, wire stripper, press, weighing machines, torque measurement meter and temperature calibrator); printed circuit board (PCB), aluminium heat sink, potting material, organisational documents, PCB assembly, glue, magnifying glass, tester, glass shell, adhesive and soldering equipment

Module 3: Test the LED Luminary

Mapped to ELE/N5804

Terminal Outcomes:

- Test the LED luminary to evaluate performance parameters as per SOP.
- Adhere to industry work practices during the entire assembling process.

Duration: *60:00*	**Duration**: *120:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Discuss the regulatory, statutory and quality standards related to LED industry. • List the key considerations to decide whether a LED luminary is fit for manufacturing or not. • List the various materials, electronic and electrical components used in electronic assembling process and require testing. • List the industry accepted equipment and devices used for testing LED luminary assembly. • Discuss the techniques used for testing LED luminary as per standard work practices. • Describe the role of devices such as LED Driver Tester, Surge Generator, Magnetic Field Generator, HV and EFT Tester, ESD Generator, etc. in the testing of LED luminary assembly. • Explain the procedure to be followed for operating the testing equipment relevant to the testing of LED luminary assembly. • List the important parameters for evaluating characteristics, such as distortion, intensity, luminescence, thermal stability, chromaticity etc., for the LED luminary. • List the performance parameters to be evaluated in the LED luminary. • Discuss the importance of recording the findings and outcomes of testing the assembly. • List the appropriate PPE that is worn during testing of the electronic assembly process.	• Demonstrate connecting the LED luminary with testing equipment using wires as per organisational SOP. • Demonstrate the process of LED luminary testing as per organisational/industry norms. • Demonstrate the steps to record and interpret the reading of various current-voltage parameters such as input voltage, input current, input power, total harmonic distortion (THD), luminous intensity distribution curve, luminous intensity data, efficient luminescence angle, correlated colour temperature (CCT), colour rendering index (CRI), etc. by referring to the board display.
Classroom Aids:	
Whiteboard, marker pen, computer or laptop attached to LCD projector, scanner, computer speakers	
Tools, Equipment and Other Requirements	

LED luminary, lighting controls, LED power supplies, LED drivers, LED luminary, electronic and electrical components; testing equipment, connecting wires, LED Driver Tester, devices such as Surge Generator; Magnetic Field Generator, HV and EFT Tester, ESD Generator, Voltage Dips and Interruptions Generator; Ring Wave Generator, Goniophotometer, Integrating Sphere with Photo-spectrophotometer; Aging Line and Aging Life Time Machine; standard operating manual, data record sheet and personal protective equipment (PPE).

Module 4: Basic Health and Safety Practices

Mapped to ELE/N1002

Terminal Outcomes:

- Apply health and safety practices at the workplace.

Duration: *15:00*	**Duration**: *15:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Discuss job-site hazards, risks and accidents. • Explain the organizational safety procedures for maintaining electrical safety, handling tools and hazardous materials. • Elaborate electronic waste disposal procedures. • Describe the process of disposal of hazardous waste • List the name and location of concerned people, documents and equipment for maintaining health and safety in the workplace. • Describe how to interpret warning signs while accessing sensitive work areas. • Explain the importance of good housekeeping. • Describe the importance of maintaining appropriate postures while lifting heavy objects. • List the types of fire and fire extinguishers. • Explain the importance of efficient utilisation of water, electricity and other resources. • List the common sources of pollution and ways to minimize it. • Describe the concept of waste management and methods of disposing hazardous waste. • Explain various warning and safety signs. • Describe different ways of preventing accidents at the	• Demonstrate the use of protective equipment suitable as per tasks and work conditions. • Prepare a report to inform the relevant authorities about any abnormal situation/behaviour of any equipment/system. • Administer first aid in case of a minor accident. • Demonstrate the steps to free a person from electrocution safely. • Administer Cardiopulmonary Resuscitation (CPR). • Demonstrate the application of defined emergency procedures such as raising alarm, safe/efficient, evacuation, moving injured people, etc. • Prepare a sample incident report. • Use a fire extinguisher in case of a fire incident. • Demonstrate the correct method of lifting and handling heavy objects.
Classroom Aids	
Training kit (Trainer guide, Presentations), White board, Marker, projector, laptop, flipchart.	
Tools, Equipment and Other Requirements	
Personal Protection Equipment: safety glasses, head protection, rubber gloves, safety footwear, warning signs and tapes, fire extinguisher, first aid kit, fire extinguishers and warning signs.	

Module 5: Employability Skills (60 Hours)
Mapped to DGT/VSQ/N0102

Terminal Outcomes:

- Discuss about Employability Skills in meeting the job requirements
- Describe opportunities as an entrepreneur.
- Describe ways of preparing for apprenticeship & Jobs appropriately.

Duration: *24:00*	**Duration:** *36:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain constitutional values, civic rights, responsibility towards society to become a responsible citizen • Discuss 21st century skills • Explain use of basic English phrases and sentences. • Demonstrate how to communicate in a well-behaved manner • Demonstrate how to work with others • Demonstrate how to operate digital devices • Discuss the significance of Internet and Computer/ Laptops • Discuss the need for identifying business opportunities • Discuss about types of customers. • Discuss on creation of biodata • Discuss about apprenticeship and opportunities related to it.	• List different learning and employability related GOI and private portals and their usage • Show how to practice different environmentally sustainable practices. • Exhibit 21st century skills like Self-Awareness, Behavior Skills, time management, etc. • Show how to use basic English sentences for everyday conversation in different contexts, in person and over the telephone • Demonstrate how to communicate in a well -mannered way with others. • Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette • Utilize virtual collaboration tools to work effectively • Demonstrate how to maintain hygiene and dressing appropriately. • Perform a mock interview
Classroom Aids	
Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Computer, UPS, Scanner, Computer Tables, LCD Projector, Computer Chairs, White Board OR Computer Lab	

Module 6: On-the-Job Training

Mapped to LED Luminary Mechanical Assembly and Testing Technician

Mandatory Duration: *150:00*	**Recommended Duration**: *00:00*
Location: On Site	

Terminal Outcomes

1. Explain the fundamental concepts of solar and LED
2. Assemble the base for LED luminary
3. Heat sink assembly for LED luminary
4. Join base assembly with heat sink assembly in adherence with standard work practices.
5. Perform preparation of the LED luminary assembly for manufacturing
6. Test the LED luminary to evaluate performance parameters as per SOP.
7. Adhere to industry work practices during the entire assembling process
8. Interact and coordinate with supervisor and colleagues
9. Work as per the given timeline and quality standards
10. Maintain a safe, healthy and secure work environment

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
Diploma/ ITI/ Certified in relevant CITS Trade	Electronics/ Electrical/ Mechanical	2	LED luminary mechanical assembly and testing	1	Trainer	

Trainer Certification	
Domain Certification	**Platform Certification**
"LED Luminary Mechanical Assembly and Testing Technician, ELE/Q5803, version 3.0". Minimum accepted score is 80%.	Recommended that the Trainer is certified for the **LED Luminary Mechanical Assembly and Testing Technician** "Trainer (VET and Skills)", mapped to the Qualification Pack: "MEP/Q2601, V2.0", with minimum score of 80%

Assessor Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training/Assessment Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
Diploma/ ITI/ Certified in relevant CITS Trade	Electronics/ Electrical/ Mechanical	3	LED luminary mechanical assembly and testing	2	Assessor	

Assessor Certification	
Domain Certification	**Platform Certification**
"LED Luminary Mechanical Assembly and Testing Technician, ELE/Q5803, version 3.0". Minimum accepted score is 80%.	Recommended that the Assessor is certified for the **LED Luminary Mechanical Assembly and Testing Technician** "Assessor (VET and Skills)", mapped to the Qualification Pack: "MEP/Q2701, V2.0", with minimum score of 80%

Assessment Strategy

1. Assessment System Overview:
    - Batches assigned to the assessment agencies for conducting the assessment on SDMS/SIP or email
    - Assessment agencies send the assessment confirmation to VTP/TC looping SSC
    - Assessment agency deploys the ToA certified Assessor for executing the assessment
    - SSC monitors the assessment process & records

2. Testing Environment:
    - Confirm that the centre is available at the same address as mentioned on SDMS or SIP
    - Check the duration of the training.
    - Check the Assessment Start and End time to be as 10 a.m. and 5 p.m.
    - If the batch size is more than 30, then there should be 2 Assessors.
    - Check that the allotted time to the candidates to complete Theory & Practical Assessment is correct.
    - Check the mode of assessment—Online (TAB/Computer) or Offline (OMR/PP).
    - Confirm the number of TABs on the ground are correct to execute the Assessment smoothly.
    - Check the availability of the Lab Equipment for the particular Job Role.

3. Assessment Quality Assurance levels / Framework:
    - Question papers created by the Subject Matter Experts (SME)
    - Question papers created by the SME verified by the other subject Matter Experts
    - Questions are mapped with NOS and PC
    - Question papers are prepared considering that level 1 to 3 are for the unskilled & semi-skilled individuals, and level 4 and above are for the skilled, supervisor & higher management
    - Assessor must be ToA certified & trainer must be ToT Certified
    - Assessment agency must follow the assessment guidelines to conduct the assessment

4. Types of evidence or evidence-gathering protocol:
    - Time-stamped & geotagged reporting of the assessor from assessment location
    - Centre photographs with signboards and scheme specific branding
    - Biometric or manual attendance sheet (stamped by TP) of the trainees during the training period
    - Time-stamped & geotagged assessment (Theory + Viva + Practical) photographs & videos

5. Method of verification or validation:
    - Surprise visit to the assessment location
    - Random audit of the batch
    - Random audit of any candidate

6. Method for assessment documentation, archiving, and access
    - Hard copies of the documents are stored
    - Soft copies of the documents & photographs of the assessment are uploaded / accessed from Cloud Storage
    - Soft copies of the documents & photographs of the assessment are stored in the Hard Drive.

References

Glossary

Sector	Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
Sub-sector	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
Occupation	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
Occupational Standards (OS)	OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the Knowledge and Understanding (KU) they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria (PC)	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
National Occupational Standards (NOS)	NOS are occupational standards which apply uniquely in the Indian context.
Qualifications Pack (QP)	QP comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.
Unit Code	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
Unit Title	Unit title gives a clear overall statement about what the incumbent should be able to do.
Description	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.

Scope	Scope is a set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on quality of performance required.
Knowledge and Understanding (KU)	Knowledge and Understanding (KU) are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard.
Organisational Context	Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Technical Knowledge	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Core Skills/ Generic Skills (GS)	Core skills or Generic Skills (GS) are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles.
Electives	Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.
Options	Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.

Acronyms and Abbreviations

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training
IPR	Intellectual Property Rights