

# Model Curriculum

## LED Light Repair Technician

**SECTOR: ELECTRONICS**  
**SUB-SECTOR: LED LIGHTING**  
**OCCUPATION: LED LIGHT TESTING AND QUALITY ASSURANCE**  
**REF ID: ELE/Q9302 VERSION 1.0**  
**NSQF LEVEL: 4**



## Certificate

**COMPLIANCE TO  
QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARD**

Is hereby issued by the

**Electronics Sector Skills Council of India**

for

**Skilling Content : LED Light Repair Technician**

Complying to National Occupational Standards of

**Job Role/QP : LED Light Repair Technician, QP No : ELE/Q9302 Level 4**

Date of Issuance : 08<sup>th</sup> May 2017

Valid up to\* : 07<sup>th</sup> May 2018

\*Valid upto the next QP Review Date or the date  
mentioned above (whichever is earlier)



Authorized Signatory  
Electronics Sector Skills Council of India

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# LED LIGHT REPAIR TECHNICIAN

## CURRICULUM / SYLLABUS

This course encompasses 3 out of 3 National Occupational Standards (NOS) of “LED Light Repair Technician” Qualification Pack issued by “Electronic Sector Skill Council”.

<b>Program Name</b>	<b>LED Light Repair Technician</b>		
<b>Qualification Pack Name &amp; Reference ID. ID</b>	ELE/Q9302 VERSION 1.0		
<b>Version No.</b>	1.0	<b>Version Update Date</b>	07-May-2017
<b>Pre-requisites to Training</b>	ITI/ Diploma – minimum 6 months as helper		
<b>Training Outcomes</b>	<p><b>After completing this programme, participants will be able to:</b></p> <ul style="list-style-type: none"> <li>• Interact with the customer in order to identify and understand the problem in the television set</li> <li>• Understanding of the basics of power electronics and its usages in lighting controls, or LED power supplies and LED drivers</li> <li>• Special safety and handling precautions to be taken during LED luminary testing</li> <li>• 5S standards (sorting, setting, standardize, sustain, shining) + safety, security</li> <li>• Follow behavior etiquettes while interacting with others</li> <li>• Ensure customer satisfaction</li> <li>• Identify dysfunctional components through visual inspection and by use of multi-meter</li> <li>• To understand, various electronic &amp; electrical components, materials and their specific properties &amp; usages</li> <li>• Communicate effectively</li> <li>• Establishing good working relationships with colleagues within and outside the department by coordinating</li> </ul>		

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	<p><b>Basic Electronics</b></p> <p><b>Theory Duration</b> (hh:mm) 20:00</p> <p><b>Practical Duration</b> (hh:mm) 20:00</p> <p><b>Corresponding NOS Code</b> ELE/N9302</p>	<ul style="list-style-type: none"> <li>Individual will understand companies various policies like Health and Hygiene, environment, quality, fire and safety, child labor, incentives, personnel management, work flow, individual's role in organization, organization structure, profile of customer etc</li> <li>To know &amp; identify the circuit components.</li> <li>Understanding the electrical properties of different components.</li> <li>Calculation of resistance by identifying the color code.</li> <li>Understand the functionality of coil.</li> <li>Winding of coil.</li> <li>Biasing of transistor.</li> <li>Current amplification circuit.</li> <li>Designing of filter.</li> <li>Types of LED</li> </ul>	<ul style="list-style-type: none"> <li>Multi-meter</li> <li>Diode</li> <li>Resistor</li> <li>Capacitor</li> <li>Transistor(BJT,FET).</li> </ul>
2	<p><b>Employability skills</b></p> <p><b>Theory Duration</b> (hh:mm) 20:00</p> <p><b>Practical Duration</b> (hh:mm) 20:00</p> <p><b>Corresponding NOS Code</b> ELE/N9201 ELE/N9919</p>	<ul style="list-style-type: none"> <li>Planning, Problem Solving, team coordination, Decision Making, Reflective thinking, Critical Thinking, multitasking, process disruption and delays, Improving work process</li> <li>Interacting with Supervisor and Colleagues</li> <li>Follow Safety Standards</li> </ul>	<ul style="list-style-type: none"> <li>Braid board</li> <li>Vero board</li> <li>Inductor</li> <li>Resistor</li> <li>Capacitor</li> <li>Transistor(BJT,FET)</li> <li>Transformer</li> <li>Soldering Iron</li> <li>Soldering ware</li> <li>Desoldering pump</li> </ul>
3	<p><b>Measuring tools and instruments</b></p> <p><b>Theory Duration</b> (hh:mm) 20:00</p> <p><b>Practical Duration</b> (hh:mm) 20:00</p> <p><b>Corresponding NOS Code</b> ELE/N9302 ELE/N9921</p>	<ul style="list-style-type: none"> <li>Understand the functionality of multimeter</li> <li>Explain different modes of testing in multimeter.</li> <li>Ensure the probes of the multimeter is connected properly before any particular test.</li> <li>Handling of regulated power supply unit.</li> <li>Following proper safety methods before attaching a light for testing.</li> <li>Precautious dealing with AC &amp; DC current</li> </ul>	<ul style="list-style-type: none"> <li>AC to DC regulated power supply</li> <li>Ammeter</li> <li>Voltmeter</li> <li>Multimeter</li> <li>Power meter.</li> </ul>

4	<p><b>Assembly Section</b></p> <p><b>Theory Duration</b> (hh:mm) 20:00</p> <p><b>Practical Duration</b> (hh:mm) 20:00</p> <p><b>Corresponding NOS Code</b> ELE/N9921</p>	<ul style="list-style-type: none"> <li>• Operating SMT machine in case of replacement.</li> <li>• Soldering of semiconductor devices following safety measures.</li> <li>• Use of ESD gloves while dealing with LED's.</li> </ul>	<ul style="list-style-type: none"> <li>• SMT machine</li> <li>• Reflow oven</li> <li>• Manual screen printer</li> <li>• PCB</li> <li>• Soldering Iron</li> <li>• Soldering ware</li> <li>• Desoldering pump</li> </ul>
5	<p><b>Test and Measurement I</b></p> <p><b>Theory Duration</b> (hh:mm) 20:00</p> <p><b>Practical Duration</b> (hh:mm) 20:00</p> <p><b>Corresponding NOS Code</b> ELE/N9302 ELE/N9919</p>	<ul style="list-style-type: none"> <li>• Finding the required test pint while checking of a assembled circuit.</li> <li>• Checking proper connectivity while testing the driver circuit</li> <li>• Selecting proper temperature for soldering of components while using a temperature controlling solder iron</li> <li>• Discussing with senior about any kind of major failure in a circuit.</li> <li>• Completing Base Assembly, Completing Heat Sink Assembly, Joining base assembly with heat sink assembly</li> </ul>	<ul style="list-style-type: none"> <li>• AC to DC regulated power supply</li> <li>• AC to AC regulated power supply</li> <li>• LED Driver Tester</li> <li>• Stripper</li> <li>• Cutter</li> <li>• Screw driver set</li> </ul>
6	<p><b>Test and Measurement II</b></p> <p><b>Theory Duration</b> (hh:mm) 20:00</p> <p><b>Practical Duration</b> (hh:mm) 20:00</p> <p><b>Corresponding NOS Code</b> ELE/N9302</p>	<ul style="list-style-type: none"> <li>• Explaining the principal of illumination from a LED.</li> <li>• Explaining the properties of LED e.g. lumen, Flux, efficacy, CRI etc.</li> <li>• Testing of the above mentioned parameters using a lamp analysis system.</li> <li>• Replacing a malfunctioning LED identifying the reason of the malfunctioning.</li> </ul>	<ul style="list-style-type: none"> <li>• Stripper</li> <li>• Cutter</li> <li>• Screw driver set</li> <li>• Multimeter</li> <li>• AC to DC regulated power supply</li> <li>• AC to AC regulated power supply</li> <li>• Integrating Sphere</li> <li>• Spectro-radiometer</li> <li>• LUX meter</li> <li>• Power meter.</li> </ul>
7	<p><b>Service and Maintenance</b></p> <p><b>Theory Duration</b> (hh:mm) 20:00</p> <p><b>Practical Duration</b> (hh:mm) 20:00</p> <p><b>Corresponding NOS Code</b> ELE/N9302 ELE/N9921</p>	<ul style="list-style-type: none"> <li>• Explaining various blocks of a LED light driving circuit.</li> <li>• Analyzing the fault by approaching each block.</li> <li>• Selection of alternate spare in case of unavailability of components.</li> <li>• Ensure the fault before demounting any element from the circuit</li> <li>• Continuing the test process until the every test process is checked properly.</li> <li>• Ensure that the repaired lighting system is ok before sending it to mechanical assembling</li> </ul>	<ul style="list-style-type: none"> <li>• Stripper</li> <li>• Cutter</li> <li>• Screw driver set</li> <li>• Plier</li> <li>• Multimeter</li> <li>• Soldering pump</li> <li>• Soldering iron</li> </ul>
8	<p><b>Basic reading and writing skills</b></p>	<ul style="list-style-type: none"> <li>• To document the number of PCB processed, components processed</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>

	<p><b>Theory Duration</b> (hh:mm) 20:00</p> <p><b>Practical Duration</b> (hh:mm) 20:00</p> <p><b>Corresponding NOS Code</b> ELE/N9201</p>	<p>inwards and outwards, to have basic co-ordinate geometry for understanding X-Y coordinates on PCB, to deliver frame to next work process, red feeder charts and board designs, understanding BOM, to improve overall work process.</p>		
9	<p><b>Interaction with customers and colleagues, concept of team work</b></p> <p><b>Theory Duration</b> (hh:mm) 20:00</p> <p><b>Practical Duration</b> (hh:mm) 20:00</p> <p><b>Corresponding NOS Code</b> ELE/N9909</p>	<ul style="list-style-type: none"> <li>• Understand the requirements.</li> <li>• Communicate effectively.</li> <li>• Understand building of team coordination.</li> <li>• Take feedback of customer satisfaction.</li> </ul>	<ul style="list-style-type: none"> <li>• Projector</li> <li>• Laptop</li> </ul>	
	<p><b>Total Duration</b></p> <p><b>Theory Duration</b> <b>180:00</b></p> <p><b>Practical Duration</b> <b>180:00</b></p>	<p><b>Unique Equipment Required:</b></p> <ul style="list-style-type: none"> <li>• Ac Power Source</li> <li>• Allen Key Set</li> <li>• Connecting Wires</li> <li>• Digital Multimeter</li> <li>• ESD Gloves</li> <li>• ESD Mat</li> <li>• ESD Wrist Band</li> <li>• 7 Watt LED Lights</li> <li>• 9 Watt LED Lights</li> <li>• 12 Watt LED Lights</li> <li>• 3 Watt LED Lights</li> <li>• 5 Watt LED Lights</li> <li>• LED Tubelight</li> <li>• Lux Meter</li> <li>• Plier</li> <li>• Precision Screw Driver</li> <li>• Regulated Dc Power Supply</li> <li>• Safety Helmet</li> <li>• Safety Shoes</li> <li>• Screw Driver Set</li> <li>• Soldering Flux</li> <li>• Soldering Station</li> <li>• LED Street Light</li> <li>• Wire Stripper</li> </ul>		

Grand Total Course Duration: **360 Hours 00 Minutes**

(This syllabus/ curriculum has been approved **Electronics Sector Skills Council of India**)



## Annexure A: TRAINER Pre-Requisites

### Trainer Prerequisites for Job role: “LED Light Repair Technician” mapped to Qualification Pack: “ELE/ Q9302 Version1.0”

Sr. No.	Area	Details
1	<b>Job Description</b>	The individual at work checks the non-functional LED light in a systematic manner to find out the fault; dismantles it; repairs the fault and reassemble the light to make it functional.
2	<b>Personal Attributes</b>	The individual must be willing to work in the field and travel through the day from one customer’s premise to another. Punctuality, amenable behaviour, patience, good interpersonal relationship building, trustworthiness, integrity, and critical thinking are important attributes for this Job
3	<b>Minimum Educational Qualifications</b>	Diploma in Electronics with at least 1-2 years of experience in LED Light Repair Technician and Should have excellent communication skills
4a	<b>Domain Certification</b>	Certified for Job Role: “ <u>LED Light Repair Technician</u> ” mapped to QP: “ <u>ELE/Q9302 version1.0</u> ”. Minimum accepted score =70%
4b	<b>Platform Certification</b>	Recommended that the Trainer is certified for the Job Role: “Trainer”, mapped to the Qualification Pack: ““SSC/1402”. Minimum accepted score =70%
5	<b>Experience</b>	1-2 years of experience in LED Light Repair.

## Annexure B: ASSESSMENT Criteria

<b>Assessment Criteria for LED Light Repair Technician</b>	
<b>Job Role</b>	<b>LED Light Repair Technician</b>
<b>Qualification Pack</b>	<b>ELE/ Q9302 version1.0</b>
<b>Sector Skill Council</b>	<b>Electronic</b>

Sr. No.	Guidelines for Assessment
1	Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2	The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3	Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training centre (as per assessment criteria below)
4	Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criteria
5	To pass the Qualification Pack, every trainee should score a minimum of 70% in each NOS
6	In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack.

Element	Performance Criteria	Total Marks (300)	Out Of	Marks Allocation	
				Theory	Skills Practical
<b>1. ELE/N930 2 Diagnose and repair fault in LED Light</b>	PC1. connect the non-functional LED Light with the AC source and switch it on	<b>100</b>	<b>2</b>	<b>1</b>	<b>1</b>
	PC2. check that there is no loose, de-soldered wires and connections if the light does not switch on			<b>1</b>	<b>1</b>
	PC3. solder wires and make connections in case of loose, de-soldered wires and connections to make the light operational again			<b>1</b>	<b>1</b>
	PC4. dismantle the LED light if no loose, de-soldered wires and connections are found externally			<b>1</b>	<b>1</b>
	PC5. check the LED light engine with DC supply as per the voltage / current requirements of the product			<b>1</b>	<b>1</b>
	PC6. replace the LED light engine if it is found faulty			<b>1</b>	<b>2</b>

	PC7. check the supply unit with AC supply / multimeter to find out the voltage / current output in case LED light Engine is not found defective		3	1	2
	PC8. check voltage / current output at different sections of the supply unit with multimeter to find out its damaged section in case of no voltage / current output found in supply unit		2	1	1
	PC9. check the components with multimeter individually of the section where voltage output is found to be less than desired / no output		3	1	2
	PC10. repair / replace the damaged components / SMPs		3	1	2
	PC11. check output voltage/current of the supply unit again with multimeter		3	1	2
	PC12. reassemble the LED light if repaired / replaced supply unit is found okay		3	1	2
	PC13. connect the non-functional LED Light with the AC source and switch it on		5	2	3
	PC14. check how many LED strips are non-functional / damaged from the array of LED strips in the light		5	3	2
	PC15. remove the glass shell from the LED light		5	2	3
	PC16. replace the burnt out / damaged LED strips		5	2	3
	PC17. check the LED array after connecting it with AC source and switching it on		5	2	3
	PC18. replace the glass shell on the LED Light and close it if all the strips are found operational		5	2	3
	PC19. correctly find the root cause of non-functional LED light and repair it in minimum possible time		8	3	5
	PC20. document the fault diagnosis and repair process as per SOP		8	3	5
	PC25. assemble all the parts as per the product design to create LED luminary		8	3	5
	PC26. assemble the product right first time so that rework is not required		8	3	5
	PC27. meet 100% daily target of defect free assembled LED luminaries		8	3	5
		<b>Total</b>	<b>100</b>	<b>40</b>	<b>60</b>
<b>2. ELE/N9919 Work with superiors and colleagues</b>	PC1. understand work requirements by receiving instructions from reporting supervisor	<b>100</b>	6	2	4
	PC2. understand standard operating procedure of the company		6	2	4
	PC3. escalate problems that cannot be handled including repetitive PCB defects, machine failures, potential hazards, process disruptions, repairs and maintenance of machine		6	2	4

	PC4. report work completed and receive feedback on work done		6	2	4
	PC5. resolve personnel issues		7	3	4
	PC6. rectify errors as per feedback and minimize mistakes to zero in future		7	3	4
	PC7. communicate about process flow improvements, quality of output, product defects received from previous process, repairs and maintenance of tools and machinery as required and find technical solutions on specific issues		7	3	4
	PC8. handover completed work and deliver the work of expected quality despite constraints		7	3	4
	PC9. collect required spares and raw materials from tool room or stores		8	3	5
	PC10. deposit unused or faulty materials, parts and tools to stores		8	3	5
	PC11. assist colleagues where necessary and as per capability		8	3	5
	PC12. resolve conflicts with colleagues at work to achieve smooth workflow		8	3	5
	PC13. complete rework in time based on feedback from quality or process departments		8	4	4
	PC14. put team over individual goals		8	4	4
		<b>TOTAL</b>	<b>100</b>	<b>40</b>	<b>60</b>
<b>3.</b>					
<b>ELE/N992</b>		<b>100</b>			
<b>1 Follow safety standards</b>	PC1. spot and report potential hazards on time		5	2	3
	PC2. follow company policy and rules regarding hazardous materials		5	2	3
	PC3. avoid accidents related to use of potentially dangerous chemicals, gases, sharp tools and hazards from machines which involves exposure to possible injuries such as cuts, bites, stings, minor burns, etc.		5	2	3
	PC4. Handle with care when using an electrical drill and sharp cutting objects		5	2	3
	PC5. understand which safety gear must be used for a particular task		6	3	3
	PC6. eye, respiratory and hearing protection as per company policy		7	3	4
	PC7. use safety gear such as respirator, mask, skull caps, gloves, goggles, jacket , etc., as prescribed for the job		7	3	4
	PC8. comply with standard health and safety procedure followed in the company while handling an equipment and hazardous materials and tools or situations		10	4	6
	PC9. understand and follow the evacuation procedure properly such as fire drills, emergency evacuation		10	4	6

	procedures, first aid to self and others, etc., which help in case of an emergency			
	PC10. take adequate safety measures while on work to prevent accidents	4	2	2
	PC11. ensure zero accidents in work	4	2	2
	PC12. avoid damage of components due to negligence in ESD procedures	4	2	2
	PC13. ensure no loss for company due to safety negligence	4	2	2
	PC14. ensure proper machine maintenance, work process achieving quality outputs as per the company standard	4	2	2
	PC15. improve process flow to reduce anticipated or repetitive hazards	4	1	3
	PC16. report on mishandling of tools, machines or hazardous materials and on electrical problems that could result in accident	4	1	3
	PC17. escalate about any hazardous materials or things found in the premises	4	1	3
	PC18. report about any breach of safety procedure in the company	4	1	3
	PC19. follow electrostatic discharge (ESD) measures for electronic component safety	4	1	3
	<b>TOTAL</b>	<b>100</b>	<b>40</b>	<b>60</b>