NATIONAL EDUCATION POLICY-2020

Common Minimum Syllabus for all Uttarakhand

State Universities and Colleges

Syllabus Proposed
2023-24

Sri Dev Suman Uttarakhand University
Badshahithol, Tehri (Garhwal)

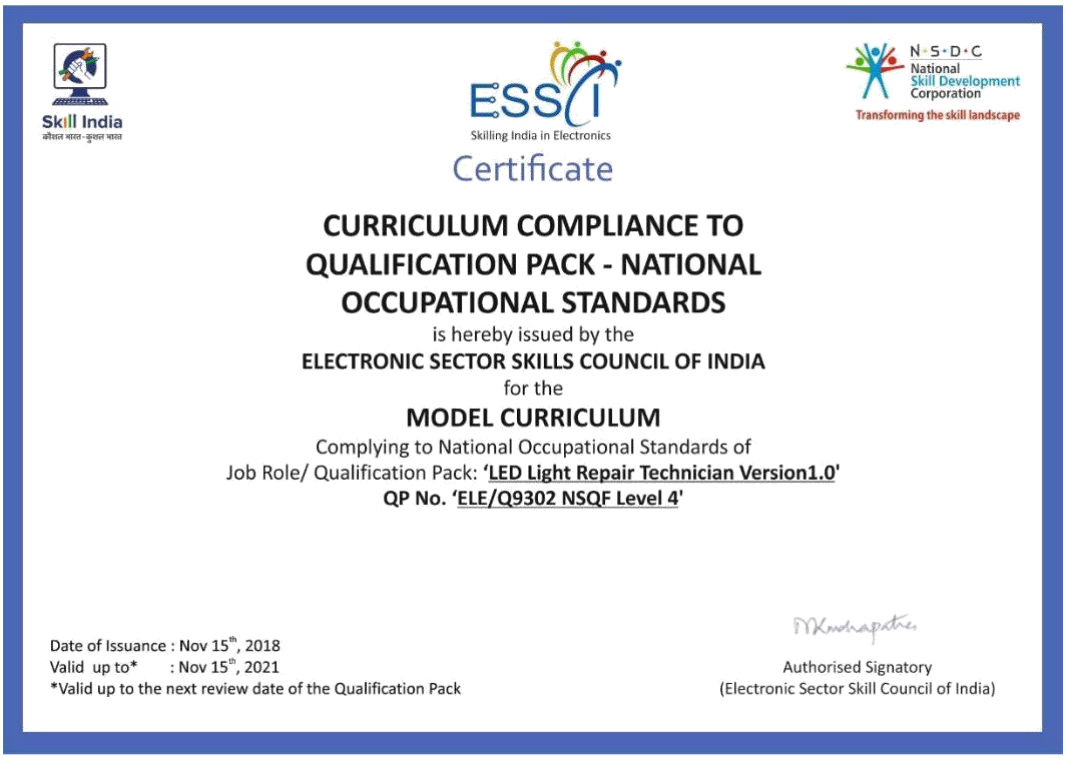
पाठ्यक्रम निर्माण समिति, उत्तराखण्ड
Curriculum Design Committee, Uttarakhand

क्र0 सं0	नाम एवं पद	
1	**प्रो0 एन0 के0 जोशी** कुलपति, श्रीदेव सुमन उत्तराखण्ड विश्वविद्यालय, टिहरी	**अध्यक्ष**
2	कुलपति, कुमाऊँ विश्वविद्यालय, नैनीताल	**सदस्य**
3	**प्रो0 जगत सिंह बिष्ट** कुलपति, सोबन सिंह जीना विश्वविद्यालय, अल्मोड़ा	**सदस्य**
4	**प्रो0 सुरेखा डंगवाल** कुलपति, दून विश्वविद्यालय, देहरादून	**सदस्य**
5	**प्रो0 ओ0 पी0 एस0 नेगी** कुलपति, उत्तराखण्ड मुक्त विश्वविद्यालय, हल्द्वानी	**सदस्य**
6	**प्रो. एम0 एस0 एम0 रावत** सलाहकार–रूसा, रूसा निदेशालय, देहरादून	**सदस्य**
7	**प्रो0 के0 डी0 पुरोहित** सलाहकार–रूसा, रूसा निदेशालय, देहरादून	**सदस्य**

Model Curriculum

LED Light Repair Technician

SECTOR:	**Electronics**
SUB-SECTOR:	**LED Lighting**
OCCUPATION:	**LED Light Testing and Quality Assurance**
REF ID:	**ELE/Q9302, Version1.0**
NSQF LEVEL:	**4**



Skill India
कौशल भारत-कुशल भारत

ESSCI
Skilling India in Electronics

N·S·D·C
National
Skill Development
Corporation
Transforming the skill landscape

Certificate

CURRICULUM COMPLIANCE TO QUALIFICATION PACK - NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

ELECTRONIC SECTOR SKILLS COUNCIL OF INDIA

for the

MODEL CURRICULUM

Complying to National Occupational Standards of
Job Role/ Qualification Pack: **'LED Light Repair Technician Version1.0'**
QP No. 'ELE/Q9302 NSQF Level 4'

Date of Issuance : Nov 15th, 2018
Valid up to* : Nov 15th, 2021
*Valid up to the next review date of the Qualification Pack

Authorised Signatory
(Electronic Sector Skill Council of India)

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LED Light Repair Technician

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of an **"**LED Light Repair Technician**"** in the "Electronics" Sector/Industry and aims at building the following key competencies amongst the learners.

Program Name	**LED Light Repair Technician**		
Qualification Pack Name & Reference ID	ELE/Q9302 VERSION 1.0		
Version No.	1.0	**Version Update Date**	15/11/2018
Prerequisites to Training	ITI/ Diploma		
Training Outcomes	**After completing this programme, the participants will be able to:** Use the knowledge of basics of electronics and LED to carry out work Perform LED repair and assembly as per the recommended quality standards Follow the safety standards and procedures Implement the soft skills that are required to carry out work efficiently		

This course encompasses 03 out of 03 National Occupational Standards (NOS) of "LED Light Repair Technician" Qualification Pack issued by "Electronics Sector Skills Council of India".

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1.	**Basics of Electronics and LED** Theory Duration (hh:mm) 60:00 Practical Duration (hh:mm) 40:00 Corresponding NOS Code ELE/N9302	Differentiate between various electronic and electrical components, materials and their specific properties, types and usages Calculate resistance by identifying the colour codes Define capacitance of a capacitor List and define the parameters of an electric circuit such as voltage, current and resistance Define Ohm's law and implement it for calculations Differentiate between alternating current (AC) and direct current (DC) Measure power and energy using relevant formula Identify the basics of power electronics and its usages in lighting controls or LED power supplies and LED drivers Identify the types of solder and flux List the function of the different components of a soldering iron Identify the selection criteria of a suitable tip Demonstrate the LED working principle List the parameters which affect the overall life of LED. Categorise LED into its various types such as indicator, illuminator and Chip on Board (COB) List the advantages of LED light products List the basic parameters of LEDs and their importance in an LED products Distinguish between the different types of power sources used in LED lighting and their characteristics	Electric circuit components such as diode, transistor, IC, LED, transformer, resistor, capacitor, thermistor, inductor, timer, motor, starter, connector, switch, PCB, relay and circuit breaker Multimeter, power source Ammeter, voltmeter Soldering Iron, soldering ware, desoldering pump

		Illustrate the different ways LEDs can be connected in a circuit and list the advantages and disadvantages of each Identify the steps of heat transfer procedure in an LED List the components of passive thermal designs to maintain low junction temperature such as adhesive and heat sinks Identify the use of constant current LED Driver	
2.	**LED Luminary Repair and Assembly** Theory Duration (hh:mm) 60:00 Practical Duration (hh:mm) 70:00 Corresponding NOS Code ELE/N9302	List the major components of an LED luminary such as LED light engine, LED Driver, LED heat sink and thermal pads Identify the tools required for LED product assembly List the materials used in LED product assembly Demonstrate basic knowledge of assembly of products such as spot light, LED bulb and LED tube light Analyse the Importance of IP rating in Led products and its requirement for different products based on the product area of use Categorise LED drivers into different types as per the type of LED Demonstrate driver selection according to the LED Follow the steps of driver selection according to the LED Identify the function and characteristics and application of a constant current LED driver and a constant voltage driver Assess the reason for LED failure including hot environment, incorrect LED driver and incorrect polarity Identify and analyse the LED luminaire failure types such as LED failure modes, secondary optics failure modes, thermal management system failure and LED driver failure	LED light, multimeter, tester, LCR meter and power analyser Stripper, cutter, screw driver set, plier, soldering pump, soldering iron

		Follow the steps to diagnose and repair fault in an LED light both at the component level and the strip level Demonstrate the process of soldering if loose, de-soldered wires and connections are found Check the LED light engine with DC supply as per the voltage / current requirements of the product Check the supply unit with AC supply / multimeter to find out the voltage /current output in case LED light engine is not found defective Check voltage / current output at different sections of the supply unit in case of no voltage / current Check the components with multimeter individually of the section where voltage output is found to be less than desired / no output Perform repair / replacement of the damaged components / SMPs Check and replace the burnt out / damaged LED strips Identify 5S work standards Perform repair as per productivity and quality standards Report faults found in the LED lights document the fault diagnosis and repair process as per SOP	
3.	**Safety Standards and Procedures** Theory Duration (hh:mm) 30:00 Practical Duration (hh:mm) 30:00 Corresponding NOS Code	Identify electrostatic discharge (ESD) causes and safety gear Identify and implement safety rules and company policy on personal protective equipment (PPE) Categorise hazards into different types Identify and report potential hazards on time Use eye, respiratory and hearing protection as per company policy	Apron, safety shoe, wrist band, wire strap, rubber gloves and safety clothes Respirator, mask, skull caps, googles, jacket

	ELE/N9921	List the reasons for a health and safety policy Comply with standard health and safety procedures followed in the company while handling an equipment and hazardous materials and tools or situations Apply electrical safety measures such as adequate wiring, proper insulation, grounding and no standing water Identify and follow standard safety procedures including daily safety instructions, before starting work, when working and after completion of work Follow emergency procedures during dangerous situations such as a fire List the key points of a fire drill Apply first aid as per the injury Follow the incident reporting procedure Implement disposal of hazardous chemicals, tools and materials by following prescribed environmental norms or as per company policy	
4.	**Soft Skills** Theory Duration (hh:mm) 30:00 Practical Duration (hh:mm) 40:00 Corresponding NOS Code ELE/N9919	Identify work requirement and targets as per drawings, job sheets or work orders from supervisor Use the tools and equipment to as per the work instructions and deposit the faulty ones Work as per the standard operating procedure (SOP) Assess work related issues and queries for solutions or escalate them to the supervisor Report work completed and receive feedback on work done Rectify errors as per feedback and minimise mistakes to zero in future Report about process flow improvements, quality of output and repairs and maintenance of tools and machinery as required	Projector, PPT

		Follow the reporting structure to resolve issues Implement the skills required for working with peers such as proper verbal and non-verbal communication, active listening and appropriate problem solving abilities Demonstrate reading skills to understand values on components, job sheets, work orders, manuals, warnings and so on Perform documentation of reports, customer complaints, solution provided and so on Demonstrate healthy interpersonal relationship by carrying resolving conflict Demonstrate team building skills to work effectively in a team Implement the principles of work ethics by resolving personnel issues, delivering quality work and reporting hazards to superior Identify and explain different policies and rules of the company to achieve quality, productivity and safety standards Implement critical thinking skills to improve work processes and spot disruptions Identify the points to be considered to facilitate decision making as per the standard operating procedure	
	Total Duration 360:00 Theory Duration 180:00 Practical Duration 180:00	Unique Equipment Required: Ac Power Source, Allen Key Set, Connecting Wires, Digital Multimeter, ESD Gloves, ESD Mat, ESD Wrist Band, 7 Watt LED Lights, 9 Watt LED Lights, 12 Watt LED Lights, 3 Watt LED Lights, 5 Watt LED Lights, LED Tubelight, Lux Meter, Plier, Precision Screw Driver, Regulated Dc Power Supply, Safety Helmet, Safety Shoes, Screw Driver Set, Soldering Flux, Soldering Station, LED Street Light, Wire Stripper	

Grand Total Course Duration: **360 Hours 0 Minutes**
(This syllabus/ curriculum has been approved by ***Electronics Sector Skills Council of India)***

Trainer Prerequisites for Job role: "LED Repair Technician" mapped to Qualification Pack: "ELE/ Q9302" Version 1.0

Sr. No.	Area	Details
1	**Job Description**	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	**Personal Attributes**	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	**Minimum Educational Qualifications**	Diploma in Electronics with at least 1-2 years of experience as an LED Light Repair Technician and should have excellent communication skills
4a	**Domain Certification**	Certified for Job Role: "LED Light Repair Technician" mapped to QP: "ELE/ Q9302 version1.0". Minimum accepted score is 80%
4b	**Platform Certification**	Recommended that the Trainer is certified for the Job Role: "Trainer", mapped to the Qualification Pack: ""MEP/Q0102". Minimum accepted score is 80%
5	**Experience**	2 years of experience in LED light repair along with training delivery experience.

Assessment Criteria for "LED Light Repair Technician"

Job Role	LED Light Repair Technician
Qualification Pack	ELE/Q9302, Version1.0
Sector Skill Council	Electronics Sector Skills Council of India

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. Each NOS will have assessed both for theoretical knowledge and practical.
3. The assessment will be based on knowledge bank of questions created by the SSC.
4. Individual assessment agencies will create unique question papers for theory and skill practical part for each candidate at each examination/training center.
5. To pass the Qualification Pack, every trainee should score a minimum of 70% in every 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.
7. In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack.

Compulsory NOS **Total Marks: 300**			**Marks Allocation**		
Assessment Outcomes	**Performance criteria**	**Total Marks**	**Out of**	**Theory**	**Skills Practical**
1. ELE/N9302 Diagnose and repair fault in LED Light	PC1. connect the non-functional LED Light with the AC source and switch it on	100	2	1	1
	PC2. check that there is no loose, de-soldered wires and connections if the light does not switch on		2	1	1
	PC3. solder wires and make connections in case of loose, de-soldered wires and connections to make the light operational again		2	1	1
	PC4. dismantle the LED light if no loose, de-soldered wires and connections are found externally		2	1	1
	PC5. check the LED light engine with DC supply as per the voltage / current requirements of the product		2	1	1
	PC6. replace the LED light engine if it is found faulty		3	1	2
	PC7. check the supply unit with AC supply		3	1	2

	/ multimeter to find out the voltage / current output in case LED light Engine is not found defective				
	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		3	1	2
	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
			100	40	60

2. ELE/N9919 Work with superiors and colleagues	PC1. understand work requirements by receiving instructions from reporting supervisor	100	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
			100	40	60
.	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,		5	2	3

ELE/N9921 Follow safety standards	sharp tools and hazards from machines which involves exposure to possible injuries such as cuts, bites, stings, minor burns, etc.	100			
	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, googles, 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 procedures, first aid to self and others, etc., which help in case of an emergency		10	4	6
	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
			100	40	60
		Total	300	120	180