Skills for Employment Investment Program (SEIP)

COMPETENCY STANDARD

FOR

ELECTRONICS

(LIGHT ENGINEERING SECTOR)

Finance Division, Ministry of Finance
Government of the People's Republic of Bangladesh

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Skills for Employment Investment Program (SEIP) Project
Finance Division
Ministry of Finance
Probashi Kallyan Bhaban (Level – 16)
71-72 Old Elephant Road
Eskaton Garden, Dhaka 1000
Telephone: +8802 551 38598-9 (PABX), +8802 551 38753-5
Facsimile: +8802 551 38752
Website: www.seip-fd.gov.bd

List of Abbreviations

General	
BMET	Bureau of Manpower Employment and Training
B-SEP	Bangladesh Skills for Employment and Productivity
BTEB	Bangladesh Technical Education Board
DTE	Directorate of Technical Education
ILO	International Labour Organization
ISC	Industry Skills Council
NPVC	National Pre-Vocation Certificate
NTVQF	National Technical and Vocational Qualifications Framework
PPP	Public Private Partnership
SCDC	Standards and Curriculum Development Committee
SEIP	Skills for Employment Investment Program
TVET	Technical Vocational Education and Training
UoC	Unit of Competency
Occupation Specific	
ESD	Electro-static discharge
OHS	Occupational health and safety
PCB	Printed circuit board
PPE	Personal protective equipment
SOP	Standard operating procedure

Introduction

The Skills for Employment Investment Program (SEIP) Project of the Finance Division of the Ministry of Finance has embarked on a project which aims to qualitatively and quantitatively expand the skilling capacity of identified public and private training providers by establishing and operationalising a responsive skill ecosystem and delivery mechanism through a combination of well-defined set of funding triggers and targeted capacity support.

Among the many components of the project, one is to promote a Market Responsive Inclusive Skills Training Delivery programme. Key priority economic growth sectors identified by the government have been targeted by the project to improve current job skills along with up-skilling of the existing workforce to ensure 'required skills to industry standards'. Training providers are encouraged and supported to work with industry to address identified skills and knowledge to enable industry growth and increased employment through the provision of market responsive inclusive skills training programmes. Priority sectors were identified to adopt a demand driven approach to training with effective inputs from Industry Skills Councils (ISC's), employer associations and employers.

This document is developed to improve skills and knowledge in accordance with the job roles, duties and tasks of the occupation and ensure that the required skills and knowledge are aligned to industry requirements.

The document also details the format, sequencing, wording and layout of the Competency Standard for an occupation which is comprised of Units of Competence and its corresponding Elements.

Overview

A **competency standard** is a written specification of the knowledge, skills and attitudes required for the performance of an occupation, trade or job corresponding to the industry standard of performance required in the workplace.

The purpose of a competency standards is to:

- provide a consistent and reliable set of components for training, recognising and assessing people's skills, and may also have optional support materials
- enable industry recognised qualifications to be awarded through direct assessment of workplace competencies
- encourage the development and delivery of flexible training which suits individual and industry requirements
- encourage learning and assessment in a work-related environment which leads to verifiable workplace outcomes

Competency standards are developed by a working group comprised of national and international subject-matter experts, SEIP, BTEB, ISC, and industry experts to identify the competencies required of an occupation in a particular sector.

Competency standards describe the skills, knowledge and attitude needed to perform effectively in the workplace. Competency standards acknowledge that people can achieve technical and vocational competency in many ways by emphasising what the learner can do, not how or where they learned to do it.

With competency standards, training and assessment may be conducted at the workplace or at training institute or any combination of these.

Competency standards consist of a number of units of competency. A unit of competency describes a distinct work activity that would normally be undertaken by one person in accordance with industry standards.

Units of competency are documented in a standard format that comprises of:

- unit title
- nominal duration
- unit code
- unit descriptor
- elements and performance criteria
- variables and range statement
- curricular content guide
- assessment evidence guide

Together, all the parts of a unit of competency:

- describe a work activity
- guide the assessor to determine whether the candidate is competent or not yet competent

Approval Sheet

Identification and validation of units of competency and elements for this occupation were made by experts within this sector. A series of meetings were held to accurately capture industry and employer needs and expectations and develop the competency framework that would help to enhance the employability of the youth trained. This process started on 28 August 2018 and concluded with a validation workshop with working group on 30 September 2018.

Experts Involved

Industry and subject-matter experts who provided their valuable inputs to develop this competency standard [August - September 2018]:

Name	Organisation	Designation
Md. Ibrahim	MAWTS	Instructor - Electronics
Ms. Priyanka Gomes	MAWTS	Instructor - Electronics
Md. Masud Rana	BITAC	Executive Engineer
Abdul Haye	BUET	Instructor - Electronics
Md. Forhad Hossain	BCSIR	Engineer
Md. Shahidul Islam	DPI	Instructor
Md Monowar Hossain	LG Electronics	Assistant Manager (Operations)
David King	British Council - SD03	Team Leader
Dr. N. R. Dhar	British Council - SD03	National Subject Matter Consultant - Light Engineering Sector

Validation Workshop

Working group formation and competency standard validation workshop participants [held on 30 September 2018]:

Name	Organisation	Designation
Mr Fazlul Haque	UCEP	Instructor - Electronics
Shawkat Ali Mia	BKTTC	Senior Instructor
Ms. Priyanka Gomes	MAWTS	Instructor - Electronics
Md. Shahidul Islam	DPI	Instructor - Electronics
Md. Forhad Hossain	BCSIR	Engineer
Rupak Kanti Biswas	BTEB	Quality Assurance Officer
Md. Abdur Razzaque	SEIP-BTEB	Specialist-1 (Competency Standards)
Syed Nasir Ershad	SEIP	AEPD (Public-1)
Md. Ahsan Habib	SEIP	TVET Specialist

Name	Organisation	Designation
Mr. Mohiuzzaman	SEIP	Course Specialist
David King	British Council - SD03	Team Leader
Dr. N. R. Dhar	British Council - SD03	National Subject Matter Consultant - Light Engineering Sector

The ensuing sections of this document comprise of a description of the relevant occupation, trade or job with all the key components of a unit of competency, including:

- a chart with an overview of all Units of Competency for the relevant occupation, trade or job including the Unit Codes and the Unit of Competency titles and corresponding Elements
- the Competency Standard that includes the Unit of Competency, Unit Descriptor, Elements and Performance Criteria, Range of Variables, Curricular Content Guide and Assessment Evidence Guide

Committee Workshop

The National competency standards for National Skills Certificate in Electronics, **NTVQF Level [INSERT LEVEL]** qualification is a document developed by the Skill for Employment Investment Programme (SEIP), Finance Division, Ministry of Finance. This standard has been developed by an industry expert group under guidance of SEIP. The standard was approved by the SCDC [BTEB to insert date] at NTVQF Cell, BTEB.

Respectable members of the SCDC:

Electronics - Level [INSERT LEVEL]		

Course Structure

SL	Unit Code and Title		Level	Nominal Duration (Hours)
Generic Competencies (4 units of competency required)				
1	SEIP-LE-ELC-01-G	Use basic mathematical concepts		24
2	SEIP-LE-ELC-02-G	Carry out workplace interaction		8
3	SEIP-LE-ELC-03-G	Operate in a team environment		16
4	SEIP-LE-ELC-04-G	Apply basic IT skills		12
Sub-Total				**60**
Sector-specific Competencies (4 units of competency required)				
1	SEIP-LE-ELC-01-S	Apply occupational health and safety (OHS) practice in the workplace		12
2	SEIP-LE-ELC-02-S	Read and interpret sketches and drawings		16
3	SEIP-LE-ELC-03-S	Use hand and power tools		16
4	SEIP-LE-ELC-04-S	Apply quality system		16
Sub-Total				**60**
Occupation-specific Competencies (5 units of competency required)				
1	SEIP-LE-ELC-01-O	Test electronic components		40
2	SEIP-LE-ELC-02-O	Connect and terminate electrical wiring and circuits		40
3	SEIP-LE-ELC-03-O	Assemble electronic products		40
4	SEIP-LE-ELC-04-O	Service consumer products and systems		60
5	SEIP-LE-ELC-05-O	Service industrial products and systems		60
Sub-Total				**240**
Total Nominal Learning Hours				**360**

Competency Chart

Units of Competency	Elements		
Generic Specific (Basic) Competencies			
Use basic mathematical concepts SEIP-LE-ELC-01-G	Identify calculation requirements in the workplace	Select appropriate mathematical methods/concepts for the calculation	Use tools and instruments to perform calculations
Carry out workplace interaction SEIP-LE-ELC-02-G	Interpret workplace communication and etiquette	Read and understand workplace documents	Participate in workplace meetings and discussions
	Practice professional ethics at work		
Operate in a team environment SEIP-LE-ELC-03-G	Identify team goals and work processes	Identify own role and responsibilities within team	Communicate and co-operate with team members
	Practice problem solving within the team		
Apply basic IT skills SEIP-LE-ELC-04-G	Identify and use most commonly used IT tools	Understand use of computer	Work with word processing application
	Work with spreadsheets	Access email and search the internet	

Sector-specific (Common) Competencies

Apply occupational health and safety (OHS) practice in the workplace SEIP-LE-ELC-01-S	Identify OHS policies and procedures	Apply personal health and safety practices	Report hazards and risks
	Respond to emergencies		
Read and interpret sketches and drawings SEIP-LE-ELC-02-S	Interpret information and specifications	Read and interpret sketches and drawings	
Use hand and power tools SEIP-LE-ELC-03-S	Identify and inspect hand and power tools	Use hand tools properly and safely	Operate power tools properly and safely
	Clean and maintain hand and power tools		
Apply quality system SEIP-LE-ELC-04-S	Work within quality system	Apply and monitor quality improvement system	Apply standard procedures for each job

Occupation-specific (Core) Competencies

Test electronic components SEIP-LE-ELC-01-O	Identify basic electronic components	Determine testing criteria	Plan testing approach
	Test components		
Connect and terminate electrical wiring and circuits SEIP-LE-ELC-02-O	Identify measuring devices and accessories	Prepare for connection and termination	Perform connection and termination
	Carry out soldering	Test connection and termination	
Assemble electronic products SEIP-LE-ELC-03-O	Prepare for assemble products	Prepare printed circuit boards (PCB) modules	Mount and solder components
	Perform assembly	Test and inspect products	
Service consumer products and systems SEIP-LE-ELC-04-O	Prepare for work	Install products and services	Diagnose faults and defects
	Repair products and systems	Test products and systems	
Service industrial products and systems SEIP-LE-ELC-05-O	Prepare for work	Install products and services	Diagnose faults and defects
	Repair products and systems	Test products and systems	

Units and Elements Table

Generic – Compulsory (4 units of competency required)

Code	Unit of Competency	Elements of Competency	Duration (hours)
SEIP-LE-ELC-01-G	Use basic mathematical concepts	**1.** Identify calculation requirements in the workplace. **2.** Select appropriate mathematical methods/concepts for the calculation. **3.** Use tools and instruments to perform calculations.	24
SEIP-LE-ELC-02-G	Carry out workplace interaction	**1.** Interpret workplace communication and etiquette. **2.** Read and understand workplace documents. **3.** Participate in workplace meetings and discussions. **4.** Practice professional ethics at work.	8
SEIP-LE-ELC-03-G	Operate in a team environment	**1.** Identify team goals and work processes. **2.** Identify own role and responsibilities within team. **3.** Communicate and co-operate with team members. **4.** Practice problem solving within the team.	16
SEIP-LE-ELC-04-G	Apply basic IT skills	**1.** Identify and use most commonly used IT tools. **2.** Understand use of computer. **3.** Work with word processing application. **4.** Work with spreadsheets. **5.** Access email and search the internet.	12
Total Hours			**60**

Sector-specific – Compulsory (4 units of competency required)

Code	Unit of Competency	Elements of Competency	Duration (hours)
SEIP-LE-ELC-01-S	Apply occupational health and safety (OHS) practice in the workplace	**1.** Identify OHS policies and procedures. **2.** Apply personal health and safety practices. **3.** Report hazards and risks. **4.** Respond to emergencies.	12
SEIP-LE-ELC-02-S	Read and interpret sketches and drawings	**1.** Interpret information and specifications. **2.** Read and interpret sketches and drawings.	16
SEIP-LE-ELC-03-S	Use hand and power tools	**1.** Identify and inspect hand and power tools. **2.** Use hand tools properly and safely. **3.** Operate power tools properly and safely. **4.** Clean and maintain hand and power tools.	16
SEIP-LE-ELC-04-S	Apply quality systems	**1.** Work within quality system. **2.** Apply and monitor quality improvement system. **3.** Apply standard procedures for each job.	16
Total Hours			**60**

Occupation-specific – Compulsory (5 units of competency required)

Code	Unit of Competency	Elements of Competency	Duration (hours)
SEIP-LE-ELC-01-O	Test electronic components	1. Identify basic electronic components 2. Determine testing criteria. 3. Plan testing approach. 4. Test components.	40
SEIP-LE-ELC-02-O	Connect and terminate electrical wiring and circuits	1. Identify measuring devices and accessories 2. Prepare for connection and termination. 3. Perform connection and termination. 4. Carry out soldering. 5. Test connection and termination.	40
SEIP-LE-ELC-03-O	Assemble electronic products	1. Prepare to assemble products. 2. Prepare printed circuit board (PCB) modules. 3. Mount and solder components. 4. Perform assembly. 5. Test and inspect products.	40
SEIP-LE-ELC-04-O	Service consumer products and systems	1. Prepare for work. 2. Install products and systems. 3. Diagnose faults and defects. 4. Repair products and systems. 5. Test products and systems.	60
SEIP-LE-ELC-05-O	Service industrial products and systems	1. Prepare for work. 2. Install products and systems. 3. Diagnose faults and defects. 4. Repair products and systems. 5. Test products and systems.	60
Total Hours			**240**

Generic Competencies

Unit Title:	Use basic mathematical concepts
Unit Code:	SEIP-LE-ELC-01-G
Nominal Hours:	24 hours
Unit Descriptor:	This unit covers the skills, knowledge and attitudes required to perform computations using basic mathematical concepts in the workplace. It specifically includes identifying general calculation requirements, selecting appropriate mathematical method/concept, and forming and solving mathematical problems in the workplace using appropriate tools and instruments.
Elements of Competency	**Performance Criteria** (**bold and underlined** terms are elaborated in the Range of Variables)
1. Identify calculation requirements in the workplace	**1.1.** **Calculation requirements** are identified from **workplace information.** **1.2.** Mathematical problems are constructed from workplace information.
2. Select appropriate mathematical methods/concepts for the calculation	**2.1.** **Appropriate method** is selected to carry out calculation requirements. **2.2.** Constructed mathematical problems are solved with appropriate method.
3. Use tools and instruments to perform calculations	**3.1.** **Tools and instruments** required for computation are identified. **3.2.** Calculation is performed using appropriate tools and instruments accurately.

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
1. Calculation requirements	**1.1.** Unit **1.2.** Area **1.3.** Height/ length/ breadth/ thickness **1.4.** Diameter **1.5.** Weight **1.6.** Capacity **1.7.** Time **1.8.** Temperature **1.9.** Material/data usage **1.10.** Speed **1.11.** Costing

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
2. Workplace information	**2.1.** Floor environment **2.2.** Design sheet **2.3.** Specification sheet **2.4.** Working chart/drawing **2.5.** Standard operating procedure (SOP) **2.6.** Job order
3. Appropriate method	**3.1.** Addition **3.2.** Subtraction **3.3.** Division **3.4.** Multiplication **3.5.** Conversion **3.6.** Percentage and ratio calculation **3.7.** Simple equation
4. Tools and instruments	**4.1.** Calculator **4.2.** Cell phone **4.3.** Computer **4.4.** Ruler

Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
1. Critical aspects of competency	Assessment must evidence that the candidate: **1.1.** Identified calculation requirements from workplace information **1.2.** Selected appropriate method to carry out the calculation requirements **1.3.** Completed calculations using appropriate tools and instruments
2. Underpinning knowledge	**2.1.** Numerical concepts **2.2.** Basic mathematical methods such as addition, subtraction, multiplication, division and percentage **2.3.** Mathematical language, symbols and terminology **2.4.** Measuring units
3. Underpinning skills	**3.1.** Constructing simple problems from workplace information **3.2.** Solving problems using appropriate method, tools and instruments **3.3.** Using appropriate tools and instruments

Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
4. Underpinning attitudes	**4.1.** Prompt in carrying out activities **4.2.** Tidy and punctual **4.3.** Respectful of peers, subordinates and seniors in the workplace **4.4.** Safely use tools and equipment **4.5.** Sincere and honest concerning duties
5. Resource implications	The following resources must be provided: **5.1.** Workplace (simulated or actual) **5.2.** Calculator **5.3.** Cell phone **5.4.** Computer/laptop/notebook **5.5.** Measuring tape **5.6.** Ruler **5.7.** Projector **5.8.** Stationary **5.9.** Learning manual
6. Methods of assessment	Methods of assessment may include but is not limited to: **6.1.** Written test **6.2.** Oral test **6.3.** Observation **6.4.** Demonstration **6.5.** Portfolio
7. Context of assessment	**7.1.** Competency assessment must be done in a training institute or an actual or simulated workplace after completion of this unit of competency. **7.2.** Assessment must be done by a suitably qualified/certified assessor.
Accreditation Requirements Training Providers must be accredited by Bangladesh Technical Education Board (BTEB), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of any NTVQF qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by BTEB.	

Unit Title:	Carry out workplace interaction
Unit Code:	SEIP-LE-ELC-02-G
Nominal Hours:	8 hours
Unit Descriptor:	This unit covers the skills, knowledge and attitudes required to carry out workplace interaction. It specifically includes workplace communication, etiquette, understanding workplace documents, workplace meetings and discussions, and professional ethics at work.
Elements of Competency	**Performance Criteria** (**bold and underlined** terms are elaborated in the Range of Variables)
1. Interpret workplace communication and etiquette	**1.1.** Workplace codes of conduct are interpreted as per organisational guidelines. **1.2.** Appropriate lines of communication are maintained with supervisors and colleagues. **1.3.** Workplace interactions are conducted in a **courteous manner** to gather and convey information. **1.4.** **Workplace procedures and matters** are comprehended.
2. Read and understand workplace documents	**2.1.** Workplace documents are interpreted correctly. **2.2.** Visual information/symbols/signage are understood correctly and followed. **2.3.** Specific and relevant information are accessed from **appropriate sources.** **2.4.** Appropriate medium is used to transfer information and ideas.
3. Participate in workplace meetings and discussions	**3.1.** Team meetings are attended on time. **3.2.** Meeting procedures and etiquette are followed. **3.3.** Active participation is ensured, opinions are expressed and heard. **3.4.** Inputs are provided and interpreted in line with the meeting purpose.
4. Practice professional ethics at work	**4.1.** Responsibilities as a team member are performed. **4.2.** Tasks are performed in accordance with workplace procedures. **4.3.** Confidentiality is maintained. **4.4.** Inappropriate and conflicting situations are avoided.

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
1. Courteous manner	**1.1.** Effective questioning **1.2.** Active listening **1.3.** Speaking skills **1.4.** Writing skill **1.5.** Email etiquette
2. Workplace procedures and matters	**2.1.** Notes **2.2.** Arranging a meeting **2.3.** Agenda **2.4.** Simple reports such as progress and incident reports **2.5.** Job sheets **2.6.** Operational manuals **2.7.** Brochures and promotional material **2.8.** Visual and graphic materials **2.9.** Standards **2.10.** OHS information **2.11.** Signs
3. Appropriate sources	**3.1.** Human Resources (HR) Department **3.2.** Managers **3.3.** Supervisors **3.4.** Management Information System (MIS)

Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
1. Critical aspects of competency	Assessment must evidence that the candidate: **1.1.** Interpreted workplace communication and etiquette **1.2.** Interpreted workplace instructions and symbols **1.3.** Performed active participation in workplace meetings
2. Underpinning knowledge	**2.1.** Workplace communication and etiquette **2.2.** Workplace documents, signs and symbols **2.3.** Meeting procedure and etiquette **2.4.** Professional ethics
3. Underpinning skills	**3.1.** Demonstrating workplace communication and etiquette **3.2.** Interpreting workplace instructions and symbols **3.3.** Demonstrating active participation in workplace meeting **3.4.** Applying professional ethics at work

Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
4. Underpinning attitudes	**4.1.** Prompt in carrying out activities **4.2.** Tidy and punctual **4.3.** Respectful of peers, subordinates and seniors in the workplace **4.4.** Concerned about the work environment **4.5.** Sincere and honest concerning duties
5. Resource implications	The following resources must be provided: **5.1.** Workplace (simulated or actual) **5.2.** Workplace procedures **5.3.** Standard operating procedure **5.4.** Workplace documents, signs and symbols **5.5.** Codes of conduct **5.6.** Projector **5.7.** Stationary **5.8.** Learning manual
6. Methods of assessment	Methods of assessment may include but is not limited to: **6.1.** Written test **6.2.** Oral test **6.3.** Observation **6.4.** Demonstration **6.5.** Portfolio
7. Context of assessment	**7.1.** Competency assessment must be done in a training institute or an actual or simulated workplace after completion of this unit of competency. **7.2.** Assessment must be done by a suitably qualified/certified assessor.
Accreditation Requirements Training Providers must be accredited by Bangladesh Technical Education Board (BTEB), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of any NTVQF qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by BTEB.	

Unit Title:	Operate in a team environment
Unit Code:	SEIP-LE-ELC-03-G
Nominal Hours:	16 hours
Unit Descriptor:	This unit covers the skills, knowledge and attitudes required to operate in a team environment. It specifically includes team goals and work processes, roles and responsibilities, team communication and problem solving within the team.
Elements of Competency	**Performance Criteria** (**bold and underlined** terms are elaborated in the Range of Variables)
1. Identify team goals and work processes	**1.1.** Roles and objectives of the team are identified and interpreted. **1.2.** Roles and responsibilities of team members are identified and interpreted.
2. Identify own role and responsibilities within team	**2.1.** Personal role and responsibilities are identified within the team environment. **2.2.** Reporting relationships are interpreted within team and external to team.
3. Communicate and co-operate with team members	**3.1.** Other teammates' tasks are identified and support provided when requested. **3.2.** The team is encouraged through **sharing information** or expertise, working together to solve problems, and putting team success first. **3.3.** Views and opinions of other team members are interpreted and respected.
4. Practice problem solving within the team	**4.1.** Problems faced at the individual and team level are identified and showed insight into the root-causes of the problems. **4.2.** A range of solutions and courses of action are identified together with benefits, costs, and risks associated with each. **4.3.** The good ideas of others to help develop solutions are recognised and advice sought from those who have solved similar problems. **4.4.** It is looked beyond the obvious and not stopped at the first answers.

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
1. Sharing information	**1.1.** Agenda **1.2.** Minutes **1.3.** Progress and incident reports **1.4.** Operational manuals **1.5.** Visual and graphic materials **1.6.** Emails and SMS **1.7.** Phone directory **1.8.** Policy, procedure and standards **1.9.** OHS information

Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
1. Critical aspects of competency	Assessment must evidence that the candidate: **1.1** Identified own role and responsibilities within team **1.2** Communicated and co-operated with team members **1.3** Demonstrated problem solving within the team
2. Underpinning knowledge	**2.1.** Team goals and work processes **2.2.** Roles and responsibilities **2.3.** Finding problems and solving them
3. Underpinning skills	**3.1.** Identifying own role and responsibilities within team **3.2.** Communicating and co-operating with team members **3.3.** Demonstrating problem solving within the team
4. Underpinning attitudes	**4.1.** Active on teamwork **4.2.** Prompt in carrying out activities **4.3.** Tidy and punctual **4.4.** Respectful of peers, subordinates and seniors in the workplace **4.5.** Sincere and honest concerning duties
5. Resource implications	The following resources must be provided: **5.1.** Workplace (simulated or actual) **5.2.** Projector **5.3.** Stationary **5.4.** Learning manual

Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
6. Methods of assessment	Methods of assessment may include but is not limited to: **6.1.** Written test **6.2.** Oral test **6.3.** Observation **6.4.** Demonstration **6.5.** Portfolio
7. Context of assessment	**7.1.** Competency assessment must be done in a training institute or an actual or simulated workplace after completion of this unit of competency. **7.2.** Assessment must be done by a suitably qualified/certified assessor.

Accreditation Requirements

Training Providers must be accredited by Bangladesh Technical Education Board (BTEB), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of any NTVQF qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by BTEB.

Unit Title:	Apply basic IT skills
Unit Code:	SEIP-LE-ELC-04-G
Nominal Hours:	12 hours
Unit Descriptor:	This unit covers the skills, knowledge and attitudes required to apply basic IT skills in the workplace. It specifically includes identifying common IT tools, using computer, using word processing and spreadsheet applications, emailing and searching on internet.
Elements of Competency	**Performance Criteria** (**bold and underlined** terms are elaborated in the Range of Variables)
1. Identify and use most commonly used IT tools	**1.1.** History of information technology (IT) is identified and summarised. **1.2.** Commonly used **IT tools** are identified and described.
2. Understand use of computer	**2.1.** Basic parts of a computer are identified. **2.2.** Turning on and off technique of a computer is performed. **2.3.** Working environment, functions and features of operating system is interpreted. **2.4.** Simple trouble-shooting techniques are applied.
3. Work with word processing application	**3.1.** Word processing application appropriate to perform activity is operated. **3.2.** Basic typing technique to document is applied. **3.3.** Word processing techniques to document are employed. **3.4.** Personal CV writing using suitable word processing techniques is practiced. **3.5.** Saving and retrieving technique of a document is used.
4. Work with spreadsheets	**4.1.** Spreadsheet working environment, functions and features are identified and interpreted. **4.2.** Data entry on spreadsheet appropriate to perform activity is performed. **4.3.** **Data manipulation techniques** to spreadsheet document are applied. **4.4.** Spreadsheet document is created and saved.
5. Access email and search the internet	**5.1.** Use of email account in online environment is explained. **5.2.** Writing and sending of workplace emails is completed. **5.3.** Different **browsers** to work online are identified and selected. **5.4.** Browse different web portals and apply proper search techniques.

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
1. IT tools	**1.1.** Cell phone **1.2.** Tablets **1.3.** Computers, laptops, notebooks **1.4.** Internet **1.5.** Software **1.6.** Satellite
2. Data manipulation techniques	**2.1.** Sum **2.2.** Average **2.3.** Count **2.4.** Max **2.5.** Min **2.6.** If **2.7.** Sort **2.8.** Fill **2.9.** Header **2.10.** Footer **2.11.** Print
3. Browsers	**3.1.** Internet Explorer **3.2.** Firefox **3.3.** Google Chrome **3.4.** Opera **3.5.** Safari **3.6.** Omni Web **3.7.** Microsoft Edge

Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
1. Critical aspects of competency	Assessment must evidence that the candidate: **1.1.** Identified commonly used IT tools **1.2.** Performed simple trouble-shooting with computer **1.3.** Performed typing on word processing software, saved and retrieved documents **1.4.** Performed data entry with spreadsheet **1.5.** Used email account for different online purposes
2. Underpinning knowledge	**2.1.** IT and IT tools **2.2.** Computer trouble-shooting **2.3.** Techniques to access internet

Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
3. Underpinning skills	**3.1.** Demonstrating simple trouble-shooting with computer **3.2.** Demonstrating typing on word processing software **3.3.** Demonstrating data entry with spreadsheet **3.4.** Opening email account and using it for different purposes
4. Underpinning attitudes	**4.1.** Active on teamwork **4.2.** Prompt in carrying out activities **4.3.** Tidy and punctual **4.4.** Respectful of peers, subordinates and seniors in the workplace **4.5.** Sincere and honest concerning duties
5. Resource implications	The following resources must be provided: **5.1.** Workplace (simulated or actual) **5.2.** Computer/laptop/notebook **5.3.** IT tools **5.4.** Software **5.5.** Internet **5.6.** Projector **5.7.** Stationary **5.8.** Learning manual
6. Methods of assessment	Methods of assessment may include but is not limited to: **6.1.** Written test **6.2.** Oral test **6.3.** Observation **6.4.** Demonstration **6.5.** Portfolio
7. Context of assessment	**7.1.** Competency assessment must be done in a training institute or an actual or simulated workplace after completion of this unit of competency. **7.2.** Assessment must be done by a suitably qualified/certified assessor.

Accreditation Requirements

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Sector-specific Competencies

Unit Title:	Apply occupational health and safety (OHS) practice in the workplace
Unit Code:	SEIP-LE-ELC-01-S
Nominal Hours:	12 hours
Unit Descriptor:	This unit covers the skills, knowledge and attitudes required to apply occupational health and safety (OHS) practices in the workplace. It specifically includes identifying OHS policies and procedures, applying personal health and safety practices, reporting hazards and risks, and responding to emergencies.
Elements of Competency	**Performance Criteria** (**bold and underlined** terms are elaborated in the Range of Variables)
1. Identify OHS policies and procedures	**1.1.** **OHS policies** and safe operating procedures are interpreted. **1.2.** Safety signs and symbols are identified and followed. **1.3.** Response, evacuation procedures and other contingency measures are interpreted correctly.
2. Apply personal health and safety practices	**2.1.** OHS policies and procedures are applied in the workplace including **personal protective equipment (PPE)**. **2.2.** Common health issues are recognised. **2.3.** Common safety issues are identified.
3. Report hazards and risks	**3.1.** Hazards and risks are identified. **3.2.** Hazards and risks assessment and controls are interpreted.
4. Respond to emergencies	**4.1.** Respond to alarms and warning devices. **4.2.** **Emergency response plans and procedures** are responded to. **4.3.** **First aid procedures** during emergency situations are identified.

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
1. OHS policies	**1.1.** Organisational OHS polices **1.2.** International OHS requirements **1.3.** Fire safety rules and regulations
2. Emergency response plans and procedures	**2.1.** Firefighting procedures **2.2.** Earthquake response procedures **2.3.** Emergency response plans and procedures **2.4.** Medical and first aid

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
3. First aid procedure	**3.1.** Washing of open wound **3.2.** Washing chemically infected area **3.3.** Applying bandage **3.4.** Taking appropriate medicine
4. Personal protective equipment	**4.1.** Safety glasses **4.2.** Ear plugs **4.3.** Gloves **4.4.** Apron **4.5.** Helmet **4.6.** Mask **4.7.** Safety shoes

Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
1. Critical aspects of competency	Assessment must evidence that the candidate: **1.1.** Identified OHS policies and procedures **1.2.** Applied personal health and safety practices (including PPE) **1.3.** Reported hazards and risks **1.4.** Responded to emergencies
2. Underpinning knowledge	**2.1.** Workplace OHS policies and procedures **2.2.** Work safety procedures **2.3.** Emergency response procedures: **2.3.1.** Firefighting **2.3.2.** Earthquake response **2.3.3.** Accident response **2.4.** Types of hazards (biological, chemical and physical) and their effects **2.5.** OHS awareness **2.6.** Personal protective equipment (PPE)
3. Underpinning skills	**3.1.** Identifying OHS policies and procedures **3.2.** Applying personal health and safety practices **3.3.** Reporting hazards and risks **3.4.** Responding to emergencies

Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
4. Underpinning attitudes	**4.1.** Committed to occupational health and safety practices **4.2.** Communicates well with peers, subordinates and seniors in workplace **4.3.** Prompt in carrying out activities **4.4.** Tidy and punctual **4.5.** Sincere and honest concerning duties **4.6.** Responsible during emergencies
5. Resource implications	The following resources must be provided: **5.1.** Workplace (simulated or actual) **5.2.** Personal protective equipment (PPE) **5.3.** Firefighting equipment **5.4.** Emergency response manual **5.5.** First aid kits **5.6.** Stationary **5.7.** Learning manual
6. Methods of assessment	Methods of assessment may include but is not limited to: **6.1.** Written test **6.2.** Oral test **6.3.** Observation **6.4.** Demonstration **6.5.** Portfolio
7. Context of assessment	**7.1.** Competency assessment must be done in a training institute or an actual or simulated workplace after completion of this unit of competency. **7.2.** Assessment must be done by a suitably qualified/certified assessor.

Accreditation Requirements

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Unit Title:	Read and interpret sketches and drawings
Unit Code:	SEIP-LE-ELC-02-S
Nominal Hours:	16 hours
Unit Descriptor:	This unit covers the skills, knowledge and attitudes required to read and interpret sketches and drawings. It specifically includes interpreting information and specifications, and reading and interpreting sketches and drawings.
Elements of Competency	**Performance Criteria** (**bold and underlined** terms are elaborated in the Range of Variables)
1. Interpret information and specifications	**1.1.** Appropriate **manuals** for work activity are identified and collected. **1.2.** Information and **specifications** in the manuals is interpreted and applied.
2. Read and interpret sketches and drawings	**2.1.** Relevant **sketches and drawings** are identified for job requirement. **2.2.** Key **terms and abbreviations** are identified and interpreted. **2.3.** **Signs and symbols** are identified and interpreted. **2.4.** Schedules, dimensions, sketches, drawings and specifications are correctly read and interpreted.

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
1. Manuals	**1.1.** Buyers specification **1.2.** Compliance **1.3.** Maintenance procedure **1.4.** Periodic maintenance **1.5.** Quality assurance **1.6.** Standard operating procedure (SOP)
2. Sketches and drawings	**2.1.** Technical **2.2.** Measurement **2.3.** Design
3. Specifications	**3.1.** Product **3.2.** Performance **3.3.** Method
4. Terms and abbreviations	**4.1.** Refers to all terms and abbreviations associated with the Light Engineering Sector
5. Signs and symbols	**5.1.** Includes all signs and symbols associated with the Light Engineering Sector

Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
1. Critical aspects of competency	Assessment must evidence that the candidate: **1.1.** Identified information and specifications **1.2.** Read and interpreted sketches and drawings
2. Underpinning knowledge	**2.1.** Manuals **2.2.** Units of measurement **2.3.** Units of conversion **2.4.** Sketch, drawings and specifications
3. Underpinning skills	**3.1.** Reading and identifying information and specifications (from manual) **3.2.** Reading and interpreting sketches and drawings
4. Underpinning attitudes	**4.1.** Eager to learn **4.2.** Tidy and punctual **4.3.** Concerned about proper use of computer and peripherals **4.4.** Concerned for other's rights **4.5.** Sincere and honest concerning duties
5. Resource implications	The following resources must be provided: **5.1.** Workplace (simulated or actual) **5.2.** Computer/laptop/notebook **5.3.** Software **5.4.** Sketches and drawings **5.5.** Specifications **5.6.** Manuals **5.7.** Stationary **5.8.** Learning manual
6. Methods of assessment	Methods of assessment may include but is not limited to: **6.1.** Written test **6.2.** Oral test **6.3.** Observation **6.4.** Demonstration **6.5.** Portfolio
7. Context of assessment	**7.1.** Competency assessment must be done in a training institute or an actual or simulated workplace after completion of this unit of competency. **7.2.** Assessment must be done by a suitably qualified/certified assessor.

Evidence Guide

The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.

Accreditation Requirements

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Unit Title:	Use hand and power tools
Unit Code:	SEIP-LE-ELC-03-S
Nominal Hours:	16 hours
Unit Descriptor:	This unit covers the skills, knowledge and attitudes required to use hand and power tools in the workplace. It specifically includes identifying and inspecting hand and power tools for usability, using and operating tools properly and safely, and cleaning and maintaining hand and power tools after use.
Elements of Competency	**Performance Criteria** (**bold and underlined** terms are elaborated in the Range of Variables)
1. Identify and inspect hand and power tools	**1.1.** Appropriate hand and power tools are identified. **1.2.** Application of hand and power tools is recognized. **1.3.** Usability of hand and power tools is checked and verified.
2. Use hand tools properly and safely	**2.1.** Appropriate **hand tools** are selected. **2.2.** Safety precautions are ensured before using hand tools. **2.3.** Unsafe or faulty hand tools are identified and marked for repair. **2.4.** **Measuring tools** are checked and calibrated before use. **2.5.** Use hand tools properly and safely to perform work activity.
3. Operate power tools properly and safely	**3.1.** Appropriate **power tools** are selected. **3.2.** Power supply outlet and electrical cord are inspected and confirmed safe for use in accordance with established workplace safety requirements. **3.3.** Safety precautions are ensured before using power tools in accordance with manufacturer's operating specification. **3.4.** Proper sequence of operation applied for using power tools. **3.5.** Unsafe or faulty power tools are identified and marked for repair. **3.6.** Operate power tools properly and safely to perform work activity.
4. Clean and maintain hand and power tools	**4.1.** Dust and foreign matter is removed from hand and power tools in accordance to workplace standards. **4.2.** Condition of hand and power tools is checked after use and reported. **4.3.** Appropriate lubricant is applied after use and prior to storage. **4.4.** **Measuring tools** are checked and calibrated after use. **4.5.** Defective hand and power tools are inspected and repaired or replaced. **4.6.** Hand and power tools are stored and secured in accordance with workplace requirements.

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
1. Hand tools	**1.1.** Hammer **1.2.** Bench vice **1.3.** Files **1.4.** Punches **1.5.** Chisels **1.6.** Wrenches **1.7.** Pliers **1.8.** Scriber **1.9.** Screwdrivers **1.10.** Hacksaw **1.11.** Socket spanners **1.12.** Spanners **1.13.** Vice grip **1.14.** Wire cutters **1.15.** Drill **1.16.** Grinder **1.17.** Clamps **1.18.** Jacks
2. Power tools	**2.1.** Drills **2.2.** Rivet gun **2.3.** Grinders **2.4.** Saws **2.5.** Glue guns **2.6.** Soldering iron
3. Measuring tools	**3.1.** Meters **3.2.** Testers **3.3.** Megger **3.4.** Measuring tape **3.5.** Hose level **3.6.** Water level **3.7.** Calliper **3.8.** Steel rule **3.9.** Protractor **3.10.** Tri-square

Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
1. Critical aspects of competency	Assessment must evidence that the candidate: **1.1.** Identified and selected appropriate hand and power tools for work to be performed **1.2.** Identified and used measuring and testing tools appropriate to work activity **1.3.** Followed safety precautions when using hand and power tools **1.4.** Operated power tools safely and pursuant to manufacturer's operating specification **1.5.** Performed cleaning and maintenance of hand and power tools after use and prior to storing
2. Underpinning knowledge	**2.1.** Information on types of hand and power tools, their functions and use **2.2.** Procedures for safely using hand and power tools
3. Underpinning skills	**3.1.** Identifying hand, power and measuring tools **3.2.** Following safety precautions when using hand, power and measuring tools **3.3.** Using hand and measuring tools correctly and safely in accordance with manufacturer's operating specification **3.4.** Operating power tools correctly and safely in accordance with manufacturer's operating specification **3.5.** Cleaning and maintaining hand and power tools after use **3.6.** Applying appropriate lubricant on hand and power tools after use and prior to storing
4. Underpinning attitudes	**4.1.** Commitment to occupational health and safety **4.2.** Promptness in carrying out activities **4.3.** Sincere and honest to duties **4.4.** Environmental concerns **4.5.** Tidiness and timeliness **4.6.** Concerned for proper use of tools
5. Resource implications	The following resources must be provided: **5.1.** Workplace (simulated or actual) **5.2.** Hand tools **5.3.** Power tools **5.4.** Measuring tools **5.5.** Projector **5.6.** Stationary **5.7.** Learning manual

Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
6. Methods of assessment	Methods of assessment may include but is not limited to: **6.1.** Written test **6.2.** Oral test **6.3.** Observation **6.4.** Demonstration **6.5.** Portfolio
7. Context of assessment	**7.1.** Competency assessment must be done in a training institute or an actual or simulated workplace after completion of this unit of competency. **7.2.** Assessment must be done by a suitably qualified/certified assessor.

Accreditation Requirements

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Unit Title:	Apply quality system
Unit Code:	SEIP-LE-ELC-04-S
Nominal Hours:	16 hours
Unit Descriptor:	This unit covers the skills, knowledge and attitudes required to apply quality systems and procedure in the workplace. It specifically includes identifying general quality procedures within a manufacturing environment, applying and monitoring a quality improvement system, and applying standard procedures for each job.
Elements of Competency	**Performance Criteria** (**bold and underlined** terms are elaborated in the Range of Variables)
1. Work within quality system	**1.1.** Instructions and procedures relating to **quality improvement system** are identified and followed. **1.2.** Duties are performed in accordance with quality improvement system ensuring conformance to specifications. **1.3.** Defects are detected and reported to authority according to standard operating procedure. **1.4.** Quality service is delivered to customer in providing a product or service.
2. Apply and monitor quality improvement system	**2.1.** Performance measurement systems are identified. **2.2.** Specifications and standard operating procedure are identified and established. **2.3.** Performance is assessed at regular intervals. **2.4.** Defects are detected and reported to authority according to standard operating procedure. **2.5.** Process improvement procedures are contributed to and implemented. **2.6.** Improvement of internal/external customer and supplier relationships is contributed to. **2.7.** Performance of operation or quality of product or service is monitored to ensure customer satisfaction.
3. Apply standard procedures for each job	**3.1.** Concept of supplying product or service to meet the customer's requirements is understood and accordingly applied. **3.2.** Responsibility is taken for quality of own work. **3.3.** Quality system procedures for each job are followed. **3.4.** Conformance to specification is ensured in every case at all situations.

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
1. Quality improvement system	**1.1.** Quality inspection **1.2.** Quality control **1.3.** Quality improvement **1.4.** Total quality control **1.5.** Quality assurance

Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
1. Critical aspects of competency	Assessment must evidence that the candidate: **1.1.** Followed quality system instructions and procedures **1.2.** Maintained proper specifications and standards of product **1.3.** Checked product for quality assurance **1.4.** Detected defects and took corrective action **1.5.** Applied and monitored quality improvement system **1.6.** Applied standard procedures for each job **1.7.** Ensured customer satisfaction
2. Underpinning knowledge	**2.1.** Quality system procedures **2.2.** Product specifications **2.3.** Quality assurance process **2.4.** Performance measurement systems **2.5.** Standard operating procedures **2.6.** Record keeping
3. Underpinning skills	**3.1.** Identifying and explaining quality improvement system **3.2.** Identifying product and process specifications and standards **3.3.** Applying and monitoring quality improvement system **3.4.** Detecting defects and faults in product **3.5.** Implementing corrective action **3.6.** Keeping records in accordance with standard operating procedure **3.7.** Identifying and meeting customer requirements

Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
4. Underpinning attitudes	**4.1.** Promptness in carrying out activities **4.2.** Sincere and honest to duties **4.3.** Tidy and punctual **4.4.** Active on teamwork **4.5.** Eager to learn **4.6.** Communicate with peers and seniors in the workplace **4.7.** Environmental concerns **4.8.** Concerned for proper use of tools **4.9.** Commitment to occupational health and safety
5. Resource implications	The following resources must be provided: **5.1.** Workplace (simulated or actual) **5.2.** Specifications **5.3.** Standard operating procedure **5.4.** Quality improvement procedure **5.5.** Quality assurance protocol **5.6.** Sample products **5.7.** Projector **5.8.** Stationary **5.9.** Learning manual
6. Methods of assessment	Methods of assessment may include but is not limited to: **6.1.** Written test **6.2.** Oral test **6.3.** Observation **6.4.** Demonstration **6.5.** Portfolio
7. Context of assessment	**7.1.** Competency assessment must be done in a training institute or an actual or simulated workplace after completion of this unit of competency. **7.2.** Assessment must be done by a suitably qualified/certified assessor.
Accreditation Requirements Training Providers must be accredited by Bangladesh Technical Education Board (BTEB), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of any NTVQF qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by BTEB.	

Occupation-specific Competencies

Unit Title:	Test electronic components
Unit Code:	SEIP-LE-ELC-01-O
Nominal Hours:	40 hours
Unit Descriptor:	This unit covers the skills, knowledge and attitudes required to test electronic components. It specifically includes identifying basic electronic components, determining testing criteria, planning testing approach, and testing components.
Elements of Competency	**Performance Criteria** (**bold and underlined** terms are elaborated in the Range of Variables)
1. Identify basic electronic components	**1.1.** **Different components** are identified and described. **1.2.** Symbols of different components are identified. **1.3.** Different terminals are identified and described.
2. Determine testing criteria	**2.1.** Work instructions are obtained and clarified based on client requirements. **2.2.** Responsible person is consulted for effective and proper work coordination. **2.3.** Data sheets are obtained and interpreted based on manufacturers specifications. **2.4.** **Testing criteria** is defined to ensure components meet technical and quality requirements. **2.5.** Document and communicate testing criteria to relevant personnel.
3. Plan testing approach	**3.1.** **Testing method** is identified based on **type of electronic component**. **3.2.** Characteristics of testing method to be used are determined. **3.3.** Testing method is selected pursuant to **testing strategy**. **3.4.** Plan for testing components is developed and documented. **3.5.** **Tools and testing devices** are prepared and checked as per standard operating procedure. **3.6.** **Recording system** is established to document testing results, including problems and faults.
4. Test components	**4.1.** Component testing is carried out to ensure products meet creative, production and technical requirements. **4.2.** Problems, faults and remedial steps required are documented in records system. **4.3.** Problems and faults are resolved in accordance with standard operating procedure. **4.4.** Products are evaluated against testing criteria. **4.5.** Testing process is reported to relevant personnel.

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
1. Different components	**1.1.** Resistor **1.2.** Capacitor **1.3.** Inductor **1.4.** Diode **1.5.** Transistor **1.6.** IC **1.7.** SCR **1.8.** Triac and diac
2. Testing criteria	**2.1.** Operating parameters **2.2.** Effectiveness **2.3.** Efficiency **2.4.** Functionality **2.5.** Performance **2.6.** Reliability
3. Testing method	**3.1.** Inspection **3.2.** Automated **3.3.** Platform **3.4.** Prototyping
4. Type of electronic component	**4.1.** Passive **4.2.** Active **4.3.** Dynamic **4.4.** Hybrid
5. Testing strategy	**5.1.** Passive **5.2.** Dynamic **5.3.** In-circuit

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
6. Tools and testing devices	**6.1.** Tools: **6.1.1.** Pliers **6.1.2.** Screwdrivers **6.1.3.** Wrenches **6.1.4.** Hand drills **6.1.5.** Hack saw **6.1.6.** Files **6.1.7.** Tin snip **6.1.8.** Hammer **6.2.** Testing devices: **6.2.1.** Variable DC power supply **6.2.2.** Digital VOM **6.2.3.** Analogue VOM **6.2.4.** Dual trace triggered oscilloscope **6.2.5.** Function generator
7. Recording system	**7.1.** Metadata*:* **7.1.1.** Description of fault **7.1.2.** Identification of code **7.1.3.** User responses **7.1.4.** Written or verbal comments **7.1.5.** Quantitative data **7.1.6.** Remedial action taken **7.1.7.** Retest result **7.1.8.** Date **7.1.9.** Tester's details **7.2.** Questionnaire **7.3.** Survey

Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
1. Critical aspects of competency	Assessment must evidence that the candidate: **1.1.** Determined testing criteria **1.2.** Planned testing approach **1.3.** Tested components **1.4.** Evaluated testing process

Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
2. Underpinning knowledge	**2.1.** Tools and equipment **2.2.** Electrical components **2.3.** Principles of electronic circuitry **2.4.** Materials **2.5.** Testing criteria **2.6.** Testing methods **2.7.** Quality requirements **2.8.** Recording systems **2.9.** Standard operating procedure **2.10.** Manufacturers specifications
3. Underpinning skills	**3.1.** Determining testing criteria **3.2.** Identifying testing methods **3.3.** Planning testing approach **3.4.** Conducting component testing **3.5.** Recording testing findings **3.6.** Resolving problems and faults **3.7.** Evaluating product
4. Underpinning attitudes	**4.1.** Tidy and punctual **4.2.** Prompt in carrying out activities **4.3.** Sincere and honest concerning duties **4.4.** Active on teamwork **4.5.** Eager to learn **4.6.** Concerned for proper use of tools **4.7.** Committed to occupational health and safety practices **4.8.** Respectful of peers, subordinates and seniors in the workplace
5. Resource implications	The following resources must be provided: **5.1.** Workplace (simulated or actual) **5.2.** Personal protective equipment (PPE) **5.3.** Tools and testing devices **5.4.** Work bench **5.5.** Electronic components **5.6.** Job specifications **5.7.** Manufacturers specifications **5.8.** Standard operating procedure **5.9.** Reporting forms **5.10.** Projector **5.11.** Stationary **5.12.** Learning manual

Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
6. Methods of assessment	Methods of assessment may include but is not limited to: **6.1.** Written test **6.2.** Oral test **6.3.** Observation **6.4.** Demonstration **6.5.** Portfolio
7. Context of assessment	**7.1.** Competency assessment must be done in a training institute or an actual or simulated workplace after completion of this unit of competency. **7.2.** Assessment must be done by a suitably qualified/certified assessor.

Accreditation Requirements

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Unit Title:	Connect and terminate electrical wiring and circuits
Unit Code:	SEIP-LE-ELC-02-O
Nominal Hours:	40 hours
Unit Descriptor:	This unit covers the skills, knowledge and attitudes required to connect and terminate electrical wiring and circuits. It specifically includes identifying measuring devices and accessories, preparing for connection and termination, performing connection and termination, carrying out soldering, and testing connection and termination of electrical wiring and circuits.
Elements of Competency	**Performance Criteria** (**bold and underlined** terms are elaborated in the Range of Variables)
1. Identify measuring devices and accessories	**1.1.** **Measuring devices** and **accessories** are identified. **1.2.** Measuring devices and accessories are collected and checked.
2. Prepare for connection and termination	**2.1.** **Materials** are checked according to job specification. **2.2.** Appropriate **tools and equipment** are selected as per job requirement. **2.3.** Job requirement is planned as per standard operating procedure. **2.4.** Electrical wiring and electronic circuits are prepared for connection/termination as per job requirement.
3. Perform connection and termination	**3.1.** Appropriate ranges of **methods** in connection/termination are employed as per job and manufacturers specification. **3.2.** Correct sequence of operation is followed according to job specification and standard operating procedure. **3.3.** Accessories are adjusted as per job specification, if necessary. **3.4.** Confirmation of connection/termination is undertaken to ensure quality completion of job as per job specification.
4. Carry out soldering	**4.1.** Components are mounted and soldered in accordance with soldering principles**.** **4.2.** Soldered components are checked to ensure compliance with international standards and job requirement.
5. Test connection and termination	**5.1.** Testing of completed connections/terminations is carried out to ensure compliance. **5.2.** Wiring and circuits are checked using specified testing procedures. **5.3.** Unplanned events or conditions are responded to in accordance with standard operating procedure.

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
1. Measuring devices	**1.1.** Variable power supply and transformer **1.2.** Digital VOM and Analogue VOM **1.3.** Function/signal generator **1.4.** ESD-free work bench with mirror **1.5.** Oscilloscope (digital) **1.6.** Flashlight/headlamp **1.7.** Assorted electronic sensors
2. Accessories	**2.1.** Brackets **2.2.** Clamps
3. Materials	**3.1.** Soldering lead **3.2.** Lead free solder **3.3.** Resin **3.4.** Cables **3.5.** Wires
4. Tools and equipment	**4.1.** Tools: **4.1.1.** Pliers **4.1.2.** Cutters **4.1.3.** Screwdrivers **4.1.4.** Soldering iron **4.2.** Equipment: **4.2.1.** Soldering gun **4.2.2.** Multi-tester **4.2.3.** De-soldering pump (Sucker)
5. Methods	**5.1.** Clamping **5.2.** Pin connection **5.3.** Soldered joints **5.4.** Plugs

Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
1. Critical aspects of competency	Assessment must evidence that the candidate: **1.1.** Identified and selected tools, equipment and materials **1.2.** Used appropriate connection/termination methods **1.3.** Followed correct sequence of connection/termination process **1.4.** Performed connection/termination **1.5.** Carried out mounting and soldering of components **1.6.** Conducted testing of connection/termination

Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
2. Underpinning knowledge	**2.1.** Tools and equipment **2.2.** Electrical theory **2.3.** Connection/termination methods **2.4.** Connection/termination process **2.5.** Single phase AC principles **2.6.** Wiring techniques **2.7.** DC power supplies **2.8.** Soldering
3. Underpinning skills	**3.1.** Preparing for work **3.2.** Identifying appropriate connection/termination methods **3.3.** Following connection/termination process and sequencing **3.4.** Performing connection/termination **3.5.** Carrying out mounting and soldering **3.6.** Carrying out testing of connection/termination work
4. Underpinning attitudes	**4.1.** Tidy and punctual **4.2.** Prompt in carrying out activities **4.3.** Sincere and honest concerning duties **4.4.** Active on teamwork **4.5.** Eager to learn **4.6.** Concerned for proper use of tools **4.7.** Committed to occupational health and safety practices **4.8.** Respectful of peers, subordinates and seniors in the workplace
5. Resource implications	The following resources must be provided: **5.1.** Workplace (simulated or actual) **5.2.** Personal protective equipment (PPE) **5.3.** Tools and equipment **5.4.** Materials and accessories **5.5.** Job specifications **5.6.** Standard operating procedure **5.7.** Projector **5.8.** Stationary **5.9.** Learning manual
6. Methods of assessment	Methods of assessment may include but is not limited to: **6.1.** Written test **6.2.** Oral test **6.3.** Observation **6.4.** Demonstration **6.5.** Portfolio

Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
7. Context of assessment	**7.1.** Competency assessment must be done in a training institute or an actual or simulated workplace after completion of this unit of competency. **7.2.** Assessment must be done by a suitably qualified/certified assessor.

Accreditation Requirements

Training Providers must be accredited by Bangladesh Technical Education Board (BTEB), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of any NTVQF qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by BTEB.

Unit Title:	Assemble electronic products
Unit Code:	SEIP-LE-ELC-03-O
Nominal Hours:	40 hours
Unit Descriptor:	This unit covers the skills, knowledge and attitudes required to assemble electronic products. It specifically includes preparing to assemble products, preparing printed circuit board (PCB) modules, mounting and soldering components, performing assembly, and testing and inspecting products.
Elements of Competency	**Performance Criteria** (**bold and underlined** terms are elaborated in the Range of Variables)
1. Prepare for assemble products	**1.1.** Assembly workplace is prepared as per standard operating procedure. **1.2.** Work instructions are obtained and clarified based on client requirements. **1.3.** Responsible person is consulted for effective and proper work coordination. **1.4.** **Tools and equipment** are prepared and checked in accordance with job requirement. **1.5.** **Materials** are prepared and checked in accordance with job requirement. **1.6.** Parts and components needed are identified and prepared as per job requirement.
2. Prepare printed circuit board (PCB) modules	**2.1.** Printed circuit board (PCB) layout is checked for conformity with schematic diagram as per layout rules. **2.2.** PCB layout is transferred to copper-cladded board per acceptable method. **2.3.** Thru-hole is drilled and PCB is cleaned. **2.4.** PCB functionality is tested and visual inspection is carried out.
3. Mount and solder components	**3.1.** **Mounting technique** is identified and selected. **3.2.** Components are mounted and soldered in accordance with soldering principles**.** **3.3.** Soldered components are checked to ensure compliance with international standards and job requirement.
4. Perform assembly	**4.1.** **Assembly procedures** are carried out as per standard operating procedure. **4.2.** Modules and accessories are connected into final product as per job specification. **4.3.** Excess components and materials are disposed of pursuant to waste management procedure.
5. Test and inspect products	**5.1.** **Testing** and inspection of finished products is carried out in accordance with quality standards and standard operating procedure. **5.2.** Job completion is recorded and reported as per standard operating procedure.

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
1. Tools and equipment	**1.1.** Tools: **1.1.1.** Screwdrivers **1.1.2.** Wrenches **1.1.3.** Allen wrench **1.1.4.** Allen keys **1.1.5.** Soldering iron **1.1.6.** De-soldering tools **1.1.7.** Multi-testers (analog/digital) **1.1.8.** Utility knife/stripper **1.1.9.** Pliers **1.1.10.** Cleaning brush **1.1.11.** High-grade magnifying glass (with lamp) **1.2.** Equipment: **1.2.1.** Variable power supply **1.2.2.** Variable transformer **1.2.3.** Hot air soldering station **1.2.4.** Table top reflow oven **1.2.5.** Function/signal generator **1.2.6.** ESD-free work bench with mirror **1.2.7.** Oscilloscope (digital) **1.2.8.** Flashlight/headlamp **1.2.9.** Assorted electronic sensors
2. Materials	**2.1.** Soldering wire **2.2.** SMD soldering paste **2.3.** Wires (stranded/solid/hook-up) **2.4.** Assorted electronic components
3. Mounting technique	**3.1.** Surface **3.2.** Thru-hole **3.3.** Socket
4. Assembly procedures	**4.1.** Prepare supplies, materials and equipment **4.2.** Familiarise with diagram and product **4.3.** Perform assembly **4.4.** Check assembled product
5. Testing	**5.1.** Aging **5.2.** Substitution **5.3.** Mechanical

Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
1. Critical aspects of competency	Assessment must evidence that the candidate: **1.1.** Prepared for product assembly **1.2.** Identified tools, equipment and materials **1.3.** Prepared printed circuit board layout and modules **1.4.** Mounted and soldered components **1.5.** Assembled components **1.6.** Tested and inspected products **1.7.** Recorded and reporting job completion
2. Underpinning knowledge	**2.1.** Tools and equipment **2.2.** Materials **2.3.** Electrical components **2.4.** Layout rules **2.5.** Soldering **2.6.** Mounting techniques **2.7.** Thermal and vibration theory **2.8.** Drilling **2.9.** Assembly **2.10.** Fabrication **2.11.** Testing and inspecting **2.12.** Standard operating procedure
3. Underpinning skills	**3.1.** Preparing for product assembly **3.2.** Identifying tools, equipment and materials **3.3.** Interpreting schematic diagrams **3.4.** Splicing and joining wires **3.5.** Preparing printed circuit board (PCB) layout and modules **3.6.** Mounting and soldering components **3.7.** Performing assembly **3.8.** Carrying out testing and inspection
4. Underpinning attitudes	**4.1.** Tidy and punctual **4.2.** Prompt in carrying out activities **4.3.** Sincere and honest concerning duties **4.4.** Active on teamwork **4.5.** Eager to learn **4.6.** Concerned for proper use of tools **4.7.** Concerned about proper use of computer and peripherals **4.8.** Committed to occupational health and safety practices **4.9.** Respectful of peers, subordinates and seniors in the workplace

Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
5. Resource implications	The following resources must be provided: **5.1.** Workplace (simulated or actual) **5.2.** Personal protective equipment (PPE) **5.3.** Tools and equipment **5.4.** Work bench **5.5.** Computer/laptop/notebook **5.6.** CAD software **5.7.** Printer **5.8.** Electronic components **5.9.** Job specifications **5.10.** Schematic diagrams **5.11.** Manufacturers specifications **5.12.** Standard operating procedure **5.13.** Reporting forms **5.14.** Projector **5.15.** Stationary **5.16.** Learning manual
6. Methods of assessment	Methods of assessment may include but is not limited to: **6.1.** Written test **6.2.** Oral test **6.3.** Observation **6.4.** Demonstration **6.5.** Portfolio
7. Context of assessment	**7.1.** Competency assessment must be done in a training institute or an actual or simulated workplace after completion of this unit of competency. **7.2.** Assessment must be done by a suitably qualified/certified assessor.
Accreditation Requirements Training Providers must be accredited by Bangladesh Technical Education Board (BTEB), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of any NTVQF qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by BTEB.	

Unit Title:	Service consumer products and systems
Unit Code:	SEIP-LE-ELC-04-O
Nominal Hours:	60 hours
Unit Descriptor:	This unit covers the skills, knowledge and attitudes required to service consumer products and systems. It specifically includes preparing for work, installing products and systems, diagnosing faults and defects, repairing products and systems, and testing products and systems.
Elements of Competency	**Performance Criteria** (**bold and underlined** terms are elaborated in the Range of Variables)
1. Prepare for work	**1.1.** **Consumer products and systems** are checked and defects are identified, verified and recorded against customer description. **1.2.** **Service manuals and information** required for installation are identified. **1.3.** Repair and maintenance history are confirmed with consumer as per standard operating procedure. **1.4.** Workplace is prepared for installation as per job requirement. **1.5.** **Tools and equipment** are identified and selected as per job requirement.
2. Install products and systems	**2.1.** Materials are identified and obtained as per job requirement. **2.2.** Products and systems are installed in accordance with manufacturers instructions. **2.3.** Products and systems are tested and inspected as per standard operating procedure. **2.4.** Unplanned events or conditions are responded to in accordance with standard operating procedure. **2.5.** Report on installation and testing of equipment is prepared as per organisational policy. **2.6.** Workplace is cleaned and cleared of all debris.
3. Diagnose faults and defects	**3.1.** **Troubleshooting techniques** are identified. **3.2.** Pre-testing procedure is carried out as per manufacturers instructions. **3.3.** Circuits are checked and isolated using as per standard operating procedure. **3.4.** System defects or fault symptoms are identified using appropriate troubleshooting technique. **3.5.** Control settings and adjustments are checked to ensure compliance with service-manual specifications. **3.6.** Results of diagnosis and testing are recorded accurately. **3.7.** Customer is informed of status and serviceability of product or system.

4. Repair products and systems	**4.1.** Electro-static discharge (ESD) protection procedure is followed in accordance with industry standards. **4.2.** Defective parts are repaired or replaced as per manufacturers instructions. **4.3.** Repaired or replaced parts are mounted and soldered as per job requirement. **4.4.** Control settings and adjustments are checked to ensure compliance with service-manual specifications. **4.5.** Repaired product or system is reassembled. **4.6.** Product or system is cleaned as per standard operating procedure. **4.7.** Workplace is cleaned and cleared of all debris.
5. Test products and systems	**5.1.** Product or system is tested and inspected in accordance with quality standards and standard operating procedure. **5.2.** Job completion is recorded and reported as per standard operating procedure.

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
1. Consumer products and systems	**1.1.** LED TV **1.2.** Microwave oven **1.3.** Food processers **1.4.** Induction stove
2. Service manuals and information	**2.1.** Manuals: **2.1.1.** Service manual/schematic diagram/parts list **2.1.2.** Operating instructions/Owner's manual **2.2.** Information: **2.2.1.** Job report sheets **2.2.2.** Job order **2.2.3.** Bill of materials **2.2.4.** Customer index **2.2.5.** Service flowchart **2.2.6.** Stock and inventory record **2.2.7.** Requisition slips (for acquisition of parts) **2.2.8.** Supplier index

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
3. Tools and equipment	**3.1.** Tools: **3.1.1.** Screwdrivers **3.1.2.** Wrenches **3.1.3.** Allen keys **3.1.4.** Soldering iron **3.1.5.** De-soldering tools **3.1.6.** Multi-testers (analog/digital) **3.1.7.** Utility knife/stripper **3.1.8.** Pliers **3.1.9.** Cleaning brush **3.1.10.** High-grade magnifying glass (with lamp) **3.2.** Equipment: **3.2.1.** Variable power supply **3.2.2.** Variable transformer **3.2.3.** Hot air soldering station **3.2.4.** Table top reflow oven **3.2.5.** Function/signal generator **3.2.6.** ESD-free work bench with mirror **3.2.7.** Oscilloscope (digital) **3.2.8.** Flashlight/headlamp **3.2.9.** Assorted electronic sensors
4. Troubleshooting techniques	**4.1.** Sensory methods **4.2.** Component substitution **4.3.** Signal injection and tracing **4.4.** Voltage and current measurement **4.5.** Continuity/resistance testing **4.6.** Waveform analysis **4.7.** Display analysis (for video displays) **4.8.** Circuit analysis

Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
1. Critical aspects of competency	Assessment must evidence that the candidate: **1.1.** Prepared for work **1.2.** Installed products and systems **1.3.** Diagnosed faults and defects **1.4.** Carried out repair and maintenance **1.5.** Reassembled products and systems **1.6.** Performed testing and inspection
2. Underpinning knowledge	**2.1.** Tools and equipment **2.2.** Materials **2.3.** Electrical products **2.4.** Electrical systems **2.5.** Drawings **2.6.** Schematic diagrams **2.7.** Principles of electrical circuits **2.8.** Pre-testing procedures **2.9.** Troubleshooting techniques **2.10.** Faults and defects **2.11.** Installation procedures **2.12.** Testing and inspecting
3. Underpinning skills	**3.1.** Preparing for work **3.2.** Identifying tools and equipment **3.3.** Interpreting drawings and schematic diagrams **3.4.** Installing products and services **3.5.** Applying troubleshooting techniques **3.6.** Diagnosing faults and defects **3.7.** Mounting and soldering components **3.8.** Reassembling products and systems **3.9.** Carrying out testing and inspection
4. Underpinning attitudes	**4.1.** Tidy and punctual **4.2.** Prompt in carrying out activities **4.3.** Sincere and honest concerning duties **4.4.** Active on teamwork **4.5.** Eager to learn **4.6.** Concerned for proper use of tools **4.7.** Concerned about proper use of computer and peripherals **4.8.** Committed to occupational health and safety practices **4.9.** Respectful of peers, subordinates and seniors in the workplace

Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
5. Resource implications	The following resources must be provided: **5.1.** Workplace (simulated or actual) **5.2.** Personal protective equipment (PPE) **5.3.** Tools and equipment **5.4.** Work bench (ESD free) **5.5.** Computer/laptop/notebook **5.6.** Audio-visual products and systems **5.7.** Consumer appliances **5.8.** Electronical components **5.9.** Job specifications **5.10.** Schematic diagrams **5.11.** Manufacturers specifications **5.12.** Standard operating procedure **5.13.** Reporting forms **5.14.** Projector **5.15.** Stationary **5.16.** Learning manual
6. Methods of assessment	Methods of assessment may include but is not limited to: **6.1.** Written test **6.2.** Oral test **6.3.** Observation **6.4.** Demonstration **6.5.** Portfolio
7. Context of assessment	**7.1.** Competency assessment must be done in a training institute or an actual or simulated workplace after completion of this unit of competency. **7.2.** Assessment must be done by a suitably qualified/certified assessor.
Accreditation Requirements Training Providers must be accredited by Bangladesh Technical Education Board (BTEB), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of any NTVQF qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by BTEB.	

Unit Title:	Service industrial products and systems
Unit Code:	SEIP-LE-ELC-05-O
Nominal Hours:	60 hours
Unit Descriptor:	This unit covers the skills, knowledge and attitudes required to service industrial products and systems. It specifically includes preparing for work, installing products and systems, diagnosing faults and defects, repairing products and systems, and testing products and systems.
Elements of Competency	**Performance Criteria** (**bold and underlined** terms are elaborated in the Range of Variables)
1. Prepare for work	**1.1.** **Industrial products and systems** are checked and defects are identified, verified and recorded against customer description. **1.2.** **Service manuals and information** required for installation are identified. **1.3.** Repair and maintenance history are confirmed with consumer as per standard operating procedure. **1.4.** Workplace is prepared for repair as per job requirement. **1.5.** **Tools and equipment** are identified and selected as per job requirement.
2. Install products and systems	**2.1.** Materials are identified and obtained as per job requirement. **2.2.** Products and systems are installed in accordance with manufacturers instructions. **2.3.** Products and systems are tested and inspected as per standard operating procedure. **2.4.** Unplanned events or conditions are responded to in accordance with standard operating procedure. **2.5.** Report on installation and testing of equipment is prepared as per organisational policy. **2.6.** Workplace is cleaned and cleared of all debris.
3. Diagnose faults and defects	**3.1.** **Troubleshooting techniques** are identified. **3.2.** Pre-testing procedure is carried out as per manufacturers instructions. **3.3.** Circuits are checked and isolated using as per standard operating procedure. **3.4.** System defects or fault symptoms are identified using appropriate troubleshooting technique. **3.5.** Control settings and adjustments are checked to ensure compliance with service-manual specifications. **3.6.** Results of diagnosis and testing are recorded accurately. **3.7.** Customer is informed of status and serviceability of product or system.

4. Repair products and systems	**4.1.** Electro-static discharge (ESD) protection procedure is followed in accordance with industry standards. **4.2.** Defective parts are repaired or replaced as per manufacturers instructions. **4.3.** Repaired or replaced parts are mounted and soldered as per job requirement. **4.4.** Control settings and adjustments are checked to ensure compliance with service-manual specifications. **4.5.** Repaired product or system is reassembled. **4.6.** Product or system is cleaned as per standard operating procedure. **4.7.** Workplace is cleaned and cleared of all debris.
5. Test products and systems	**5.1.** Product or system is tested and inspected in accordance with quality standards and standard operating procedure. **5.2.** Job completion is recorded and reported as per standard operating procedure.

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
1. Industrial products and systems	**1.1.** Motor controllers and drives **1.2.** Sensors and input devices
2. Service manuals and information	**2.1.** Manuals: **2.1.1.** Service manual/schematic diagram/parts list **2.1.2.** Operating instructions/Owner's manual **2.2.** Information: **2.2.1.** Job report sheets **2.2.2.** Job order **2.2.3.** Bill of materials **2.2.4.** Customer index **2.2.5.** Service flowchart **2.2.6.** Stock and inventory record **2.2.7.** Requisition slips (for acquisition of parts) **2.2.8.** Supplier index

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
3. Tools and equipment	**3.1.** Tools: **3.1.1.** Screwdrivers **3.1.2.** Wrenches **3.1.3.** Allen keys **3.1.4.** Soldering iron **3.1.5.** De-soldering tools **3.1.6.** Multi-testers (analog/digital) **3.1.7.** Utility knife/stripper **3.1.8.** Pliers **3.1.9.** Ball been hammer **3.1.10.** Test jig **3.1.11.** Cleaning brush **3.1.12.** High-grade magnifying glass (with lamp) **3.2.** Equipment: **3.2.1.** Variable power supply **3.2.2.** Step-down transformer **3.2.3.** Hot air soldering station **3.2.4.** Table top reflow oven **3.2.5.** Function/signal generator **3.2.6.** ESD-free work bench with mirror **3.2.7.** Oscilloscope (digital) **3.2.8.** Multi-testers **3.2.9.** Flashlight/headlamp **3.2.10.** High voltage probe **3.2.11.** Assorted wires **3.2.12.** Assorted electronic sensors
4. Troubleshooting techniques	**4.1.** Sensory methods **4.2.** Component substitution **4.3.** Signal injection and tracing **4.4.** Voltage and current measurement **4.5.** Continuity/resistance testing **4.6.** Waveform analysis **4.7.** Display analysis (for video displays) **4.8.** Circuit analysis

Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
1. Critical aspects of competency	Assessment must evidence that the candidate: **1.1.** Prepared for work **1.2.** Installed products and systems **1.3.** Diagnosed faults and defects **1.4.** Carried out repair and maintenance **1.5.** Reassembled products and systems **1.6.** Performed testing and inspection
2. Underpinning knowledge	**2.1.** Tools and equipment **2.2.** Materials **2.3.** Electrical products **2.4.** Electrical systems **2.5.** Drawings **2.6.** Schematic diagrams **2.7.** Principles of electrical circuits **2.8.** Pre-testing procedures **2.9.** Troubleshooting techniques **2.10.** Faults and defects **2.11.** Installation procedures **2.12.** Testing and inspecting
3. Underpinning skills	**3.1.** Preparing for work **3.2.** Identifying tools and equipment **3.3.** Interpreting drawings and schematic diagrams **3.4.** Installing products and services **3.5.** Applying troubleshooting techniques **3.6.** Diagnosing faults and defects **3.7.** Mounting and soldering components **3.8.** Reassembling products and systems **3.9.** Carrying out testing and inspection
4. Underpinning attitudes	**4.1.** Tidy and punctual **4.2.** Prompt in carrying out activities **4.3.** Sincere and honest concerning duties **4.4.** Active on teamwork **4.5.** Eager to learn **4.6.** Concerned for proper use of tools **4.7.** Concerned about proper use of computer and peripherals **4.8.** Committed to occupational health and safety practices **4.9.** Respectful of peers, subordinates and seniors in the workplace

Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
5. Resource implications	The following resources must be provided: **5.1.** Workplace (simulated or actual) **5.2.** Personal protective equipment (PPE) **5.3.** Tools and equipment **5.4.** Work bench (ESD free) **5.5.** Computer/laptop/notebook **5.6.** Audio-visual products and systems **5.7.** Consumer appliances **5.8.** Electronical components **5.9.** Job specifications **5.10.** Schematic diagrams **5.11.** Manufacturers specifications **5.12.** Standard operating procedure **5.13.** Reporting forms **5.14.** Projector **5.15.** Stationary **5.16.** Learning manual
6. Methods of assessment	Methods of assessment may include but is not limited to: **6.1.** Written test **6.2.** Oral test **6.3.** Observation **6.4.** Demonstration **6.5.** Portfolio
7. Context of assessment	**7.1.** Competency assessment must be done in a training institute or an actual or simulated workplace after completion of this unit of competency. **7.2.** Assessment must be done by a suitably qualified/certified assessor.

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