Qualification Pack

PCB Assembly Technician

QP Code: ELE/Q7804

Version: 4.0

NSQF Level: 4

Electronics Sector Skills Council of India || 155, 2nd Floor, ESC House Okhla Industrial Area-Phase 3
New Delhi- 110020 || email:anu@essc-india.org

Contents

Qualification Pack

ELE/Q7804: PCB Assembly Technician

Brief Job Description

PCB Assembly Technician is responsible for manually placing different types of components on the PCB as per the design requirements and then soldering them.

Personal Attributes

The individual on this job must have good communication and interpersonal skills in addition to being a team player. He should pay attention to details, have good eyesight, and ability to work for long hours (generally in a sitting position).

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. ELE/N5106: PCB Assembly Preparation
2. ELE/N5107: PCB Assembly, Quality Check, and Delivery
3. DGT/VSQ/N0101: Employability Skills (30 Hours)

Qualification Pack (QP) Parameters

Sector	Electronics
Sub-Sector	Electronics Manufacturing System
Occupation	Assembly-EMS
Country	India
NSQF Level	4
Credits	16
Aligned to NCO/ISCO/ISIC Code	NCO-2015/8212.0400

Minimum Educational Qualification & Experience	12th grade Pass (12th grade or equivalent) with NA of experience OR 10th grade pass (10th grade or equivalent) with 3 Years of experience Relevant Experience in Electronics Manufacturing Services OR Previous relevant Qualification of NSQF Level (Level-3 in relevant domain) with 3 Years of experience Relevant Experience in Electronics Manufacturing Services
Minimum Level of Education for Training in School	10th Class
Pre-Requisite License or Training	NA
Minimum Job Entry Age	16 Years
Last Reviewed On	NA
Next Review Date	07/10/2028
NSQC Approval Date	07/10/2025
Version	4.0
Reference code on NQR	QG-04-EH-044832025-V2-ESSCI
NQR Version	2

Remarks:

NA

ELE/N5106: PCB Assembly Preparation

Description

This NOS is about preparing for PCB assembly by organizing components, tools, and workspace as per technical specifications and safety standards.

Scope

The scope covers the following :

- Introduction and Prerequisites for PCB Assembly

Elements and Performance Criteria

Introduction and Prerequisites for PCB Assembly

To be competent, the user/individual on the job must be able to:

PC1. Describe the role of a PCB Assembly Technician and the use of SMT and THT techniques along with tools like pick-and-place machines, soldering systems, and inspection technologies in electronics manufacturing.

PC2. Identify daily work requirements and PCB design specifications from the supervisor and Arrange necessary tools like wire cutters, pliers, and soldering irons.

PC3. Collect PCB boards, electronic components, and module software as required.

PC4. Inspect the board and components for errors and arrange for rectification/replacement

PC5. Verify that all materials and tools are in working condition before starting.

PC6. Ensure compliance with safety standards and use PPE during preparation

PC7. Organize workspace to facilitate an efficient assembly process.

PC8. Cross-check the bill of materials (BOM) to confirm all required components are available.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. Understand the role, responsibilities, and importance of a PCB Assembly Technician in the electronics manufacturing process.

KU2. Know the difference between SMT (Surface Mount Technology) and THT (Through-Hole Technology) assembly methods.

KU3. Be familiar with the functions and safe operation of tools and machines such as soldering irons, pliers, pick-and-place machines, and inspection systems.

KU4. Understand the process of reading and verifying PCB design specifications, job sheets, and bill of materials (BOM).

KU5. Know the safety standards, PPE requirements, and workspace organization principles essential for error-free PCB assembly.

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. Communicate effectively with supervisors to understand work requirements and clarify specifications.

GS2. Demonstrate organizational skills by arranging tools, materials, and components systematically for efficient workflow.

GS3. Apply problem-solving skills to identify and rectify defects in boards or components before assembly.

GS4. Follow standard operating procedures and safety guidelines responsibly during preparation activities.

GS5. Exhibit attention to detail and accountability in verifying BOM, material readiness, and tool functionality before beginning assembly work.

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Introduction and Prerequisites for PCB Assembly	**40**	**50**	**-**	**10**
PC1. Describe the role of a PCB Assembly Technician and the use of SMT and THT techniques along with tools like pick-and-place machines, soldering systems, and inspection technologies in electronics manufacturing.	-	-	-	-
PC2. Identify daily work requirements and PCB design specifications from the supervisor and Arrange necessary tools like wire cutters, pliers, and soldering irons.	-	-	-	-
PC3. Collect PCB boards, electronic components, and module software as required.	-	-	-	-
PC4. Inspect the board and components for errors and arrange for rectification/replacement	-	-	-	-
PC5. Verify that all materials and tools are in working condition before starting.	-	-	-	-
PC6. Ensure compliance with safety standards and use PPE during preparation	-	-	-	-
PC7. Organize workspace to facilitate an efficient assembly process.	-	-	-	-
PC8. Cross-check the bill of materials (BOM) to confirm all required components are available.	-	-	-	-
NOS Total	**40**	**50**	**-**	**10**

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	ELE/N5106
NOS Name	PCB Assembly Preparation
Sector	Electronics
Sub-Sector	
Occupation	Assembly-EMS
NSQF Level	4
Credits	7.5
Version	1.0
Last Reviewed Date	07/10/2025
Next Review Date	07/10/2028
NSQC Clearance Date	07/10/2025

ELE/N5107: PCB Assembly, Quality Check, and Delivery

Description

This NOS is about assembling PCBs, performing quality checks, and ensuring timely delivery of completed electronic assemblies as per standards.

Scope

The scope covers the following :

- Assemble PCB
- Soldering and Inspection
- Documentation and Delivery

Elements and Performance Criteria

Assemble PCB

To be competent, the user/individual on the job must be able to:

PC1. Assemble using pick-and-place machines, perform quality checks with ICT (In-Circuit Testing) and track delivery using ERP systems for traceability.

PC2. Select the appropriate PCB assembly process based on design and requirements.

PC3. Use high-resolution digital microscopes and soldering/rework stations with temperature control to inspect and fix defects on PCB assemblies accurately.

PC4. Inspect and rectify any component placement errors.

PC5. Apply flux or solder paste as per requirement before soldering.

PC6. Handle sensitive electronic components using anti-static measures.

Soldering and Inspection

To be competent, the user/individual on the job must be able to:

PC7. Inspect the soldering station before starting work to resolve issues.

PC8. Solder components onto the circuit board as per SOPs.

PC9. Analyze the assembled board using a magnifying glass to check for missing components, incorrect values, or dry soldering.

PC10. Conduct functional testing of the PCB assembly to detect soldering errors.

PC11. Rework to fix soldering or other identified errors to pass the functional test.

PC12. Use automated testing equipment where applicable for quality assurance

Documentation and Delivery

To be competent, the user/individual on the job must be able to:

PC13. Document the quantity and type of assembled components and software used.

PC14. Ensure compliance with ESD (Electrostatic Discharge) safety standards.

PC15. Maintain traceability records of assembled PCBs for quality audits

PC16. Deliver the assembled board to the device assembly team on time

PC17. Dispose of defective components and waste materials as per environmental guidelines.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. Understand different PCB assembly processes (SMT/THT) and their selection based on design and production requirements.

KU2. Know the functions and operation of pick-and-place machines, ICT systems, rework stations, and ERP tracking tools

KU3. Understand soldering principles, use of flux, temperature control, and quality parameters for defect-free joints

KU4. Be aware of ESD safety measures, component handling precautions, and environmental waste disposal standards.

KU5. Know documentation protocols for recording assembly details, material usage, and traceability for quality audits.

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. Apply precision and attention to detail during component placement, soldering, and inspection activities

GS2. Use microscopes, multimeters, and automated testing tools effectively to identify and correct assembly defects.

GS3. Demonstrate problem-solving skills to troubleshoot soldering, alignment, or testing errors promptly.

GS4. Maintain accurate documentation and follow ERP systems for process tracking and quality reporting.

GS5. Exhibit responsibility, teamwork, and time management to ensure timely delivery of assembled PCBs to the next production stage.

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Assemble PCB	**12**	**18**	**-**	**5**
PC1. Assemble using pick-and-place machines, perform quality checks with ICT (In-Circuit Testing) and track delivery using ERP systems for traceability.	-	-	-	-
PC2. Select the appropriate PCB assembly process based on design and requirements.	-	-	-	-
PC3. Use high-resolution digital microscopes and soldering/rework stations with temperature control to inspect and fix defects on PCB assemblies accurately.	-	-	-	-
PC4. Inspect and rectify any component placement errors.	-	-	-	-
PC5. Apply flux or solder paste as per requirement before soldering.	-	-	-	-
PC6. Handle sensitive electronic components using anti-static measures.	-	-	-	-
Soldering and Inspection	**13**	**18**	**-**	**3**
PC7. Inspect the soldering station before starting work to resolve issues.	-	-	-	-
PC8. Solder components onto the circuit board as per SOPs.	-	-	-	-
PC9. Analyze the assembled board using a magnifying glass to check for missing components, incorrect values, or dry soldering.	-	-	-	-
PC10. Conduct functional testing of the PCB assembly to detect soldering errors.	-	-	-	-
PC11. Rework to fix soldering or other identified errors to pass the functional test.	-	-	-	-
PC12. Use automated testing equipment where applicable for quality assurance	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Documentation and Delivery	**15**	**14**	**-**	**2**
PC13. Document the quantity and type of assembled components and software used.	-	-	-	-
PC14. Ensure compliance with ESD (Electrostatic Discharge) safety standards.	-	-	-	-
PC15. Maintain traceability records of assembled PCBs for quality audits	-	-	-	-
PC16. Deliver the assembled board to the device assembly team on time	-	-	-	-
PC17. Dispose of defective components and waste materials as per environmental guidelines.	-	-	-	-
NOS Total	**40**	**50**	**-**	**10**

National Occupational Standards (NOS) Parameters

NOS Code	ELE/N5107
NOS Name	PCB Assembly, Quality Check, and Delivery
Sector	Electronics
Sub-Sector	
Occupation	Assembly-EMS
NSQF Level	4
Credits	7.5
Version	1.0
Last Reviewed Date	07/10/2025
Next Review Date	07/10/2028
NSQC Clearance Date	07/10/2025

DGT/VSQ/N0101: Employability Skills (30 Hours)

Description

This unit is about employability skills, Constitutional values, becoming a professional in the 21st Century, digital, financial, and legal literacy, diversity and Inclusion, English and communication skills, customer service, entrepreneurship, and apprenticeship, getting ready for jobs and career development.

Scope

The scope covers the following :

- Introduction to Employability Skills
- Constitutional values - Citizenship
- Becoming a Professional in the 21st Century
- Basic English Skills
- Communication Skills
- Diversity & Inclusion
- Financial and Legal Literacy
- Essential Digital Skills
- Entrepreneurship
- Customer Service
- Getting ready for Apprenticeship & Jobs

Elements and Performance Criteria

Introduction to Employability Skills

To be competent, the user/individual on the job must be able to:

PC1. understand the significance of employability skills in meeting the job requirements

Constitutional values – Citizenship

To be competent, the user/individual on the job must be able to:

PC2. identify constitutional values, civic rights, duties, personal values and ethics and environmentally sustainable practices

Becoming a Professional in the 21st Century

To be competent, the user/individual on the job must be able to:

PC3. explain 21st Century Skills such as Self-Awareness, Behavior Skills, Positive attitude, self-motivation, problem-solving, creative thinking, time management, social and cultural awareness, emotional awareness, continuous learning mindset etc.

Basic English Skills

To be competent, the user/individual on the job must be able to:

PC4. speak with others using some basic English phrases or sentences

Communication Skills

To be competent, the user/individual on the job must be able to:

PC5. follow good manners while communicating with others

PC6. work with others in a team

Diversity & Inclusion

To be competent, the user/individual on the job must be able to:

PC7. communicate and behave appropriately with all genders and PwD

PC8. report any issues related to sexual harassment

Financial and Legal Literacy

To be competent, the user/individual on the job must be able to:

PC9. use various financial products and services safely and securely

PC10. calculate income, expenses, savings etc.

PC11. approach the concerned authorities for any exploitation as per legal rights and laws

Essential Digital Skills

To be competent, the user/individual on the job must be able to:

PC12. operate digital devices and use its features and applications securely and safely

PC13. use internet and social media platforms securely and safely

Entrepreneurship

To be competent, the user/individual on the job must be able to:

PC14. identify and assess opportunities for potential business

PC15. identify sources for arranging money and associated financial and legal challenges

Customer Service

To be competent, the user/individual on the job must be able to:

PC16. identify different types of customers

PC17. identify customer needs and address them appropriately

PC18. follow appropriate hygiene and grooming standards

Getting ready for apprenticeship & Jobs

To be competent, the user/individual on the job must be able to:

PC19. create a basic biodata

PC20. search for suitable jobs and apply

PC21. identify and register apprenticeship opportunities as per requirement

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. need for employability skills

KU2. various constitutional and personal values

KU3. different environmentally sustainable practices and their importance

KU4. Twenty first (21st) century skills and their importance

KU5. how to use basic spoken English language

KU6. Do and dont of effective communication

KU7. inclusivity and its importance

KU8. different types of disabilities and appropriate communication and behaviour towards PwD

KU9. different types of financial products and services

KU10. how to compute income and expenses
KU11. importance of maintaining safety and security in financial transactions
KU12. different legal rights and laws
KU13. how to operate digital devices and applications safely and securely
KU14. ways to identify business opportunities
KU15. types of customers and their needs
KU16. how to apply for a job and prepare for an interview
KU17. apprenticeship scheme and the process of registering on apprenticeship portal

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. communicate effectively using appropriate language
GS2. behave politely and appropriately with all
GS3. perform basic calculations
GS4. solve problems effectively
GS5. be careful and attentive at work
GS6. use time effectively
GS7. maintain hygiene and sanitisation to avoid infection

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Introduction to Employability Skills	**1**	**1**	**-**	**-**
PC1. understand the significance of employability skills in meeting the job requirements	-	-	-	-
Constitutional values – Citizenship	**1**	**1**	**-**	**-**
PC2. identify constitutional values, civic rights, duties, personal values and ethics and environmentally sustainable practices	-	-	-	-
Becoming a Professional in the 21st Century	**1**	**3**	**-**	**-**
PC3. explain 21st Century Skills such as Self-Awareness, Behavior Skills, Positive attitude, self-motivation, problem-solving, creative thinking, time management, social and cultural awareness, emotional awareness, continuous learning mindset etc.	-	-	-	-
Basic English Skills	**2**	**3**	**-**	**-**
PC4. speak with others using some basic English phrases or sentences	-	-	-	-
Communication Skills	**1**	**1**	**-**	**-**
PC5. follow good manners while communicating with others	-	-	-	-
PC6. work with others in a team	-	-	-	-
Diversity & Inclusion	**1**	**1**	**-**	**-**
PC7. communicate and behave appropriately with all genders and PwD	-	-	-	-
PC8. report any issues related to sexual harassment	-	-	-	-
Financial and Legal Literacy	**3**	**4**	**-**	**-**
PC9. use various financial products and services safely and securely	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. calculate income, expenses, savings etc.	-	-	-	-
PC11. approach the concerned authorities for any exploitation as per legal rights and laws	-	-	-	-
Essential Digital Skills	**4**	**6**	**-**	**-**
PC12. operate digital devices and use its features and applications securely and safely	-	-	-	-
PC13. use internet and social media platforms securely and safely	-	-	-	-
Entrepreneurship	**3**	**5**	**-**	**-**
PC14. identify and assess opportunities for potential business	-	-	-	-
PC15. identify sources for arranging money and associated financial and legal challenges	-	-	-	-
Customer Service	**2**	**2**	**-**	**-**
PC16. identify different types of customers	-	-	-	-
PC17. identify customer needs and address them appropriately	-	-	-	-
PC18. follow appropriate hygiene and grooming standards	-	-	-	-
Getting ready for apprenticeship & Jobs	**1**	**3**	**-**	**-**
PC19. create a basic biodata	-	-	-	-
PC20. search for suitable jobs and apply	-	-	-	-
PC21. identify and register apprenticeship opportunities as per requirement	-	-	-	-
NOS Total	**20**	**30**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	DGT/VSQ/N0101
NOS Name	Employability Skills (30 Hours)
Sector	Cross Sectoral
Sub-Sector	Professional Skills
Occupation	Employability
NSQF Level	2
Credits	1
Version	1.0
Last Reviewed Date	07/10/2025
Next Review Date	07/10/2028
NSQC Clearance Date	07/10/2025

Assessment Guidelines and Assessment Weightage

Assessment Guidelines

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.

2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC.

3. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.

4. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training centre (as per assessment criteria below).

5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training centre based on this criterion.

6. To pass the Qualification Pack, every trainee should score a minimum of 70% of aggregate marks to successfully clear the assessment.

7. In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack.

Minimum Aggregate Passing % at QP Level : 70

(**Please note**: Every Trainee should score a minimum aggregate passing percentage as specified above, to successfully clear the Qualification Pack assessment.)

Assessment Weightage

Compulsory NOS

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
ELE/N5106.PCB Assembly Preparation	40	50	-	10	100	40
ELE/N5107.PCB Assembly, Quality Check, and Delivery	40	50	-	10	100	40
DGT/VSQ/N0101.Employability Skills (30 Hours)	20	30	-	-	50	20
Total	**100**	**130**	**-**	**20**	**250**	**100**

Acronyms

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training
QP	Qualification Pack
NSQF	National Skills Qualification Framework
NSQC	National Skills Qualification Committee
NOS	National Occupational Standards
SOP	Standard Operating Procedures
PCB	Printed Circuit Board

Glossary

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

Knowledge and Understanding (KU)	Knowledge and Understanding (KU) are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard.
Organisational Context	Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Technical Knowledge	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Core Skills/ Generic Skills (GS)	Core skills or Generic Skills (GS) are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles.
Electives	Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.
Options	Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.
PTH	Plated Through-Hole
THT	Thru-Hole Technology
SMT	Surface Mount Technology
ESD	Electro-Static Discharge
IPR	Intellectual Property Rights
Declarative Knowledge	Declarative knowledge refers to facts, concepts and principles that need to be known and/or understood in order to accomplish a task or to solve a problem.
Key Learning Outcome	Key learning outcome is the statement of what a learner needs to know, understand and be able to do in order to achieve the terminal outcomes. A set of key learning outcomes will make up the training outcomes. Training outcome is specified in terms of knowledge, understanding (theory) and skills (practical application).
OJT (M)	On-the-job training (Mandatory) trainees are mandated to complete specified hours of training on site

OJT (R)	On-the-job training (Recommended) trainees are recommended the specified hours of training on site
On-the-job training (Recommend	Procedural knowledge addresses how to do something, or how to perform a task. It is the ability to work, or produce a tangible work output by applying cognitive, affective or psychomotor skills.
Training Outcome	Training outcome is a statement of what a learner will know, understand and be able to do upon the completion of the training.
Terminal Outcome	Terminal outcome is a statement of what a learner will know, understand and be able to do upon the completion of a module. A set of terminal outcomes help to achieve the training outcome.