









Through Hole Assembly Operator

QP Code: ELE/Q5101

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

ELE/Q5101: Through Hole Assembly Operator	3
Brief Job Description	
Applicable National Occupational Standards (NOS)	
Compulsory NOS	3
Qualification Pack (QP) Parameters	3
ELE/N5113: Perform Through-Hole Assembly on PCB Components	5
ELE/N5114: Operate the Through-Hole Machine for Automated Assembling	9
ELE/N5115: Maintain and Troubleshoot Through-Hole Assembly Equipment	13
DGT/VSQ/N0101: Employability Skills (30 Hours)	17
Assessment Guidelines and Weightage	22
Assessment Guidelines	
Assessment Weightage	23
Acronyms	24
Glossary	









ELE/Q5101: Through Hole Assembly Operator

Brief Job Description

A Through Hole Assembly Operator is responsible for manually/automatic fixing components using hand tools, operating and maintaining the automated insertion machine used for placing different types of components on the through-hole PCBs.

Personal Attributes

The job requires the individual to have: attention to details, good eyesight, and ability to work for long hours generally in a standing or sitting position

Applicable National Occupational Standards (NOS)

Compulsory NOS:

- 1. ELE/N5113: Perform Through-Hole Assembly on PCB Components
- 2. ELE/N5114: Operate the Through-Hole Machine for Automated Assembling
- 3. ELE/N5115: Maintain and Troubleshoot Through-Hole Assembly Equipment
- 4. 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	18
Aligned to NCO/ISCO/ISIC Code	NCO-2015/8212.1602









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-044822025-V2-ESSCI
NQR Version	2

Remarks:









ELE/N5113: Perform Through-Hole Assembly on PCB Components

Description

This NOS is about performing through-hole assembly of electronic components on a PCB by inserting, soldering, and inspecting connections as per circuit design and quality standards

Scope

The scope covers the following:

• Introduction and Mount the Components on the PCB

Elements and Performance Criteria

Introduction and Mount the Components on the PCB

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

- **PC1.** Describe the role and responsibilities of a Sr. Operator Through Hole Assembly; explain the scope of through-hole technology in electronics manufacturing and the use of axial/radial insertion machines, digital assembly instructions, and related tools for efficient PCB assembly.
- **PC2.** Identify the daily PCB-loading list and Check the components received from the preparation section and insert them correctly as per the instructions.
- **PC3.** Ensure the leads are properly fitted before further processing.
- **PC4.** Check the placement of inserted components to ensure they are straight.
- **PC5.** Bend the component leads extending through the holes and apply adhesive to secure them to the PCB.
- **PC6.** Firmly mount the components using hand tools as per the circuit diagram.
- **PC7.** Hand over the assembled boards to the wave solder machine operator.
- **PC8.** Solder the components onto the circuit boards at the soldering station.
- **PC9.** Assemble PCB components using axial and radial insertion machines to ensure efficient and accurate through-hole component placement.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- **KU1.** Understand the role and responsibilities of a senior operator in through hole assembly and its importance in electronics manufacturing
- **KU2.** Know different types of through hole components and their insertion methods using manual and machine processes
- **KU3.** Understand PCB layout circuit diagram and component identification before mounting
- **KU4.** Learn correct procedures for lead bending adhesive application and soldering standards
- **KU5.** Understand safety practices and quality parameters in through hole component assembly

Generic Skills (GS)









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

- **GS1.** Identify and collect required components and tools for PCB assembly work
- GS2. Mount and secure components accurately as per job instructions and circuit design
- **GS3.** Operate axial and radial insertion machines for efficient assembly
- **GS4.** Operate axial and radial insertion machines for efficient assembly
- GS5. Communicate and coordinate with team members to maintain workflow and quality standards









Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Introduction and Mount the Components on the PCB	40	50	-	10
PC1. Describe the role and responsibilities of a Sr. Operator – Through Hole Assembly; explain the scope of through-hole technology in electronics manufacturing and the use of axial/radial insertion machines, digital assembly instructions, and related tools for efficient PCB assembly.	-	-	-	-
PC2. Identify the daily PCB-loading list and Check the components received from the preparation section and insert them correctly as per the instructions.	-	-	-	-
PC3. Ensure the leads are properly fitted before further processing.	-	-	-	-
PC4. Check the placement of inserted components to ensure they are straight.	-	-	-	-
PC5. Bend the component leads extending through the holes and apply adhesive to secure them to the PCB.	-	-	-	-
PC6. Firmly mount the components using hand tools as per the circuit diagram.	-	-	-	-
PC7. Hand over the assembled boards to the wave solder machine operator.	-	-	-	-
PC8. Solder the components onto the circuit boards at the soldering station.	-	-	-	-
PC9. Assemble PCB components using axial and radial insertion machines to ensure efficient and accurate through-hole component placement.	-	-	-	-
NOS Total	40	50	-	10









National Occupational Standards (NOS) Parameters

NOS Code	ELE/N5113
NOS Name	Perform Through-Hole Assembly on PCB Components
Sector	Electronics
Sub-Sector	
Occupation	Assembly-EMS
NSQF Level	4
Credits	5.5
Version	1.0
Last Reviewed Date	07/10/2025
Next Review Date	07/10/2028
NSQC Clearance Date	07/10/2025









ELE/N5114: Operate the Through-Hole Machine for Automated Assembling

Description

This NOS is about operating through-hole insertion machines to automatically assemble electronic components on PCBs as per specified layouts and production quality standards.

Scope

The scope covers the following:

• Set Up and Operate the Machine

Elements and Performance Criteria

Set Up and Operate the Machine

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

- **PC1.** Set up tools and required parts to operate the machine.
- **PC2.** Place insertion chutes in the programmed locations for efficiency.
- **PC3.** Ensure polarity marking and loading direction as per the job sheet.
- **PC4.** Control the insertion sequence and lead formation to match hole dimensions.
- **PC5.** Load PCB fixtures and move them to the correct location for assembly.
- **PC6.** Set the machine to zero settings before starting the operation
- **PC7.** Ensure the anvil cutter properly trims and bends the leads for secure placement
- **PC8.** Use screen-based or digital assembly instructions to enhance accuracy and minimize dependence on printed manuals during assembly operations.
- **PC9.** Follow ESD and contamination prevention standards while assembling all PCBs.
- **PC10.** Monitor machine operation to ensure compliance with quality standards.
- **PC11.** Visually inspect assembled PCBs for missing or incorrectly placed components.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- **KU1.** Understand the setup and operation process of insertion machines used in through hole assembly
- **KU2.** Know the function of insertion chutes anvil cutters and fixtures in PCB assembly
- **KU3.** Learn the importance of polarity marking and lead formation for correct component placement
- **KU4.** Understand ESD safety and contamination prevention standards in electronic assembly
- **KU5.** Know how to interpret job sheets and digital assembly instructions for machine setup and operation









Generic Skills (GS)

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

- **GS1.** Set up tools and parts accurately for machine operation as per production plan
- **GS2.** Operate insertion machines efficiently by following digital or screen based instructions
- GS3. Inspect PCB assemblies visually to identify missing or incorrectly placed components
- **GS4.** Adjust machine settings and insertion sequence to maintain quality and accuracy
- **GS5.** Communicate effectively with supervisors and team members to ensure smooth workflow and timely issue resolution









Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Set Up and Operate the Machine	40	50	-	10
PC1. Set up tools and required parts to operate the machine.	-	-	-	-
PC2. Place insertion chutes in the programmed locations for efficiency.	-	-	-	-
PC3. Ensure polarity marking and loading direction as per the job sheet.	-	-	-	-
PC4. Control the insertion sequence and lead formation to match hole dimensions.	_	-	-	_
PC5. Load PCB fixtures and move them to the correct location for assembly.	-	-	-	-
PC6. Set the machine to zero settings before starting the operation	-	-	-	-
PC7. Ensure the anvil cutter properly trims and bends the leads for secure placement	-	-	-	-
PC8. Use screen-based or digital assembly instructions to enhance accuracy and minimize dependence on printed manuals during assembly operations.	-	-	-	-
PC9. Follow ESD and contamination prevention standards while assembling all PCBs.	-	-	-	-
PC10. Monitor machine operation to ensure compliance with quality standards.	_	-	-	-
PC11. Visually inspect assembled PCBs for missing or incorrectly placed components.	_	-	-	-
NOS Total	40	50	-	10









National Occupational Standards (NOS) Parameters

NOS Code	ELE/N5114
NOS Name	Operate the Through-Hole Machine for Automated Assembling
Sector	Electronics
Sub-Sector	
Occupation	Assembly-EMS
NSQF Level	4
Credits	5.5
Version	1.0
Last Reviewed Date	07/10/2025
Next Review Date	07/10/2028
NSQC Clearance Date	07/10/2025









ELE/N5115: Maintain and Troubleshoot Through-Hole Assembly Equipment

Description

This NOS is about maintaining, inspecting, and troubleshooting through-hole assembly equipment to ensure smooth operation, minimal downtime, and adherence to quality and safety standards.

Scope

The scope covers the following:

• Undertake Preventive Maintenance of the Machine

Elements and Performance Criteria

Undertake Preventive Maintenance of the Machine

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

- **PC1.** Maintain the machine to prevent unscheduled downtime.
- **PC2.** Perform regular cleaning, weekly greasing, and nozzle maintenance.
- **PC3.** Repair minor machine faults or call a service technician if required.
- **PC4.** Inspect belts, gears, and moving components for wear and replace them as needed.
- PC5. Check and tighten electrical connections to prevent malfunction
- **PC6.** Document maintenance activities and update service records regularly.
- **PC7.** Monitor machine performance trends to predict potential failures
- **PC8.** Ensure all safety interlocks and emergency stops are functional.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- **KU1.** Understand the importance of preventive maintenance to reduce machine downtime and increase productivity
- **KU2.** Know the correct methods for cleaning greasing and maintaining nozzles belts and gears
- **KU3.** Learn how to identify early signs of wear or malfunction in mechanical and electrical components
- KU4. Understand the role of safety interlocks and emergency stop systems in machine safety
- **KU5.** Know how to document maintenance activities and interpret performance data for predictive maintenance

Generic Skills (GS)

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









- **GS1.** Perform regular maintenance tasks such as cleaning lubrication and inspection as per schedule
- **GS2.** Identify and repair minor faults or escalate major issues to the service technician
- **GS3.** Record maintenance activities accurately in service logs or digital systems
- GS4. Use hand tools and safety equipment properly while carrying out maintenance work
- **GS5.** Communicate effectively with supervisors and team members regarding maintenance plans and machine condition









Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Undertake Preventive Maintenance of the Machine	40	50	-	10
PC1. Maintain the machine to prevent unscheduled downtime.	-	-	-	-
PC2. Perform regular cleaning, weekly greasing, and nozzle maintenance.	-	-	-	-
PC3. Repair minor machine faults or call a service technician if required.	-	-	-	-
PC4. Inspect belts, gears, and moving components for wear and replace them as needed.	-	-	-	-
PC5. Check and tighten electrical connections to prevent malfunction	-	-	-	-
PC6. Document maintenance activities and update service records regularly.	-	-	-	-
PC7. Monitor machine performance trends to predict potential failures	-	-	-	-
PC8. Ensure all safety interlocks and emergency stops are functional.	-	-	-	-
NOS Total	40	50	-	10









National Occupational Standards (NOS) Parameters

NOS Code	ELE/N5115
NOS Name	Maintain and Troubleshoot Through-Hole Assembly Equipment
Sector	Electronics
Sub-Sector	
Occupation	Assembly-EMS
NSQF Level	4
Credits	6
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 Element/ 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 Element/ 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 center (as per assessment criteria below).
- 5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/ training center based on these criteria.
- 6. To pass the Qualification Pack assessment, every trainee should score the Recommended Pass % aggregate for the QP.
- 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/N5113.Perform Through- Hole Assembly on PCB Components	40	50	-	10	100	25
ELE/N5114.Operate the Through-Hole Machine for Automated Assembling	40	50	-	10	100	25
ELE/N5115.Maintain and Troubleshoot Through-Hole Assembly Equipment	40	50	-	10	100	25
DGT/VSQ/N0101.Employability Skills (30 Hours)	20	30	-	_	50	25
Total	140	180	-	30	350	100









Acronyms

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