Model Curriculum

MCr Name: Fundamentals of Cleanroom- Semiconductor

OEM Name: Cleanroom Technician – Semiconductor Manufacturing

MCr Code: ELE/MCr-0004

MCr Version: 1.0

NSQF Level: 4.5

Model Curriculum Version: 1.0

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Training Parameters

Sector	Electronics
Sub-Sector	Semiconductor & Components
Occupation	Production-S&C
Country	India
NSQF Level	4.5
Aligned to NCO/ISCO/ISIC Code	NCO-xxxx/xxxxxxx
Minimum Educational Qualification and Experience	1. Diploma after 10th in Electronics and Communication Engineering/ Electrical Engineering with 6 Months of relevant experience required 2. 12th in Science or Equivalent in science with 1.5 years of relevant experience 3. 10th or equivalent with 4.5 years of relevant experience 4. Previous NSQF qualifications of Level 4 with 1.5 years of relevant experience *Relevant Experience in Semiconductor Domain
Pre-Requisite License or Training	NA
Minimum Job Entry Age	NA
Last Reviewed On	07/10/2025
Next Review Date	07/10/2028
NSQC Approval Date	07/10/2025
MCr Version	1.0
Model Curriculum Creation Date	07/10/2025
Model Curriculum Valid Up to Date	07/10/2028
Model Curriculum Version	1.0
Maximum Duration of the Course	30 Hrs.

Program Overview

This section summarizes the end objectives of the program along with its duration.

Training Outcomes:

At the end of the program, the learner should have acquired the listed knowledge and skills:

Compulsory:

- Basic lecture introduces different aspects of Electronics and exposure to the current activities at a particular.

Compulsory Modules:

The table lists the modules and their duration corresponding to the Compulsory MCr of the QF.

MCr and Module Details	Theory / Demonstration Duration (In Hours)	Practical/OJT Duration (In Hours)	On-the-Job Training Duration (in hours) (Mandatory)	On-the-Job Training Duration (in hours) (Recommended)	Total Duration (In Hours)
ELE/MCr-0004	12:00	18:00	00:00	00:00	30:00
Module 1: Introduction to Cleanroom- Semiconductor Manufacturing	12:00	18:00	00:00	00:00	30:00
Total Duration	**12:00**	**18:00**	**00:00**	**00:00**	**30:00**

Module Details

Module 1: Introduction to Cleanroom- Semiconductor Manufacturing

Mapped to ELE/MCr-0004

Terminal Outcomes:

Upon completion of the module on Introduction to Cleanroom - Semiconductor, students will be able to:

- Understanding cleanroom protocols during Semiconductor manufacturing process
- Identify Environmental Monitoring and Control parameters.
- Able to maintain cleanliness and ensuring contamination control to meet industry standards.

Duration: 12:00 hrs
Theory - Key Learning Outcomes
• Understand cleanroom classifications (e.g., Class 100, 1000) and relevant ISO standards. • Explain airflow patterns and the role of HEPA/ULPA filters in particle control. • Monitor and control air particles, temperature, and humidity in cleanroom environments. • Understand the operation and maintenance procedures of cleanroom equipment. • Identify contamination sources and apply best practices for contamination control. • Follow cleanroom safety standards and respond effectively to emergency situations.
Duration: 18:00 hrs
Practical - Key Learning Outcomes
• Demonstrate how to classify cleanrooms and verify compliance using particle count data. • Operate and inspect airflow systems and filtration units (HEPA/ULPA) for proper functioning. • Perform air particle monitoring and adjust environmental controls to maintain required conditions. • Operate, clean, and carry out routine maintenance of cleanroom equipment as per SOPs. • Implement contamination control practices during handling, gowning, and material transfer. • Use appropriate PPE and execute emergency response procedures in cleanroom scenarios.
Classroom Aids: (If Offline mode)
• Whiteboard and Markers • Chart paper and sketch pens • LCD Projector and Laptop for presentations

Tools, Equipment and Other Requirements
Labs equipped with the following: ● Antistatic coveralls/gowns, face masks, gloves, shoe covers/booties, goggles/face shields – for personal protection and contamination control. ● Gowning bench, sticky mats – for proper gowning and entry protocol into cleanrooms. ● Laminar flow benches – to ensure particle-free working environments. ● Air particle counter, surface particle testing kit – for monitoring air and surface cleanliness.

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	**Specialization**	**Years**	**Specialization**	
Graduate Science & Engineering	Electrical/ Mechanical/ Electronics	1	Semiconductor Technology, Embedded System	1	Semiconductor Technology, Embedded System	
Diploma/ITI	Electrical/ Mechanical/ Electronics	2	Semiconductor Technology, Embedded System	1	Semiconductor Technology, Embedded System	

Trainer Certification	
Domain Certification	**Platform Certification**
"**Cleanroom Technician- Semiconductor Manufacturing**, ELE/MCr-0004, version 1.0". Minimum accepted score is 80%.	Recommended that the Trainer is certified for the **Cleanroom Technician- Semiconductor Manufacturing** "Trainer (VET and Skills)", mapped to the Qualification Pack: "MEP/Q2601, V2.0", with minimum score of 80%

Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	**Specialization**	**Years**	**Specialization**	
Graduate Science & Engineering	Electrical/ Mechanical/ Electronics	2	Semiconductor Technology, Embedded System	1	Semiconductor Technology, Embedded System	
Diploma/ITI	Electrical/ Mechanical/ Electronics	3	Semiconductor Technology, Embedded System	1	Semiconductor Technology, Embedded System	

Assessor Certification	
Domain Certification	**Platform Certification**
"**Cleanroom Technician- Semiconductor Manufacturing**, ELE/MCr-0004, version 1.0". Minimum accepted score is 80%.	Recommended that the Assessor is certified for the **Cleanroom Technician- Semiconductor Manufacturing** "Assessor (VET and Skills)", mapped to the Qualification Pack: "MEP/Q2701, V2.0", with minimum score of 80%

Assessment Strategy

1. Assessment System Overview:
   - Batches assigned to the assessment agencies for conducting the assessment on SDMS/SIP or email
   - Assessment agencies send the assessment confirmation to VTP/TC looping SSC
   - Assessment agency deploys the ToA certified Assessor for executing the assessment
   - SSC monitors the assessment process & records

2. Testing Environment:
   - Confirm that the centre is available at the same address as mentioned on SDMS or SIP
   - Check the duration of the training.
   - Check the Assessment Start and End time to be as 10 a.m. and 5 p.m.
   - If the batch size is more than 30, then there should be 2 Assessors.
   - Check that the allotted time to the candidates to complete Theory & Practical Assessment is correct.
   - Check the mode of assessment—Online (TAB/Computer) or Offline (OMR/PP).
   - Confirm the number of TABs on the ground are correct to execute the Assessment smoothly.
   - Check the availability of the Lab Equipment for the particular Job Role.

3. Assessment Quality Assurance levels / Framework:
   - Question papers created by the Subject Matter Experts (SME)
   - Question papers created by the SME verified by the other subject Matter Experts
   - Questions are mapped with MCr and PC
   - Question papers are prepared considering that level 1 to 3 are for the unskilled & semi-skilled individuals, and level 4 and above are for the skilled, supervisor & higher management
   - Assessor must be ToA certified & trainer must be ToT Certified
   - Assessment agency must follow the assessment guidelines to conduct the assessment

4. Types of evidence or evidence-gathering protocol:

   - Time-stamped & geotagged reporting of the assessor from assessment location

- Centre photographs with signboards and scheme specific branding
- Biometric or manual attendance sheet (stamped by TP) of the trainees during the training period
- Time-stamped & geotagged assessment (Theory + Viva + Practical) photographs & videos

5. Method of verification or validation:

   - Surprise visit to the assessment location
   - Random audit of the batch
   - Random audit of any candidate

6. Method for assessment documentation, archiving, and access

   - Hard copies of the documents are stored
   - Soft copies of the documents & photographs of the assessment are uploaded / accessed from Cloud Storage
   - Soft copies of the documents & photographs of the assessment are stored in the Hard Drives

References

Glossary

Term	Description
Key Learning Outcome	Key learning outcome is the statement of what a learner needs to know, understand and be able to do 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/OJT application).
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.
National Occupational Standard	National Occupational Standard specify the standard of performance an individual must achieve when carrying out a function in the workplace
Persons with Disability	Persons with Disability are those who have long-term physical, mental, intellectual, or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others

Acronyms and Abbreviations

Term	Description
QF	Qualification File
NSQF	National Skills Qualification Framework
NSQC	National Skills Qualification Committee
NOS	National Occupational Standards
SSC	Skill Sectors Councils
NASSCOM	National Association of Software & Service Companies
NCO	National Classification of Occupations
ISO	International Organization for Standardization
SLA	Service Level Agreement
IT	Information Technology
CRM	Customer Relationship Management
PC	Performance Criteria
PwD	Persons with Disability
SOP	Standard Operating Procedure