



Qualification Pack

TECHNICAL SUPERVISOR -ADDITIVE MANUFACTURING

QP Code: MSME/CSC/Q3401

Version: 1.0

NSQF Level: 5

MSME TECHNOLOGY CENTRE ||
B-36 CHANDAKA INDUSTRIAL AREA || email:msmeexamcell@gmail.com



Qualification Pack

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Qualification Pack

MSME/CSC/Q3401: TECHNICAL SUPERVISOR -ADDITIVE MANUFACTURING

Brief Job Description

Qualified learner will be competent in future skills and get employment in following area.

Personal Attributes

Qualified learner will be competent in future skills and get employment in following area.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. [MSME/CSC/N3403: Develop new product using 3D Printing machine](#)
2. [MSME/CSC/N3402: Design of Product using Design software tools](#)
3. [MSME/CSC/N3401: Introduction to Additive Manufacturing \(AM\) Process](#)
4. [MSME/CSC/N3404: Employability Skills 05](#)

Qualification Pack (QP) Parameters

Sector	Capital Goods
Sub-Sector	Machine Tools
Occupation	Manufacturing
Country	India
NSQF Level	5
Credits	20
Aligned to NCO/ISCO/ISIC Code	(Mechanical Engineer, General)



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Minimum Educational Qualification & Experience	B.E./B.Tech with NA of experience OR Completed 3 year diploma after 10th with 2 Years of experience OR Previous relevant Qualification of NSQF Level (Previous relevant Qualification of NSQF Level 4.5) with 1.5 years of experience OR Previous relevant Qualification of NSQF Level (Previous relevant Qualification of NSQF Level 4) with 3 Years of experience
Minimum Level of Education for Training in School	
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 Years
Last Reviewed On	NA
Next Review Date	30/04/2027
NSQF Approval Date	30/04/2024
Version	1.0
Reference code on NQR	NCVET- QG-05-CG-02410-2024-V1-MSME
NQR Version	1.0



Qualification Pack

MSME/CSC/N3403: Develop new product using 3D Printing machine

Description

After completion of course Student should be able to Understand 3D Printing technology

Scope

The scope covers the following :

- After completion of course Student should be able to Understand 3D Printing technology

Elements and Performance Criteria

MSME/MCCAM/03 Develop new product using 3D Printing machine

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

- PC1.** Explain the 3D Printing Technology
- PC2.** Explain the Element of 3D Printing Machine
- PC3.** Explain the various printer parameters
- PC4.** Explain the use of 3D Printing & Scanning
- PC5.** Describe 3D Scanning Technology.
- PC6.** Describe various part of 3D scanning.
- PC7.** Describe types of 3D scanner.
- PC8.** Explain Create the CAD model from point cloud data
- PC9.** Data preparation.
- PC10.** Explain the Steps in 3D Printing
- PC11.** Explain the concept of elastic and plastic deformation
- PC12.** Design & Develop the 3D Model and Print on 3D Printing Machine
- PC13.** Design the 3D Model as per the requirement AM.
- PC14.** Demonstrate the Printing Process.
- PC15.** Carry out the product development using 3d printing technology.



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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>MSME/MCCAM/03 Develop new product using 3D Printing machine</i>	-	100	-	-
PC1. Explain the 3D Printing Technology	-	-	-	-
PC2. Explain the Element of 3D Printing Machine	-	-	-	-
PC3. Explain the various printer parameters	-	-	-	-
PC4. Explain the use of 3D Printing & Scanning	-	-	-	-
PC5. Describe 3D Scanning Technology.	-	-	-	-
PC6. Describe various part of 3D scanning.	-	-	-	-
PC7. Describe types of 3D scanner.	-	-	-	-
PC8. Explain Create the CAD model from point cloud data	-	-	-	-
PC9. Data preparation.	-	-	-	-
PC10. Explain the Steps in 3D Printing	-	-	-	-
PC11. Explain the concept of elastic and plastic deformation	-	-	-	-
PC12. Design & Develop the 3D Model and Print on 3D Printing Machine	-	-	-	-
PC13. Design the 3D Model as per the requirement AM.	-	-	-	-
PC14. Demonstrate the Printing Process.	-	-	-	-
PC15. Carry out the product development using 3d printing technology.	-	-	-	-
NOS Total	-	100	-	-



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National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3403
NOS Name	Develop new product using 3D Printing machine
Sector	Capital Goods
Sub-Sector	
Occupation	Manufacturing
NSQF Level	5
Credits	10
Version	1.0
Last Reviewed Date	30/04/2024
Next Review Date	30/04/2027
NSQF Clearance Date	30/04/2024



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MSME/CSC/N3402: Design of Product using Design software tools

Description

After completion of course Student should be able to Understand 3D CAD modeling using the CAD Software.

Scope

The scope covers the following :

- After completion of course Student should be able to Understand 3D CAD modeling using the CAD Software.

Elements and Performance Criteria

MSME/MCCAM/02 Design of Product using Design software tools

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

- PC1.** Describe various feature in CAD software.
- PC2.** Explain about limitation & advantages of each CAD Software
- PC3.** Explain working of CAD
- PC4.** Create and Edit 2D geometric sketches by using CAD software.
- PC5.** Explain the Feature base modeling in CAD
- PC6.** Explain the Feature base modeling in CAD
- PC7.** Develop 3D part modeling by using advanced command.
- PC8.** Design & Develop the Function Assembly
- PC9.** Explain the Types of Assembly
- PC10.**
 - Apply assembly constraint & develop different types of assembly design
 - by using CAD Software.
- PC11.** Create the detail drafting of the product / assembly.
- PC12.** Explain the Difference between Creative & Generative Drafting
- PC13.** Create / import entities in 3D space as per job requirement
- PC14.**
 - Create 3-D views on the screen by manipulating drawing planes and
 - inserting 3-D geometric shapes
- PC15.** Prepare a model for export to the AM Pre Processing Software
- PC16.** Prepare and Convert the model for Additive Manufacturing process.



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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>MSME/MCCAM/02 Design of Product using Design software tools</i>	-	100	-	-
PC1. Describe various feature in CAD software.	-	-	-	-
PC2. Explain about limitation & advantages of each CAD Software	-	-	-	-
PC3. Explain working of CAD	-	-	-	-
PC4. Create and Edit 2D geometric sketches by using CAD software.	-	-	-	-
PC5. Explain the Feature base modeling in CAD	-	-	-	-
PC6. Explain the Feature base modeling in CAD	-	-	-	-
PC7. Develop 3D part modeling by using advanced command.	-	-	-	-
PC8. Design & Develop the Function Assembly	-	-	-	-
PC9. Explain the Types of Assembly	-	-	-	-
PC10. <ul style="list-style-type: none">• Apply assembly constraint & develop different types of assembly design• by using CAD Software.	-	-	-	-
PC11. Create the detail drafting of the product / assembly.	-	-	-	-
PC12. Explain the Difference between Creative & Generative Drafting	-	-	-	-
PC13. Create / import entities in 3D space as per job requirement	-	-	-	-
PC14. <ul style="list-style-type: none">• Create 3-D views on the screen by manipulating drawing planes and• inserting 3-D geometric shapes	-	-	-	-
PC15. Prepare a model for export to the AM Pre Processing Software	-	-	-	-



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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC16. Prepare and Convert the model for Additive Manufacturing process.	-	-	-	-
NOS Total	-	100	-	-



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National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3402
NOS Name	Design of Product using Design software tools
Sector	Capital Goods
Sub-Sector	
Occupation	Manufacturing
NSQF Level	5
Credits	6
Version	1.0
Last Reviewed Date	30/04/2024
Next Review Date	30/04/2027
NSQF Clearance Date	30/04/2024



Qualification Pack

MSME/CSC/N3401: Introduction to Additive Manufacturing (AM) Process

Description

Analyze and understand the mechanical property of the component

Scope

The scope covers the following :

- Analyze and understand the mechanical property of the component

Elements and Performance Criteria

MSME/MCCAM/01 Introduction to Additive Manufacturing (AM) Process

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

- PC1.** Explain the different Type of Manufacturing Technology.
- PC2.** Explain the advantages of Additive Manufacturing.
- PC3.** Explain the limitation of additive manufacturing.
- PC4.** Explain the history of Additive Manufacturing
- PC5.** Explain the need of Additive Manufacturing
- PC6.** Describe the process of Additive Manufacturing
- PC7.** Explain the Process steps in additive manufacturing.
- PC8.** Classify the types of Additive Manufacturing Technology
- PC9.** Design the product as per the customer requirement.
- PC10.**
 - Explain solid base, liquid base and powder base technology like LOM
 - (Laminated Object Manufacturing) System, FDM (Fuse Deposition
 - Modeling) System, Multi-Jet Modeling (MJM) System, Shape Deposition
 - Manufacturing Process.
- PC11.**
 - Explain the various printer parameters in solid base, Liquid base and
 - powder base technology.
- PC12.** Classify the different types material available in additive manufacturing
- PC13.**
 - Compare the various Additive Manufacturing technology (RP
 - Techniques)
- PC14.** Explain the defects in additive Manufacturing Technology
- PC15.** Explain the various application of additive Manufacturing.



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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>MSME/MCCAM/01Introduction to Additive Manufacturing (AM) Process</i>	100	-	-	-
PC1. Explain the different Type of Manufacturing Technology.	-	-	-	-
PC2. Explain the advantages of Additive Manufacturing.	-	-	-	-
PC3. Explain the limitation of additive manufacturing.	-	-	-	-
PC4. Explain the history of Additive Manufacturing	-	-	-	-
PC5. Explain the need of Additive Manufacturing	-	-	-	-
PC6. Describe the process of Additive Manufacturing	-	-	-	-
PC7. Explain the Process steps in additive manufacturing.	-	-	-	-
PC8. Classify the types of Additive Manufacturing Technology	-	-	-	-
PC9. Design the product as per the customer requirement.	-	-	-	-
PC10. <ul style="list-style-type: none">• Explain solid base, liquid base and powder base technology like LOM• (Laminated Object Manufacturing) System, FDM (Fuse Deposition• Modeling) System, Multi-Jet Modeling (MJM) System, Shape Deposition• Manufacturing Process.	-	-	-	-
PC11. <ul style="list-style-type: none">• Explain the various printer parameters in solid base, Liquid base and• powder base technology.	-	-	-	-
PC12. Classify the different types material available in additive manufacturing	-	-	-	-



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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. <ul style="list-style-type: none">• Compare the various Additive Manufacturing technology (RP• Techniques)	-	-	-	-
PC14. Explain the defects in additive Manufacturing Technology	-	-	-	-
PC15. Explain the various application of additive Manufacturing.	-	-	-	-
NOS Total	100	-	-	-



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National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3401
NOS Name	Introduction to Additive Manufacturing (AM) Process
Sector	Capital Goods
Sub-Sector	
Occupation	Manufacturing
NSQF Level	5
Credits	2
Version	1.0
Last Reviewed Date	30/04/2024
Next Review Date	30/04/2027
NSQF Clearance Date	30/04/2024



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MSME/CSC/N3404: Employability Skills 05

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 :

- 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.

Elements and Performance Criteria

NOS/Module: MSME/ES/02 Employability Skills

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

- PC1.** Discuss the importance of Employability Skills in meeting the job requirements.
- PC2.**
 - Explain constitutional values, civic rights, duties, citizenship,
 - responsibility towards society etc. that are required to be followed to
 - become a responsible citizen.
- PC3.** Show how to practice different environmentally sustainable practices.
- PC4.** Discuss 21st century skills.
- PC5.**
 - Display positive attitude, self -motivation, problem solving, time
 - management skills and continuous learning mindset in different situations.
- PC6.** Use appropriate basic English sentences/phrases while speaking.
- PC7.**
 - Demonstrate how to communicate in a well -mannered way with
 - others.
- PC8.** Demonstrate working with others in a team.
- PC9.** Show how to conduct oneself appropriately with all genders and PwD
- PC10.** Discuss the significance of reporting sexual harassment issues in time
- PC11.**
 - Discuss the significance of using financial products and services safely
 - and securely.
- PC12.** Explain the importance of managing expenses, income, and savings.
- PC13.**
 - Explain the significance of approaching the concerned authorities in
 - time for any exploitation as per legal rights and laws.
- PC14.**
 - Show how to operate digital devices and use the associated applications
 - and features, safely and securely.
- PC15.**
 - Discuss the significance of using internet for browsing, accessing social
 - media platforms, safely and Securely



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- PC16.** • Discuss the need for identifying opportunities for potential business,
• sources for arranging money and potential legal and financial challenges.
- PC17.** Differentiate between types of customers.
- PC18.** • Explain the significance of identifying customer needs and addressing
• them.
- PC19.** Discuss the significance of maintaining hygiene and dressing appropriately
- PC20.** Create a biodata
- PC21.** Use various sources to search and apply for jobs
- PC22.** • Discuss the significance of dressing up neatly and maintaining hygiene
• for an interview
- PC23.** Discuss how to search and register for apprenticeship opportunities



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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>NOS/Module: MSME/ES/02 Employability Skills</i>	100	-	-	-
PC1. Discuss the importance of Employability Skills in meeting the job requirements.	-	-	-	-
PC2. <ul style="list-style-type: none">• Explain constitutional values, civic rights, duties, citizenship,• responsibility towards society etc. that are required to be followed to• become a responsible citizen.	-	-	-	-
PC3. Show how to practice different environmentally sustainable practices.	-	-	-	-
PC4. Discuss 21st century skills.	-	-	-	-
PC5. <ul style="list-style-type: none">• Display positive attitude, self -motivation, problem solving, time• management skills and continuous learning mindset in different situations.	-	-	-	-
PC6. Use appropriate basic English sentences/phrases while speaking.	-	-	-	-
PC7. <ul style="list-style-type: none">• Demonstrate how to communicate in a well -mannered way with• others.	-	-	-	-
PC8. Demonstrate working with others in a team.	-	-	-	-
PC9. Show how to conduct oneself appropriately with all genders and PwD	-	-	-	-
PC10. Discuss the significance of reporting sexual harassment issues in time	-	-	-	-
PC11. <ul style="list-style-type: none">• Discuss the significance of using financial products and services safely• and securely.	-	-	-	-
PC12. Explain the importance of managing expenses, income, and savings.	-	-	-	-



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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. <ul style="list-style-type: none">• Explain the significance of approaching the concerned authorities in• time for any exploitation as per legal rights and laws.	-	-	-	-
PC14. <ul style="list-style-type: none">• Show how to operate digital devices and use the associated applications• and features, safely and securely.	-	-	-	-
PC15. <ul style="list-style-type: none">• Discuss the significance of using internet for browsing, accessing social• media platforms, safely and Securely	-	-	-	-
PC16. <ul style="list-style-type: none">• Discuss the need for identifying opportunities for potential business,• sources for arranging money and potential legal and financial challenges.	-	-	-	-
PC17. Differentiate between types of customers.	-	-	-	-
PC18. <ul style="list-style-type: none">• Explain the significance of identifying customer needs and addressing• them.	-	-	-	-
PC19. Discuss the significance of maintaining hygiene and dressing appropriately	-	-	-	-
PC20. Create a biodata	-	-	-	-
PC21. Use various sources to search and apply for jobs	-	-	-	-
PC22. <ul style="list-style-type: none">• Discuss the significance of dressing up neatly and maintaining hygiene• for an interview	-	-	-	-
PC23. Discuss how to search and register for apprenticeship opportunities	-	-	-	-
NOS Total	100	-	-	-



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National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3404
NOS Name	Employability Skills 05
Sector	Capital Goods
Sub-Sector	
Occupation	Manufacturing
NSQF Level	5
Credits	2
Version	1.0
Last Reviewed Date	30/04/2024
Next Review Date	30/04/2027
NSQC Clearance Date	30/04/2024

Assessment Guidelines and Assessment Weightage

Assessment Guidelines

As per QP

Minimum Aggregate Passing % at QP Level : 40

(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



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National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
MSME/CSC/N3403.Develop new product using 3D Printing machine	-	100	-	-	100	20
MSME/CSC/N3402.Design of Product using Design software tools	-	100	-	-	100	40
MSME/CSC/N3401.Introduction to Additive Manufacturing (AM) Process	100	-	-	-	100	20
MSME/CSC/N3404.Employability Skills 05	100	-	-	-	100	20
Total	200	200	-	-	400	100



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Acronyms

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training



Qualification Pack

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.



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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.