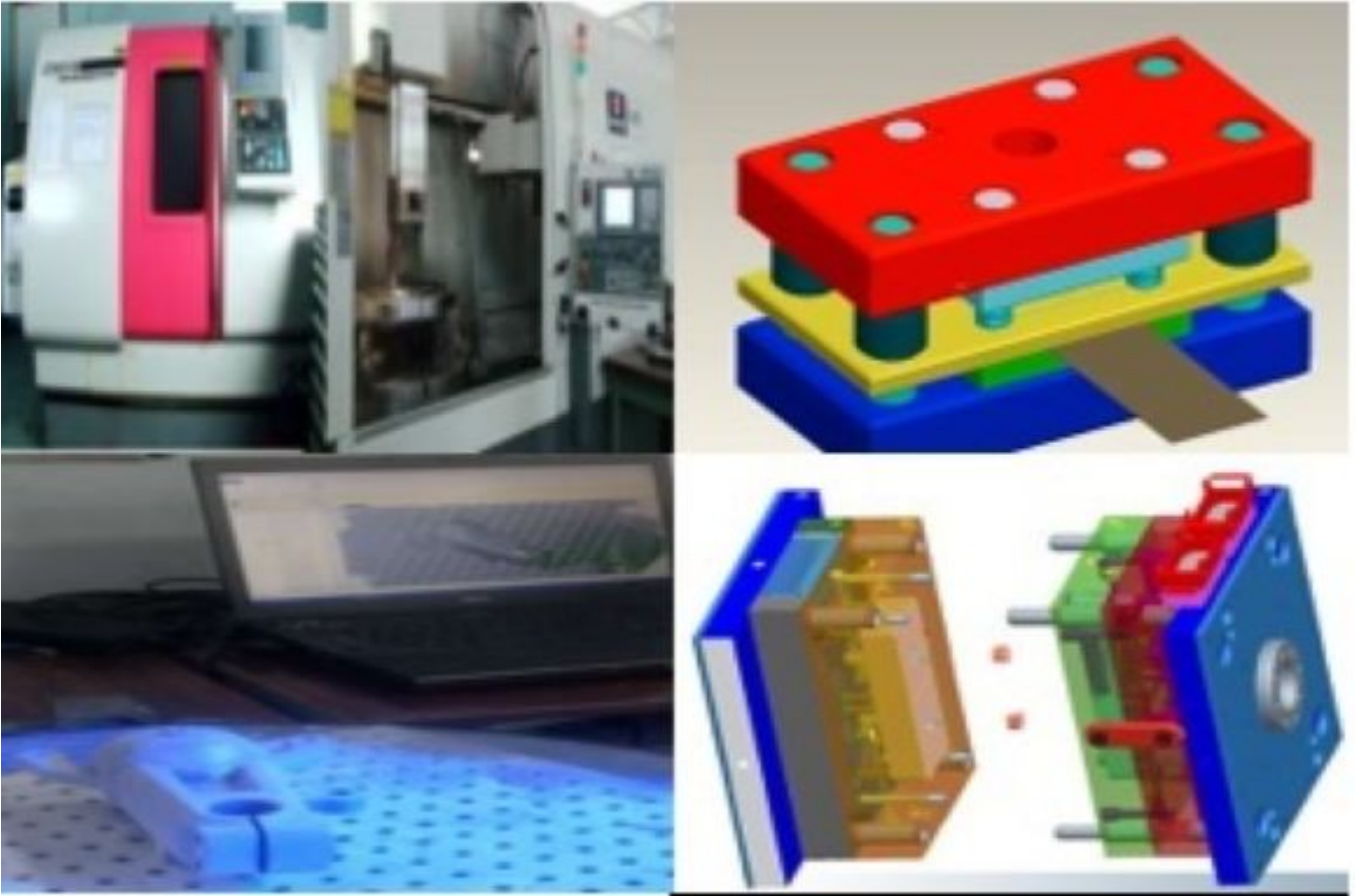




Qualification Pack



SENIOR TOOL DESIGNER CAD / CAM

QP Code: MSME/CSC/Q3704

Version: 1.0

NSQF Level: 6.5

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



Qualification Pack

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Qualification Pack

MSME/CSC/Q3704: SENIOR TOOL DESIGNER CAD / CAM

Brief Job Description

They are Responsible for developing tool design and tool manufacturing. They will be able to generate CAD models and product design and validate the same using CAE software. And able to do the process planning and manufacturing of the product. Also, with the application of knowledge and skill of Tool and die technology and CAD/CAM/CAE the participants can develop their own enterprises

Personal Attributes

to do the process planning and manufacturing of the product

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. [MSME/CSC/N3030: Additive manufacturing](#)
2. [MSME/CSC/N3028: Innovative Design Techniques and Research Methodology](#)
3. [MSME/CSC/N3027: FEA using CAE Software](#)
4. [MSME/CSC/N3026: Design of Tools with Advance CAD Software Module II \(Creoparametric\)](#)
5. [MSME/CSC/N3025: Manufacturing Process Planning and Heat Treatment](#)
6. [MSME/CSC/N3024: Mechanical Measurement and Total Quality Management p](#)
7. [MSME/CSC/N3023: Mechanical Measurements and Total Quality Management](#)
8. [MSME/CSC/N3022: Design of Metal Die Casting P](#)
9. [MSME/CSC/N3021: Design of Metal Die Casting](#)
10. [MSME/CSC/N3020: Mold Design for Plastic Parts Practical](#)
11. [MSME/CSC/N3019: Mold Design for Plastic Part](#)
12. [MSME/CSC/N3018: Design of Tools with Advance Cad Software Module I](#)
13. [MSME/CSC/N3017: Stamping Die Design p](#)
14. [MSME/CSC/N3016: Stamping Die Design](#)
15. [MSME/CSC/N3015: Design of Work holding Devices And Gauges p](#)
16. [MSME/CSC/N3014: Design of Work holding Devices And Gauges](#)



Qualification Pack

17. [MSME/CSC/N3013: Advance Manufacturing Practices Using Cam Software](#)
18. [MSME/CSC/N3012: Engineering Drafting And Modelling Using CAD Software](#)
19. [MSME/CSC/N3009: Product Manufacturing with CNC Programming And Machining](#)
20. [MSME/CSC/N3029: Employability Skills / Entrepreneurship](#)
21. [MSME/CSC/N3011: OJT-1](#)

Qualification Pack (QP) Parameters

Sector	Capital Goods
Sub-Sector	Machine Tools
Occupation	Tool & Die Making 01, Tool & Die Making
Country	India
NSQF Level	6.5
Credits	63
Aligned to NCO/ISCO/ISIC Code	2144.0101 (Process Design Engineer)
Minimum Educational Qualification & Experience	Completed 4 year UG degree with Honours/ Honours with research (nil) OR Previous relevant Qualification of NSQF Level (5.5) with 1.5 years of experience OR Previous relevant Qualification of NSQF Level (5) with 3 Years of experience
Minimum Level of Education for Training in School	12th Class
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 Years
Last Reviewed On	NA
Next Review Date	08/05/2030
NSQF Approval Date	08/05/2025
Version	1.0



Qualification Pack

Reference code on NQR	QG-6.5-IT-04170-2025-V1-MSME
NQR Version	1.0



Qualification Pack

MSME/CSC/N3030: Additive manufacturing

Description

Understand and explain the Concept of Additive Manufacturing techniques 2. List and classify different RP techniques 3. Describe advantage and disadvantages of RP 4. Apply knowledge of RP & RE using 3D scanning and 3D printing in rapid prototype

Scope

The scope covers the following :

- Understand and explain the Concept of Additive Manufacturing techniques
- 2. List and classify different RP techniques
- 3. Describe advantage and disadvantages of RP
- 4. Apply knowledge of RP & RE using 3D scanning and 3D printing in rapid prototype

Elements and Performance Criteria

MSME/PGDTD/13

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

- PC1.** Identify basic of Additive manufacturing
- PC2.** design potential in 3D Printing
- PC3.** knowledge of 3D Printing and 3D scanning
- PC4.** describe design complexity
- PC5.** apply basic CAD properties
- PC6.** test the functional of 3D scanning & 3D printing
- PC7.** Use the 3D scanning to reconstruct the design
- PC8.** To get the dimensions over physical modal
- PC9.** Basic knowledge of materials
- PC10.** Use the concept of photo polymerization
- PC11.** Apply the processes control of 3D printing
- PC12.** Ensure Basic knowledge of materials
- PC13.** Use the concept of photo polymerization
- PC14.** Apply the processes control of 3D printing
- PC15.** Apply the knowledge in medical
- PC16.** Identify the digital manufacturing
- PC17.** Describe electronic and electronic modeling
- PC18.** Use selective laser sintering(SLS), Stereo lithography apparatus(SLA)
- PC19.** Clarify the applications of 3D printing & 3D scanning
- PC20.** Evaluate the scope of 3D scanning & 3D printing
- PC21.** Work with different Technology problem and proposed solutions



Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>MSME/PGDTD/13</i>	100	-	-	-
PC1. Identify basic of Additive manufacturing	-	-	-	-
PC2. design potential in 3D Printing	-	-	-	-
PC3. knowledge of 3D Printing and 3D scanning	-	-	-	-
PC4. describe design complexity	-	-	-	-
PC5. apply basic CAD properties	-	-	-	-
PC6. test the functional of 3D scanning & 3D printing	-	-	-	-
PC7. Use the 3D scanning to reconstruct the design	-	-	-	-
PC8. To get the dimensions over physical modal	-	-	-	-
PC9. Basic knowledge of materials	-	-	-	-
PC10. Use the concept of photo polymerization	-	-	-	-
PC11. Apply the processes control of 3D printing	-	-	-	-
PC12. Ensure Basic knowledge of materials	-	-	-	-
PC13. Use the concept of photo polymerization	-	-	-	-
PC14. Apply the processes control of 3D printing	-	-	-	-
PC15. Apply the knowledge in medical	-	-	-	-
PC16. Identify the digital manufacturing	-	-	-	-
PC17. Describe electronic and electronic modeling	-	-	-	-



Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC18. Use selective laser sintering(SLS), Stereo lithography apparatus(SLA)	-	-	-	-
PC19. Clarify the applications of 3D printing & 3D scanning	-	-	-	-
PC20. Evaluate the scope of 3D scanning & 3D printing	-	-	-	-
PC21. Work with different Technology problem and proposed solutions	-	-	-	-
NOS Total	100	-	-	-



Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3030
NOS Name	Additive manufacturing
Sector	Capital Goods
Sub-Sector	
Occupation	Designing
NSQF Level	6.5
Credits	1
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2030
NSQC Clearance Date	08/05/2025



Qualification Pack

MSME/CSC/N3028: Innovative Design Techniques and Research Methodology

Description

To explain the concept of Innovation and its Various Strategies To explain the Innovation problem solving and its various processes and techniques To discuss the methods of Idea generation processes and techniques Select research methodology Define research problem Perform literature survey and review Design research problem Collect and analyses data Write report

Scope

The scope covers the following :

- To explain the concept of Innovation and its Various Strategies
- To explain the Innovation problem solving and its various processes and techniques
- To discuss the methods of Idea generation processes and techniques
- Select research methodology
- Define research problem
- Perform literature survey and review

Elements and Performance Criteria

MSME/PGDTD/14

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

- PC1.** Encompasses various modules and functionalities Innovation
- PC2.** Explain Needs, Challenges and Strategies of Innovations.
- PC3.** Describe different types of Innovative Problem solving and Matrixes
- PC4.** Explain different Innovative Idea generation processes and Techniques
- PC5.** Describe Objectives and Motivation of Research,
- PC6.** Explain different Types of Research and Research Approaches,
- PC7.** Describe different methods of Literature survey
- PC8.** . Describe Principal of DOE
- PC9.** Types of Research design
- PC10.** Explain different methods of Data collection, Data Analysis
- PC11.** Report Writing



Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>MSME/PGDTD/14</i>	100	-	-	-
PC1. Encompasses various modules and functionalities Innovation	-	-	-	-
PC2. Explain Needs, Challenges and Strategies of Innovations.	-	-	-	-
PC3. Describe different types of Innovative Problem solving and Matrixes	-	-	-	-
PC4. Explain different Innovative Idea generation processes and Techniques	-	-	-	-
PC5. Describe Objectives and Motivation of Research,	-	-	-	-
PC6. Explain different Types of Research and Research Approaches,	-	-	-	-
PC7. Describe different methods of Literature survey	-	-	-	-
PC8. . Describe Principal of DOE	-	-	-	-
PC9. Types of Research design	-	-	-	-
PC10. Explain different methods of Data collection, Data Analysis	-	-	-	-
PC11. Report Writing	-	-	-	-
NOS Total	100	-	-	-



Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3028
NOS Name	Innovative Design Techniques and Research Methodology
Sector	Capital Goods
Sub-Sector	
Occupation	Designing
NSQF Level	6.5
Credits	2
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2030
NSQF Clearance Date	08/05/2025



Qualification Pack

MSME/CSC/N3027: FEA using CAE Software

Description

Understand and Explain the concept of FEA and its Application in Analytical Simulation 2. Able to Analyze and understand customers need 3. Able to Discuss and finalize product and product analysis needs 4. Execute Preprocessing for Analytical Simulation 5. Test against standards and parameters 6. Perform Analysis using CAE software - ANSYS 7. interpret of output 8. apply CAE in Tool Design

Scope

The scope covers the following :

- Understand and Explain the concept of FEA and its Application in Analytical Simulation
- 2. Able to Analyze and understand customers need
- 3. Able to Discuss and finalize product and product analysis needs
- 4. Execute Preprocessing for Analytical Simulation
- 5. Test against standards and parameters
- 6. Perform Analysis using CAE software - ANSYS
- 7. interpret of output
- 8. apply CAE in Tool Design

Elements and Performance Criteria

MSME/PGDTD/12

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

- PC1.** • Solve the problem on Cantilever Beam
• PC.2 Solve the problem on Simple Supported b
- PC2.** Solve the problem on Simple Supported beam
- PC3.** Solve the problem on 3D Models
- PC4.** Maximum Load Condition
- PC5.** Stress Calculation
- PC6.** Maximum and Minimum Deflection
- PC7.** • spring back, cutting clearance, burr, sheet metal thinning, and loss of
• flatness after sheet metal forming
- PC8.** • Solve problem of heat checks, weld line, air entrapments, blow holes,
• draft, and problems during ejection etc.
- PC9.** • solve above problems by undertaking self-study and providing creative
• solution
- PC10.** • Experimentation on the problem and can generate feasible solution
• wherever applicable



Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>MSME/PGDTD/12</i>	-	100	-	-
PC1. <ul style="list-style-type: none">Solve the problem on Cantilever BeamPC.2 Solve the problem on Simple Supported b	-	-	-	-
PC2. Solve the problem on Simple Supported beam	-	-	-	-
PC3. Solve the problem on 3D Models	-	-	-	-
PC4. Maximum Load Condition	-	-	-	-
PC5. Stress Calculation	-	-	-	-
PC6. Maximum and Minimum Deflection	-	-	-	-
PC7. <ul style="list-style-type: none">spring back, cutting clearance, burr, sheet metal thinning, and loss offlatness after sheet metal forming	-	-	-	-
PC8. <ul style="list-style-type: none">Solve problem of heat checks, weld line, air entrapments, blow holes,draft, and problems during ejection etc.	-	-	-	-
PC9. <ul style="list-style-type: none">solve above problems by undertaking self-study and providing creativesolution	-	-	-	-
PC10. <ul style="list-style-type: none">Experimentation on the problem and can generate feasible solutionwherever applicable	-	-	-	-
NOS Total	-	100	-	-



Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3027
NOS Name	FEA using CAE Software
Sector	Capital Goods
Sub-Sector	
Occupation	Designing
NSQF Level	6.5
Credits	2
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2030
NSQC Clearance Date	08/05/2025



Qualification Pack

MSME/CSC/N3026: Design of Tools with Advance CAD Software Module II (Creoparametric)

Description

Understand and explain the concept of tooling Recognise the need for tool designing with the help of advanced 3D CAD software Creoparametric Understand advanced 3D CAD software Creoparametric as compared to other advanced CAD software Create 2D geometric sketches by using UG and CATIA software Develop 3D solid and surface modeling by using advanced commands Understand assembly constraints and develop different types of assembly designs Apply knowledge to create complicated modeling and provide creative or innovative design solutions Create tool parts models assembly and drafting with the help of advanced 3D CAD software Creoparametric Able to analyze and understand customer needs Able to discuss and finalize product needs Prepare conceptual design and finalize Test against standards and parameters Develop 2D and 3D models using advanced 3D CAD software Interpret output Apply CAD in tool design

Scope

The scope covers the following :

- Understand and explain the concept of tooling
- Recognise the need for tool designing with the help of advanced 3D CAD software Creoparametric
- Understand advanced 3D CAD software Creoparametric as compared to other advanced CAD software
- Create 2D geometric sketches by using UG and CATIA software
- Develop 3D solid and surface modeling by using advanced commands
- Understand assembly constraints and develop different types of assembly designs
- Apply knowledge to create complicated modeling and provide creative or innovative design solutions
- Create tool parts models assembly and drafting with the help of advanced 3D CAD software Creoparametric
- Able to analyze and understand customer needs
- Able to discuss and finalize product needs
- Prepare conceptual design and finalize
- Test against standards and parameters
- Develop 2D and 3D models using advanced 3D CAD software
- Interpret output
- Apply CAD in tool design

Elements and Performance Criteria

MSME/PGDTD/11

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

- PC1.**
- Develop intricate and precise die designs for die casting using PRO-E,
 - ensuring compliance with dimensional and functional specifications.
- PC2.**
- Create accurate 3D models of die components such as core, cavity, and
 - inserts using PRO-E's parametric modeling features



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- PC3.** • Implement solid and surface modeling techniques for designing complex geometries within the die
- PC4.** • Validate the 3D model through cross-section analysis, ensuring that all design features are precise and manufacturable.
- PC5.** • Conduct simulations using PRO-E to predict the behavior of molten metal flow, cooling, and solidification within the die.
- PC6.** • Utilize parametric design capabilities in PRO-E to create flexible die models that can easily be modified for different product variations.
- PC7.** • Use feature-based modeling to manage design changes efficiently and automate repetitive design task
- PC8.** • Implement design constraints and rules to ensure consistency across multiple die design iterations.
- PC9.** • Create die assemblies in PRO-E, ensuring that all components (e.g., ejector pins, runners, slides) fit and function together without interference.
- PC10.** • Use interference checking tools to detect any overlaps or clashes between die components and adjust the design accordingly.
- PC11.** • Simulate the movement of die components (such as core and cavity motion) to ensure smooth operation during the casting process.
- PC12.** • Design and optimize gating systems (sprues, runners, gates) for efficient metal flow into the die cavity using PRO-E
- PC13.** • Conduct stress analysis using PRO-E to identify areas of high stress and potential failure within the die during the casting process.
- PC14.** • Analyze the behavior of different materials (such as steel alloys) under die casting conditions to ensure durability and optimal performance
- PC15.** • Incorporate material properties such as hardness, thermal conductivity, and expansion rates into the die design
- PC16.** • Implement changes based on optimization results to enhance production efficiency and minimize defects.
- PC17.** • Utilize PRO-E's automation features (such as macros or scripting) to speed up the design process and reduce manual work.
- PC18.** • Generate detailed 2D drawings from 3D models in PRO-E, including dimensions, tolerances, and annotations necessary for die manufacturing.
- PC19.** • Ensure that all drawing views (exploded views, sectional views) provide clear and comprehensive information to toolmakers.
- PC20.** • Maintain proper documentation, including BOM (Bill of Materials), material specifications, and assembly instructions.
- PC21.** • Communicate effectively with stakeholders to ensure that die design aligns with production goals, quality standards, and customer requirements.



Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>MSME/PGDTD/11</i>	-	98	-	-
PC1. <ul style="list-style-type: none">Develop intricate and precise die designs for die casting using PRO-E,ensuring compliance with dimensional and functional specifications.	-	-	-	-
PC2. <ul style="list-style-type: none">Create accurate 3D models of die components such as core, cavity, andinserts using PRO-E's parametric modeling features	-	-	-	-
PC3. <ul style="list-style-type: none">Implement solid and surface modeling techniques for designing complexgeometries within the die	-	-	-	-
PC4. <ul style="list-style-type: none">Validate the 3D model through cross-section analysis, ensuring that alldesign features are precise and manufacturable.	-	-	-	-
PC5. <ul style="list-style-type: none">Conduct simulations using PRO-E to predict the behavior of moltenmetal flow, cooling, and solidification within the die.	-	-	-	-
PC6. <ul style="list-style-type: none">Utilize parametric design capabilities in PRO-E to create flexible diemodels that can easily be modified for different product variations.	-	-	-	-
PC7. <ul style="list-style-type: none">Use feature-based modeling to manage design changes efficiently andautomate repetitive design task	-	-	-	-
PC8. <ul style="list-style-type: none">Implement design constraints and rules to ensure consistency acrossmultiple die design iterations.	-	-	-	-



Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC9. <ul style="list-style-type: none">• Create die assemblies in PRO-E, ensuring that all components (e.g., ejector pins, runners, slides) fit and function together without interference.	-	-	-	-
PC10. <ul style="list-style-type: none">• Use interference checking tools to detect any overlaps or clashes between die components and adjust the design accordingly.	-	-	-	-
PC11. <ul style="list-style-type: none">• Simulate the movement of die components (such as core and cavity motion) to ensure smooth operation during the casting process.	-	-	-	-
PC12. <ul style="list-style-type: none">• Design and optimize gating systems (sprues, runners, gates) for efficient metal flow into the die cavity using PRO-E	-	-	-	-
PC13. <ul style="list-style-type: none">• Conduct stress analysis using PRO-E to identify areas of high stress and potential failure within the die during the casting process.	-	-	-	-
PC14. <ul style="list-style-type: none">• Analyze the behavior of different materials (such as steel alloys) under die casting conditions to ensure durability and optimal performance	-	-	-	-
PC15. <ul style="list-style-type: none">• Incorporate material properties such as hardness, thermal conductivity, and expansion rates into the die design	-	-	-	-
PC16. <ul style="list-style-type: none">• Implement changes based on optimization results to enhance production efficiency and minimize defects.	-	-	-	-



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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC17. <ul style="list-style-type: none">Utilize PRO-E's automation features (such as macros or scripting) tospeed up the design process and reduce manual work.	-	-	-	-
PC18. <ul style="list-style-type: none">Generate detailed 2D drawings from 3D models in PRO-E, includingdimensions, tolerances, and annotations necessary for diemanufacturing.	-	-	-	-
PC19. <ul style="list-style-type: none">Ensure that all drawing views (exploded views, sectional views) provideclear and comprehensive information to toolmakers.	-	-	-	-
PC20. <ul style="list-style-type: none">Maintain proper documentation, including BOM (Bill of Materials),material specifications, and assembly instructions.	-	-	-	-
PC21. <ul style="list-style-type: none">Communicate effectively with stakeholders to ensure that die designaligns with production goals, quality standards, and customerrequirements.	-	-	-	-
NOS Total	-	100	-	-



Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3026
NOS Name	Design of Tools with Advance CAD Software Module II (Creoparametric)
Sector	Capital Goods
Sub-Sector	
Occupation	Designing
NSQF Level	6.5
Credits	2
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2030
NSQF Clearance Date	08/05/2025



Qualification Pack

MSME/CSC/N3025: Manufacturing Process Planning and Heat Treatment

Description

Describe explain and classify engineering materials and explain the physical properties of materials Define the relation of grain size and its relation to mechanical properties review and briefly discuss stress and strain Evaluate tensile strength percentage of elongation and analyze fatigue and creep testing and testing for residual stresses Explain the selection and specification of carbon and alloy steels and describe types of modern cutting tool materials Understand and describe powder metallurgy and its applications Understand and explain the concept of hardenability and define and explain austempering martempering and isothermal annealing Determine and analyze tool failures due to improper quenching and loading Define and identify various manufacturing processes and discuss process capabilities Understand and explain sheet metal working its applications and limitations Summarize and define man machine considerations and explain man machine information exchange

Scope

The scope covers the following :

- Describe, explain and Classify Engineering material and explain physical properties of materials.
- 2. Define relation of grain size and relation to mechanical properties Review and brief discussion on stress
- strain
- 3. Evaluate tensile strength percentage of elongation etc& Annalise Fatigue and Creep testing, testing for
- Residual stresses
- 4. Explain Selection and specification of carbon and alloy steels and also Describe types of modern Cutting
- Tool materials
- 5. Understand and describe Powder Metallurgy and its applications

Elements and Performance Criteria

MSME/PGDTD/10

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

- PC1.** Define and identify various manufacturing processes
- PC2.** Discuss process capabilities
- PC3.**
 - Identify and explain manufacturing process in sheet metalworking,
 - Moulding and die casting die
- PC4.** Summaries and define man machine consideration
- PC5.** Explain man machine information exchange
- PC6.**
 - Implement and describe JIT, KANBAN. Describe quality function
 - development
- PC7.**
 - Explain and streamline creation of manufacturing database and
 - application of computer in production management
- PC8.** Explain and streamline creation of manufacturing database



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- PC9.** Describe Computer aided manufacturing process.
- PC10.** • List of tool elements are used in press tool, Mould, Jigs and fixture
• and Die Casting Die
- PC11.** • Describe functions of each element are used in press tool, Mould,
• Jigs and fixture and Die Casting Die
- PC12.** Identify application of each part and importance in there
- PC13.** • Details each parts are used in press tool, Mould, Jigs and fixture and
• Die Casting Die
- PC14.** • Identify manufacturing operation are used to by making tool
• elements
- PC15.** Identify accuracy criteria for tooling elements
- PC16.** Identify various materials of tool elements
- PC17.** • explain concept of hardenability
• Detail knowledge of Properties of tool elements material



Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>MSME/PGDTD/10</i>	100	-	-	-
PC1. Define and identify various manufacturing processes	-	-	-	-
PC2. Discuss process capabilities	-	-	-	-
PC3. <ul style="list-style-type: none">Identify and explain manufacturing process in sheet metalworking,Moulding and die casting die	-	-	-	-
PC4. Summaries and define man machine consideration	-	-	-	-
PC5. Explain man machine information exchange	-	-	-	-
PC6. <ul style="list-style-type: none">Implement and describe JIT, KANBAN. Describe quality functiondevelopment	-	-	-	-
PC7. <ul style="list-style-type: none">Explain and streamline creation of manufacturing database andapplication of computer in production management	-	-	-	-
PC8. Explain and streamline creation of manufacturing database	-	-	-	-
PC9. Describe Computer aided manufacturing process.	-	-	-	-
PC10. <ul style="list-style-type: none">List of tool elements are used in press tool, Mould, Jigs and fixtureand Die Casting Die	-	-	-	-
PC11. <ul style="list-style-type: none">Describe functions of each element are used in press tool, Mould,Jigs and fixture and Die Casting Die	-	-	-	-
PC12. Identify application of each part and importance in there	-	-	-	-



Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. <ul style="list-style-type: none">• Details each parts are used in press tool, Mould, Jigs and fixture and• Die Casting Die	-	-	-	-
PC14. <ul style="list-style-type: none">• Identify manufacturing operation are used to by making tool• elements	-	-	-	-
PC15. Identify accuracy criteria for tooling elements	-	-	-	-
PC16. Identify various materials of tool elements	-	-	-	-
PC17. <ul style="list-style-type: none">• explain concept of hardenability• Detail knowledge of Properties of tool elements material	-	-	-	-
NOS Total	100	-	-	-



Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3025
NOS Name	Manufacturing Process Planning and Heat Treatment
Sector	Capital Goods
Sub-Sector	
Occupation	Designing
NSQF Level	6.5
Credits	1
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2030
NSQF Clearance Date	08/05/2025



Qualification Pack

MSME/CSC/N3024: Mechanical Measurement and Total Quality Management p

Description

Describe and explain various metrology inspection and quality control Explain and demonstrate measuring techniques through mechanical measuring instruments such as vernier caliper vernier height gauge vernier depth gauge micrometers and slip gauges Understand the definition and concept of total quality management Solve problems effectively using a step by step process and address different concerns in an organization Experience team dynamics in solving problems Understand good leadership Understand the need for ISO 9000 and 45000 quality system elements and documentation Understand the concept of quality auditing QS 9000 and ISO 45000

Scope

The scope covers the following :

- Describe and explain various metrology inspection and quality control
- Explain and demonstrate measuring techniques through mechanical measuring instruments such as vernier caliper vernier height gauge vernier depth gauge micrometers and slip gauges
- Understand the definition and concept of total quality management
- Solve problems effectively using a step by step process and address different concerns in an organization
- Experience team dynamics in solving problems
- Understand good leadership
- Understand the need for ISO 9000 and 45000 quality system elements and documentation
- Understand the concept of quality auditing QS 9000 and ISO 45000

Elements and Performance Criteria

MSME/PGDTD/09

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

- PC1.** • Describe significance of measurement and types of measurements.
- PC2.** Explain how to do standardization of the measuring instruments
- PC3.** List the Principles of measurements
- PC4.** Types of inspection
- PC5.** • Inspection the measurement by using various Instrument like Vernier caliper, Micrometer, Gauges etc.
- PC6.** List various features to Inspections.
- PC7.** List various features to Inspections
- PC8.** Describe Inspection Straightness & Flatness of various surface
- PC9.** Explain Types of QC and SQC
- PC10.** Explain TQM
- PC11.** Describe various types of Quality Control Chart



Qualification Pack

PC12. Describe Quality Circle and elements of Quality Circle

PC13. List and Explain 3 types of Quality Philosophy



Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>MSME/PGDTD/09</i>	-	100	-	-
PC1. • Describe significance of measurement and types • of measurements.	-	-	-	-
PC2. Explain how to do standardization of the measuring instruments	-	-	-	-
PC3. List the Principles of measurements	-	-	-	-
PC4. Types of inspection	-	-	-	-
PC5. • Inspection the measurement by using various Instrument like Vernier • caliper, Micrometer, Gauges etc.	-	-	-	-
PC6. List various features to Inspections.	-	-	-	-
PC7. List various features to Inspections	-	-	-	-
PC8. Describe Inspection Straightness & Flatness of various surface	-	-	-	-
PC9. Explain Types of QC and SQC	-	-	-	-
PC10. Explain TQM	-	-	-	-
PC11. Describe various types of Quality Control Chart	-	-	-	-
PC12. Describe Quality Circle and elements of Quality Circle	-	-	-	-
PC13. List and Explain 3 types of Quality Philosophy	-	-	-	-
NOS Total	-	100	-	-



Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3024
NOS Name	Mechanical Measurement and Total Quality Management p
Sector	Capital Goods
Sub-Sector	
Occupation	Designing
NSQF Level	6.5
Credits	2
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2030
NSQF Clearance Date	08/05/2025



Qualification Pack

MSME/CSC/N3023: Mechanical Measurements and Total Quality Management

Description

Describe and explain various metrology inspection and quality control Explain and demonstrate measuring techniques through mechanical measuring instruments such as vernier caliper vernier height gauge vernier depth gauge micrometers and slip gauges Understand the definition and concept of total quality management Solve problems effectively using a step by step process and address different concerns in an organization Experience team dynamics in solving problems Understand good leadership Understand the need for ISO 9000 and 45000 quality system elements and documentation Understand the concept of quality auditing QS 9000 and ISO 45000

Scope

The scope covers the following :

- Describe and explain various metrology inspection and quality control
- Explain and demonstrate measuring techniques through mechanical measuring instruments such as vernier caliper vernier height gauge vernier depth gauge micrometers and slip gauges
- Understand the definition and concept of total quality management
- Solve problems effectively using a step by step process and address different concerns in an organization
- Experience team dynamics in solving problems
- Understand good leadership
- Understand the need for ISO 9000 and 45000 quality system elements and documentation
- Understand the concept of quality auditing QS 9000 and ISO 45000

Elements and Performance Criteria

MSME/PGDTD/09

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

- PC1.** • Describe significance of measurement and types
• of measurements.
- PC2.** Explain how to do standardization of the measuring instruments
- PC3.** List the Principles of measurements
- PC4.** Types of inspection
- PC5.** • Inspection the measurement by using various Instrument like Vernier
• caliper, Micrometer, Gauges etc.
- PC6.** List various features to Inspections.
- PC7.** List various features to Inspections
- PC8.** Describe Inspection Straightness & Flatness of various surface
- PC9.** Explain Types of QC and SQC
- PC10.** Explain TQM
- PC11.** Describe various types of Quality Control Chart



Qualification Pack

PC12. Describe Quality Circle and elements of Quality Circle

PC13. List and Explain 3 types of Quality Philosophy



Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>MSME/PGDTD/09</i>	100	-	-	-
PC1. • Describe significance of measurement and types • of measurements.	-	-	-	-
PC2. Explain how to do standardization of the measuring instruments	-	-	-	-
PC3. List the Principles of measurements	-	-	-	-
PC4. Types of inspection	-	-	-	-
PC5. • Inspection the measurement by using various Instrument like Vernier • caliper, Micrometer, Gauges etc.	-	-	-	-
PC6. List various features to Inspections.	-	-	-	-
PC7. List various features to Inspections	-	-	-	-
PC8. Describe Inspection Straightness & Flatness of various surface	-	-	-	-
PC9. Explain Types of QC and SQC	-	-	-	-
PC10. Explain TQM	-	-	-	-
PC11. Describe various types of Quality Control Chart	-	-	-	-
PC12. Describe Quality Circle and elements of Quality Circle	-	-	-	-
PC13. List and Explain 3 types of Quality Philosophy	-	-	-	-
NOS Total	100	-	-	-



Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3023
NOS Name	Mechanical Measurements and Total Quality Management
Sector	Capital Goods
Sub-Sector	
Occupation	Designing
NSQF Level	6.5
Credits	2
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2030
NSQF Clearance Date	08/05/2025



Qualification Pack

MSME/CSC/N3022: Design of Metal Die Casting P

Description

Grasp fundamental concepts of metal Casting and machineries 2. Able to Understand and Analyse customers need, 3. Able discuss and finalize product needs 4. Conceptualize and Design Die Casting Die Assembly for given component Page 28 of 53 5. Conceive the tool design parameters 6. Design against standard and parameters 7. Test against specifications and standards 8. Interpret of output and confirming to specifications 9. Communicate with manufacturing line 10. Take remedial action if required

Scope

The scope covers the following :

- Grasp fundamental concepts of metal Casting and machineries
- 2. Able to Understand and Analyse customers need,
- 3. Able discuss and finalize product needs
- 4. Conceptualize and Design Die Casting Die Assembly for given component
- Page 28 of 53
- 5. Conceive the tool design parameters
- 6. Design against standard and parameters
- 7. Test against specifications and standards
- 8. Interpret of output and confirming to specifications
- 9. Communicate with manufacturing line
- 10. Take remedial action if required

Elements and Performance Criteria

MSME/PGDTD/08

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

- PC1.** • Design complex die casting components using advanced CAD software, considering the intricacies of die design.
- PC2.** • Develop designs that meet dimensional, functional, and quality standards required in die casting
- PC3.** • Incorporate critical factors such as material shrinkage, draft angles, and wall thickness in the design
- PC4.** • Use advanced simulation tools to analyze the casting process for potential defects like air entrapment, porosity, and warping
- PC5.** • Validate the die design by simulating material flow, thermal behavior, and cooling cycle to optimize part quality.
- PC6.** • Implement feedback from simulation results to refine and optimize the die design.
- PC7.** • Select appropriate alloys and materials for die casting based on mechanical properties, heat resistance, and casting performance.
- PC8.** • Conduct thermal and stress analysis to predict the behavior of selected materials during casting.



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- PC9.** • Optimize material use to balance part strength, manufacturability, and cost-effectiveness
- PC10.** • Optimize die design for efficient production, considering factors such as cycle time, cooling rates, and part ejection.
- PC11.** • Minimize defects and improve casting quality through design changes that optimize gating, runner, and venting systems.
- PC12.** • Incorporate modular designs or interchangeable components to enhance production flexibility and reduce downtime.
- PC13.** • Design and implement efficient cooling systems within the die to regulate temperatures and reduce casting defects
- PC14.** • Analyze cooling rates using simulation tools to optimize the thermal performance of the die
- PC15.** • Ensure uniform cooling of cast parts to avoid warping, residual stress, or shrinkage.
- PC16.** • Design dies with wear-resistant materials and coatings to extend the life of the tool.
- PC17.** • Analyze the die for stress concentration points and potential areas of failure due to high-temperature exposure.
- PC18.** • Incorporate features in the die that allow easy maintenance and replacement of high-wear components.
- PC19.** • Analyze and optimize the entire die casting process to improve productivity and reduce cycle times.
- PC20.** • Use statistical process control (SPC) and data analysis to monitor and control critical process parameters (e.g., temperature, pressure, and injection speed).
- PC21.** • Integrate advanced manufacturing techniques like CNC machining, additive manufacturing (for prototypes), and EDM (electrical discharge machining) in the die development process.
- PC22.** • Evaluate the manufacturability of the die design to ensure it can be efficiently produced with available resources.
- PC23.** • Collaborate with toolmakers and manufacturers to incorporate the best practices for die production and assembly.
- PC24.** • Implement design changes and process adjustments to prevent common casting defects such as porosity, cracks, and misruns.
- PC25.** • Use quality control tools and techniques such as FMEA (Failure Mode and Effect Analysis) to predict and mitigate potential issues in the die casting process.
- PC26.** • Perform root cause analysis of defects and introduce corrective actions to improve casting quality.
- PC27.** • Optimize the die casting process to reduce energy consumption, including furnace management and efficient use of molten metal.
- PC28.** • Prepare detailed reports outlining the results of process optimization efforts and key performance metrics.
- PC29.** • Collaborate effectively with cross-functional teams, including designers, toolmakers, and production engineers, to ensure alignment in die casting design and optimization efforts



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- PC30.** • Communicate design concepts, simulation results, and optimization strategies clearly to stakeholders through presentations and design reviews
- PC31.** • Perform cost analysis of die casting projects, including tooling, material, and process costs.
- PC32.** • Present feasibility reports based on analysis of production efficiency, expected life of the die, and return on investment
- PC33.** • Ensure that all die casting designs comply with relevant safety regulations and industry standards.
- PC34.** • Maintain compliance with quality management systems (such as ISO standards) throughout the die design, development, and casting processes.



Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>MSME/PGDTD/08</i>	-	100	-	-
PC1. <ul style="list-style-type: none">Design complex die casting components using advanced CAD software,considering the intricacies of die design.	-	-	-	-
PC2. <ul style="list-style-type: none">Develop designs that meet dimensional, functional, and qualitystandards required in die casting	-	-	-	-
PC3. <ul style="list-style-type: none">Incorporate critical factors such as material shrinkage, draft angles, andwall thickness in the design	-	-	-	-
PC4. <ul style="list-style-type: none">Use advanced simulation tools to analyze the casting process forpotential defects like air entrapment, porosity, and warping	-	-	-	-
PC5. <ul style="list-style-type: none">Validate the die design by simulating material flow, thermal behavior,and cooling cycle to optimize part quality.	-	-	-	-
PC6. <ul style="list-style-type: none">Implement feedback from simulation results to refine and optimize thedie design.	-	-	-	-
PC7. <ul style="list-style-type: none">Select appropriate alloys and materials for die casting based onmechanical properties, heat resistance, and casting performance.	-	-	-	-
PC8. <ul style="list-style-type: none">Conduct thermal and stress analysis to predict the behavior of selectedmaterials during casting.	-	-	-	-
PC9. <ul style="list-style-type: none">Optimize material use to balance part strength, manufacturability, andcost-effectiveness	-	-	-	-



Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. <ul style="list-style-type: none">Optimize die design for efficient production, considering factors suchas cycle time, cooling rates, and part ejection.	-	-	-	-
PC11. <ul style="list-style-type: none">Minimize defects and improve casting quality through design changesthat optimize gating, runner, and venting systems.	-	-	-	-
PC12. <ul style="list-style-type: none">Incorporate modular designs or interchangeable components toenhance production flexibility and reduce downtime.	-	-	-	-
PC13. <ul style="list-style-type: none">Design and implement efficient cooling systems within the die toregulate temperatures and reduce casting defects	-	-	-	-
PC14. <ul style="list-style-type: none">Analyze cooling rates using simulation tools to optimize the thermalperformance of the die	-	-	-	-
PC15. <ul style="list-style-type: none">Ensure uniform cooling of cast parts to avoid warping, residual stress,or shrinkage.	-	-	-	-
PC16. <ul style="list-style-type: none">Design dies with wear-resistant materials and coatings to extend thelife of the tool.	-	-	-	-
PC17. <ul style="list-style-type: none">Analyze the die for stress concentration points and potential areas offailure due to high-temperature exposure.	-	-	-	-
PC18. <ul style="list-style-type: none">Incorporate features in the die that allow easy maintenance andreplacement of high-wear components.	-	-	-	-



Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC19. <ul style="list-style-type: none">Analyze and optimize the entire die casting process to improve productivity and reduce cycle times.	-	-	-	-
PC20. <ul style="list-style-type: none">Use statistical process control (SPC) and data analysis to monitor and control critical process parameters (e.g., temperature, pressure, and injection speed).	-	-	-	-
PC21. <ul style="list-style-type: none">Integrate advanced manufacturing techniques like CNC machining, additive manufacturing (for prototypes), and EDM (electrical discharge machining) in the die development process.	-	-	-	-
PC22. <ul style="list-style-type: none">Evaluate the manufacturability of the die design to ensure it can be efficiently produced with available resources.	-	-	-	-
PC23. <ul style="list-style-type: none">Collaborate with toolmakers and manufacturers to incorporate the best practices for die production and assembly.	-	-	-	-
PC24. <ul style="list-style-type: none">Implement design changes and process adjustments to prevent common casting defects such as porosity, cracks, and misruns.	-	-	-	-
PC25. <ul style="list-style-type: none">Use quality control tools and techniques such as FMEA (Failure Mode and Effect Analysis) to predict and mitigate potential issues in the die casting process.	-	-	-	-
PC26. <ul style="list-style-type: none">Perform root cause analysis of defects and introduce corrective actions to improve casting quality.	-	-	-	-



Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC27. <ul style="list-style-type: none">Optimize the die casting process to reduce energy consumption,including furnace management and efficient use of molten metal.	-	-	-	-
PC28. <ul style="list-style-type: none">Prepare detailed reports outlining the results of process optimizationefforts and key performance metrics.	-	-	-	-
PC29. <ul style="list-style-type: none">Collaborate effectively with cross-functional teams, includingdesigners, toolmakers, and production engineers, to ensure alignmentin die casting design and optimization efforts	-	-	-	-
PC30. <ul style="list-style-type: none">Communicate design concepts, simulation results, and optimizationstrategies clearly to stakeholders through presentations and designreviews	-	-	-	-
PC31. <ul style="list-style-type: none">Perform cost analysis of die casting projects, including tooling,material, and process costs.	-	-	-	-
PC32. <ul style="list-style-type: none">Present feasibility reports based on analysis of production efficiency,expected life of the die, and return on investment	-	-	-	-
PC33. <ul style="list-style-type: none">Ensure that all die casting designs comply with relevant safetyregulations and industry standards.	-	-	-	-
PC34. <ul style="list-style-type: none">Maintain compliance with quality management systems (such as ISOstandards) throughout the die design, development, and castingprocesses.	-	-	-	-
NOS Total	-	100	-	-



Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3022
NOS Name	Design of Metal Die Casting P
Sector	Capital Goods
Sub-Sector	
Occupation	Designing
NSQF Level	6.5
Credits	2
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2030
NSQF Clearance Date	08/05/2025



Qualification Pack

MSME/CSC/N3021: Design of Metal Die Casting

Description

Grasp fundamental concepts of metal Casting and machineries 2. Able to Understand and Analyse customers need, 3. Able discuss and finalize product needs 4. Conceptualize and Design Die Casting Die Assembly for given component Page 28 of 53 5. Conceive the tool design parameters 6. Design against standard and parameters 7. Test against specifications and standards 8. Interpret of output and confirming to specifications 9. Communicate with manufacturing line 10. Take remedial action if required

Scope

The scope covers the following :

- Grasp fundamental concepts of metal Casting and machineries
- 2. Able to Understand and Analyse customers need,
- 3. Able discuss and finalize product needs
- 4. Conceptualize and Design Die Casting Die Assembly for given component
- Page 28 of 53
- 5. Conceive the tool design parameters
- 6. Design against standard and parameters
- 7. Test against specifications and standards
- 8. Interpret of output and confirming to specifications
- 9. Communicate with manufacturing line
- 10. Take remedial action if required

Elements and Performance Criteria

MSME/PGDTD/08

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

- PC1.** • Design complex die casting components using advanced CAD software, considering the intricacies of die design.
- PC2.** • Develop designs that meet dimensional, functional, and quality standards required in die casting
- PC3.** • Incorporate critical factors such as material shrinkage, draft angles, and wall thickness in the design
- PC4.** • Use advanced simulation tools to analyze the casting process for potential defects like air entrapment, porosity, and warping
- PC5.** • Validate the die design by simulating material flow, thermal behavior, and cooling cycle to optimize part quality.
- PC6.** • Implement feedback from simulation results to refine and optimize the die design.
- PC7.** • Select appropriate alloys and materials for die casting based on mechanical properties, heat resistance, and casting performance.
- PC8.** • Conduct thermal and stress analysis to predict the behavior of selected materials during casting.



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- PC9.** • Optimize material use to balance part strength, manufacturability, and cost-effectiveness
- PC10.** • Optimize die design for efficient production, considering factors such as cycle time, cooling rates, and part ejection.
- PC11.** • Minimize defects and improve casting quality through design changes that optimize gating, runner, and venting systems.
- PC12.** • Incorporate modular designs or interchangeable components to enhance production flexibility and reduce downtime.
- PC13.** • Design and implement efficient cooling systems within the die to regulate temperatures and reduce casting defects
- PC14.** • Analyze cooling rates using simulation tools to optimize the thermal performance of the die
- PC15.** • Ensure uniform cooling of cast parts to avoid warping, residual stress, or shrinkage.
- PC16.** • Design dies with wear-resistant materials and coatings to extend the life of the tool.
- PC17.** • Analyze the die for stress concentration points and potential areas of failure due to high-temperature exposure.
- PC18.** • Incorporate features in the die that allow easy maintenance and replacement of high-wear components.
- PC19.** • Analyze and optimize the entire die casting process to improve productivity and reduce cycle times.
- PC20.** • Use statistical process control (SPC) and data analysis to monitor and control critical process parameters (e.g., temperature, pressure, and injection speed).
- PC21.** • Integrate advanced manufacturing techniques like CNC machining, additive manufacturing (for prototypes), and EDM (electrical discharge machining) in the die development process.
- PC22.** • Evaluate the manufacturability of the die design to ensure it can be efficiently produced with available resources.
- PC23.** • Collaborate with toolmakers and manufacturers to incorporate the best practices for die production and assembly.
- PC24.** • Implement design changes and process adjustments to prevent common casting defects such as porosity, cracks, and misruns.
- PC25.** • Use quality control tools and techniques such as FMEA (Failure Mode and Effect Analysis) to predict and mitigate potential issues in the die casting process.
- PC26.** • Perform root cause analysis of defects and introduce corrective actions to improve casting quality.
- PC27.** • Optimize the die casting process to reduce energy consumption, including furnace management and efficient use of molten metal.
- PC28.** • Prepare detailed reports outlining the results of process optimization efforts and key performance metrics.
- PC29.** • Collaborate effectively with cross-functional teams, including designers, toolmakers, and production engineers, to ensure alignment in die casting design and optimization efforts



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- PC30.** • Communicate design concepts, simulation results, and optimization strategies clearly to stakeholders through presentations and design reviews
- PC31.** • Perform cost analysis of die casting projects, including tooling, material, and process costs.
- PC32.** • Present feasibility reports based on analysis of production efficiency, expected life of the die, and return on investment
- PC33.** • Ensure that all die casting designs comply with relevant safety regulations and industry standards.
- PC34.** • Maintain compliance with quality management systems (such as ISO standards) throughout the die design, development, and casting processes.



Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>MSME/PGDTD/08</i>	100	-	-	-
PC1. <ul style="list-style-type: none">Design complex die casting components using advanced CAD software,considering the intricacies of die design.	-	-	-	-
PC2. <ul style="list-style-type: none">Develop designs that meet dimensional, functional, and qualitystandards required in die casting	-	-	-	-
PC3. <ul style="list-style-type: none">Incorporate critical factors such as material shrinkage, draft angles, andwall thickness in the design	-	-	-	-
PC4. <ul style="list-style-type: none">Use advanced simulation tools to analyze the casting process forpotential defects like air entrapment, porosity, and warping	-	-	-	-
PC5. <ul style="list-style-type: none">Validate the die design by simulating material flow, thermal behavior,and cooling cycle to optimize part quality.	-	-	-	-
PC6. <ul style="list-style-type: none">Implement feedback from simulation results to refine and optimize thedie design.	-	-	-	-
PC7. <ul style="list-style-type: none">Select appropriate alloys and materials for die casting based onmechanical properties, heat resistance, and casting performance.	-	-	-	-
PC8. <ul style="list-style-type: none">Conduct thermal and stress analysis to predict the behavior of selectedmaterials during casting.	-	-	-	-
PC9. <ul style="list-style-type: none">Optimize material use to balance part strength, manufacturability, andcost-effectiveness	-	-	-	-



Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. <ul style="list-style-type: none">Optimize die design for efficient production, considering factors suchas cycle time, cooling rates, and part ejection.	-	-	-	-
PC11. <ul style="list-style-type: none">Minimize defects and improve casting quality through design changesthat optimize gating, runner, and venting systems.	-	-	-	-
PC12. <ul style="list-style-type: none">Incorporate modular designs or interchangeable components toenhance production flexibility and reduce downtime.	-	-	-	-
PC13. <ul style="list-style-type: none">Design and implement efficient cooling systems within the die toregulate temperatures and reduce casting defects	-	-	-	-
PC14. <ul style="list-style-type: none">Analyze cooling rates using simulation tools to optimize the thermalperformance of the die	-	-	-	-
PC15. <ul style="list-style-type: none">Ensure uniform cooling of cast parts to avoid warping, residual stress,or shrinkage.	-	-	-	-
PC16. <ul style="list-style-type: none">Design dies with wear-resistant materials and coatings to extend thelife of the tool.	-	-	-	-
PC17. <ul style="list-style-type: none">Analyze the die for stress concentration points and potential areas offailure due to high-temperature exposure.	-	-	-	-
PC18. <ul style="list-style-type: none">Incorporate features in the die that allow easy maintenance andreplacement of high-wear components.	-	-	-	-



Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC19. <ul style="list-style-type: none">Analyze and optimize the entire die casting process to improve productivity and reduce cycle times.	-	-	-	-
PC20. <ul style="list-style-type: none">Use statistical process control (SPC) and data analysis to monitor and control critical process parameters (e.g., temperature, pressure, and injection speed).	-	-	-	-
PC21. <ul style="list-style-type: none">Integrate advanced manufacturing techniques like CNC machining, additive manufacturing (for prototypes), and EDM (electrical discharge machining) in the die development process.	-	-	-	-
PC22. <ul style="list-style-type: none">Evaluate the manufacturability of the die design to ensure it can be efficiently produced with available resources.	-	-	-	-
PC23. <ul style="list-style-type: none">Collaborate with toolmakers and manufacturers to incorporate the best practices for die production and assembly.	-	-	-	-
PC24. <ul style="list-style-type: none">Implement design changes and process adjustments to prevent common casting defects such as porosity, cracks, and misruns.	-	-	-	-
PC25. <ul style="list-style-type: none">Use quality control tools and techniques such as FMEA (Failure Mode and Effect Analysis) to predict and mitigate potential issues in the die casting process.	-	-	-	-
PC26. <ul style="list-style-type: none">Perform root cause analysis of defects and introduce corrective actions to improve casting quality.	-	-	-	-



Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC27. <ul style="list-style-type: none">Optimize the die casting process to reduce energy consumption,including furnace management and efficient use of molten metal.	-	-	-	-
PC28. <ul style="list-style-type: none">Prepare detailed reports outlining the results of process optimizationefforts and key performance metrics.	-	-	-	-
PC29. <ul style="list-style-type: none">Collaborate effectively with cross-functional teams, includingdesigners, toolmakers, and production engineers, to ensure alignmentin die casting design and optimization efforts	-	-	-	-
PC30. <ul style="list-style-type: none">Communicate design concepts, simulation results, and optimizationstrategies clearly to stakeholders through presentations and designreviews	-	-	-	-
PC31. <ul style="list-style-type: none">Perform cost analysis of die casting projects, including tooling,material, and process costs.	-	-	-	-
PC32. <ul style="list-style-type: none">Present feasibility reports based on analysis of production efficiency,expected life of the die, and return on investment	-	-	-	-
PC33. <ul style="list-style-type: none">Ensure that all die casting designs comply with relevant safetyregulations and industry standards.	-	-	-	-
PC34. <ul style="list-style-type: none">Maintain compliance with quality management systems (such as ISOstandards) throughout the die design, development, and castingprocesses.	-	-	-	-
NOS Total	100	-	-	-



Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3021
NOS Name	Design of Metal Die Casting
Sector	Capital Goods
Sub-Sector	
Occupation	Designing
NSQF Level	6.5
Credits	2
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2030
NSQF Clearance Date	08/05/2025



Qualification Pack

MSME/CSC/N3020: Mold Design for Plastic Parts Practical

Description

Grasp fundamental concepts of Plastics, Plastic parts and Moulding Processes and machineries. 2. Able to Understand and Analyse customers need, 3. Able discuss and finalize product needs 4. Conceptualize and Design Mould Assembly for necessary for given Plastic component 5. Conceive the tool design parameters 6. Design against standard and parameters 7. Test against specifications and standards 8. Develop prototype / simulation 9. Interpret of output and confirming to specifications 10. Communicate with manufacturing line 11. Take remedial action if required

Scope

The scope covers the following :

- Grasp fundamental concepts of Plastics, Plastic parts and Moulding Processes and machineries.
- 2. Able to Understand and Analyse customers need,
- 3. Able discuss and finalize product needs
- 4. Conceptualize and Design Mould Assembly for necessary for given Plastic component
- 5. Conceive the tool design parameters
- 6. Design against standard and parameters
- 7. Test against specifications and standards
- 8. Develop prototype / simulation
- 9. Interpret of output and confirming to specifications
- 10. Communicate with manufacturing line
- 11. Take remedial action if required

Elements and Performance Criteria

MSME/PGDTD/07

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

- PC1.** • Demonstrate the ability to design complex moulds using advanced CAD software.
- PC2.** • Apply principles of mould design to optimize the functionality and efficiency of the mould
- PC3.** • Integrate considerations for material flow, cooling, and ejection systems into the design process.
- PC4.** • Develop and implement prototype moulds, ensuring they meet design specifications and performance standards.
- PC5.** • Utilize advanced manufacturing techniques such as additive manufacturing or precision machining for mould fabrication.
- PC6.** • Conduct rigorous testing and validation of the moulds to ensure they perform as expected.
- PC7.** • Analyze and optimize moulding processes to enhance productivity and reduce waste
- PC8.** • Implement process improvements based on data analysis and performance metrics



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- PC9.** • Utilize statistical process control (SPC) and other analytical tools to
• monitor and improve process efficiency.
- PC10.** • Select appropriate materials for mould construction based on their
• properties and the requirements of the moulding process.
- PC11.** • Manage and oversee the material handling and preparation to ensure
• quality and consistency
- PC12.** • Identify and resolve complex issues related to mould design and
• manufacturing processes.
- PC13.** • Apply advanced problem-solving techniques to address challenges and
• improve overall mould performance.
- PC14.** • Effectively communicate design and process changes to team members
• and stakeholder
- PC15.** • Collaborate with cross-functional teams to ensure alignment and
• successful implementation of mould design and process optimization
• strategies
- PC16.** • Ensure that all mould design and development activities comply with
• industry standards and safety regulations.
- PC17.** • Implement safety protocols to protect personnel and equipment during
• the moulding process
- PC18.** • Stay abreast of the latest technological advancements in mould design
• and manufacturing
- PC19.** • Encourage and implement innovative approaches to improve mould
• design and process efficiency.
- PC20.** • Maintain detailed documentation of design processes, material
• specifications, and process optimizations.
- PC21.** • Prepare comprehensive reports and presentations to communicate
• findings and recommendations to stakeholders
- PC22.** • Implement design changes and process adjustments to prevent common
• casting defects such as porosity, cracks, and misruns
- PC23.** • Use quality control tools and techniques such as FMEA (Failure Mode and
• Effect Analysis) to predict and mitigate potential issues in the die casting
• process
- PC24.** • Perform root cause analysis of defects and introduce corrective actions
• to improve casting quality



Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>MSME/PGDTD/07</i>	-	100	-	-
PC1. • Demonstrate the ability to design complex moulds using advanced CAD software.	-	-	-	-
PC2. • Apply principles of mould design to optimize the functionality and efficiency of the mould	-	-	-	-
PC3. • Integrate considerations for material flow, cooling, and ejection systems into the design process.	-	-	-	-
PC4. • Develop and implement prototype moulds, ensuring they meet design specifications and performance standards.	-	-	-	-
PC5. • Utilize advanced manufacturing techniques such as additive manufacturing or precision machining for mould fabrication.	-	-	-	-
PC6. • Conduct rigorous testing and validation of the moulds to ensure they perform as expected.	-	-	-	-
PC7. • Analyze and optimize moulding processes to enhance productivity and reduce waste	-	-	-	-
PC8. • Implement process improvements based on data analysis and performance metrics	-	-	-	-
PC9. • Utilize statistical process control (SPC) and other analytical tools to monitor and improve process efficiency.	-	-	-	-



Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. <ul style="list-style-type: none">• Select appropriate materials for mould construction based on their• properties and the requirements of the moulding process.	-	-	-	-
PC11. <ul style="list-style-type: none">• Manage and oversee the material handling and preparation to ensure• quality and consistency	-	-	-	-
PC12. <ul style="list-style-type: none">• Identify and resolve complex issues related to mould design and• manufacturing processes.	-	-	-	-
PC13. <ul style="list-style-type: none">• Apply advanced problem-solving techniques to address challenges and• improve overall mould performance.	-	-	-	-
PC14. <ul style="list-style-type: none">• Effectively communicate design and process changes to team members• and stakeholder	-	-	-	-
PC15. <ul style="list-style-type: none">• Collaborate with cross-functional teams to ensure alignment and• successful implementation of mould design and process optimization• strategies	-	-	-	-
PC16. <ul style="list-style-type: none">• Ensure that all mould design and development activities comply with• industry standards and safety regulations.	-	-	-	-
PC17. <ul style="list-style-type: none">• Implement safety protocols to protect personnel and equipment during• the moulding process	-	-	-	-
PC18. <ul style="list-style-type: none">• Stay abreast of the latest technological advancements in mould design• and manufacturing	-	-	-	-



Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC19. <ul style="list-style-type: none">Encourage and implement innovative approaches to improve moulddesign and process efficiency.	-	-	-	-
PC20. <ul style="list-style-type: none">Maintain detailed documentation of design processes, materialspecifications, and process optimizations.	-	-	-	-
PC21. <ul style="list-style-type: none">Prepare comprehensive reports and presentations to communicatefindings and recommendations to stakeholders	-	-	-	-
PC22. <ul style="list-style-type: none">Implement design changes and process adjustments to prevent commoncasting defects such as porosity, cracks, and misruns	-	-	-	-
PC23. <ul style="list-style-type: none">Use quality control tools and techniques such as FMEA (Failure Mode andEffect Analysis) to predict and mitigate potential issues in the die castingprocess	-	-	-	-
PC24. <ul style="list-style-type: none">Perform root cause analysis of defects and introduce corrective actionsto improve casting quality	-	-	-	-
NOS Total	-	100	-	-



Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3020
NOS Name	Mold Design for Plastic Parts Practical
Sector	Capital Goods
Sub-Sector	
Occupation	Designing
NSQF Level	6.5
Credits	4
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2030
NSQF Clearance Date	08/05/2025



Qualification Pack

MSME/CSC/N3019: Mold Design for Plastic Part

Description

Grasp fundamental concepts of Plastics, Plastic parts and Moulding Processes and machineries. 2. Able to Understand and Analyse customers need, 3. Able discuss and finalize product needs 4. Conceptualize and Design Mould Assembly for necessary for given Plastic component 5. Conceive the tool design parameters 6. Design against standard and parameters 7. Test against specifications and standards 8. Develop prototype / simulation 9. Interpret of output and confirming to specifications 10. Communicate with manufacturing line 11. Take remedial action if required

Scope

The scope covers the following :

- Grasp fundamental concepts of Plastics, Plastic parts and Moulding Processes and machineries.
- 2. Able to Understand and Analyse customers need,
- 3. Able discuss and finalize product needs
- 4. Conceptualize and Design Mould Assembly for necessary for given Plastic component
- 5. Conceive the tool design parameters
- 6. Design against standard and parameters
- 7. Test against specifications and standards
- 8. Develop prototype / simulation
- 9. Interpret of output and confirming to specifications
- 10. Communicate with manufacturing line
- 11. Take remedial action if required

Elements and Performance Criteria

MSME/PGDTD/07

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

- PC1.** • Demonstrate the ability to design complex moulds using advanced CAD software.
- PC2.** • Apply principles of mould design to optimize the functionality and efficiency of the mould
- PC3.** • Integrate considerations for material flow, cooling, and ejection systems into the design process.
- PC4.** • Develop and implement prototype moulds, ensuring they meet design specifications and performance standards.
- PC5.** • Utilize advanced manufacturing techniques such as additive manufacturing or precision machining for mould fabrication.
- PC6.** • Conduct rigorous testing and validation of the moulds to ensure they perform as expected.
- PC7.** • Analyze and optimize moulding processes to enhance productivity and reduce waste
- PC8.** • Implement process improvements based on data analysis and performance metrics



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- PC9.** • Utilize statistical process control (SPC) and other analytical tools to
• monitor and improve process efficiency.
- PC10.** • Select appropriate materials for mould construction based on their
• properties and the requirements of the moulding process.
- PC11.** • Manage and oversee the material handling and preparation to ensure
• quality and consistency
- PC12.** • Identify and resolve complex issues related to mould design and
• manufacturing processes.
- PC13.** • Apply advanced problem-solving techniques to address challenges and
• improve overall mould performance.
- PC14.** • Effectively communicate design and process changes to team members
• and stakeholder
- PC15.** • Collaborate with cross-functional teams to ensure alignment and
• successful implementation of mould design and process optimization
• strategies
- PC16.** • Ensure that all mould design and development activities comply with
• industry standards and safety regulations.
- PC17.** • Implement safety protocols to protect personnel and equipment during
• the moulding process
- PC18.** • Stay abreast of the latest technological advancements in mould design
• and manufacturing
- PC19.** • Encourage and implement innovative approaches to improve mould
• design and process efficiency.
- PC20.** • Maintain detailed documentation of design processes, material
• specifications, and process optimizations.
- PC21.** • Prepare comprehensive reports and presentations to communicate
• findings and recommendations to stakeholders
- PC22.** • Implement design changes and process adjustments to prevent common
• casting defects such as porosity, cracks, and misruns
- PC23.** • Use quality control tools and techniques such as FMEA (Failure Mode and
• Effect Analysis) to predict and mitigate potential issues in the die casting
• process
- PC24.** • Perform root cause analysis of defects and introduce corrective actions
• to improve casting quality



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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>MSME/PGDTD/07</i>	100	-	-	-
PC1. • Demonstrate the ability to design complex moulds using advanced CAD software.	-	-	-	-
PC2. • Apply principles of mould design to optimize the functionality and efficiency of the mould	-	-	-	-
PC3. • Integrate considerations for material flow, cooling, and ejection systems into the design process.	-	-	-	-
PC4. • Develop and implement prototype moulds, ensuring they meet design specifications and performance standards.	-	-	-	-
PC5. • Utilize advanced manufacturing techniques such as additive manufacturing or precision machining for mould fabrication.	-	-	-	-
PC6. • Conduct rigorous testing and validation of the moulds to ensure they perform as expected.	-	-	-	-
PC7. • Analyze and optimize moulding processes to enhance productivity and reduce waste	-	-	-	-
PC8. • Implement process improvements based on data analysis and performance metrics	-	-	-	-
PC9. • Utilize statistical process control (SPC) and other analytical tools to monitor and improve process efficiency.	-	-	-	-



Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. <ul style="list-style-type: none">• Select appropriate materials for mould construction based on their• properties and the requirements of the moulding process.	-	-	-	-
PC11. <ul style="list-style-type: none">• Manage and oversee the material handling and preparation to ensure• quality and consistency	-	-	-	-
PC12. <ul style="list-style-type: none">• Identify and resolve complex issues related to mould design and• manufacturing processes.	-	-	-	-
PC13. <ul style="list-style-type: none">• Apply advanced problem-solving techniques to address challenges and• improve overall mould performance.	-	-	-	-
PC14. <ul style="list-style-type: none">• Effectively communicate design and process changes to team members• and stakeholder	-	-	-	-
PC15. <ul style="list-style-type: none">• Collaborate with cross-functional teams to ensure alignment and• successful implementation of mould design and process optimization• strategies	-	-	-	-
PC16. <ul style="list-style-type: none">• Ensure that all mould design and development activities comply with• industry standards and safety regulations.	-	-	-	-
PC17. <ul style="list-style-type: none">• Implement safety protocols to protect personnel and equipment during• the moulding process	-	-	-	-
PC18. <ul style="list-style-type: none">• Stay abreast of the latest technological advancements in mould design• and manufacturing	-	-	-	-



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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC19. <ul style="list-style-type: none">Encourage and implement innovative approaches to improve moulddesign and process efficiency.	-	-	-	-
PC20. <ul style="list-style-type: none">Maintain detailed documentation of design processes, materialspecifications, and process optimizations.	-	-	-	-
PC21. <ul style="list-style-type: none">Prepare comprehensive reports and presentations to communicatefindings and recommendations to stakeholders	-	-	-	-
PC22. <ul style="list-style-type: none">Implement design changes and process adjustments to prevent commoncasting defects such as porosity, cracks, and misruns	-	-	-	-
PC23. <ul style="list-style-type: none">Use quality control tools and techniques such as FMEA (Failure Mode andEffect Analysis) to predict and mitigate potential issues in the die castingprocess	-	-	-	-
PC24. <ul style="list-style-type: none">Perform root cause analysis of defects and introduce corrective actionsto improve casting quality	-	-	-	-
NOS Total	100	-	-	-



Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3019
NOS Name	Mold Design for Plastic Part
Sector	Capital Goods
Sub-Sector	
Occupation	Designing
NSQF Level	6.5
Credits	4
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2030
NSQC Clearance Date	08/05/2025



Qualification Pack

MSME/CSC/N3018: Design of Tools with Advance Cad Software Module I

Description

Understand and explain the basic concept of tools Recognise the need for tool designing with the help of CAD software Understand advanced computer aided design software UG and CATIA as compared to other CAD software Create 2D geometric sketches by using UG and CATIA software Develop 3D solid and surface modeling by using advanced commands Understand assembly constraints and develop different types of assembly designs Understand design generative and interactive drafting Apply knowledge to create complicated modeling and provide creative or innovative solutions Create tool parts models assembly and drafting with the help of Unigraphics and CATIA

Scope

The scope covers the following :

- Understand and explain the basic concept of tools
- Recognise the need for tool designing with the help of CAD software
- Understand advanced computer aided design software UG and CATIA as compared to other CAD software
- Create 2D geometric sketches by using UG and CATIA software
- Develop 3D solid and surface modeling by using advanced commands
- Understand assembly constraints and develop different types of assembly designs
- Understand design generative and interactive drafting
- Apply knowledge to create complicated modeling and provide creative or innovative solutions
- Create tool parts models assembly and drafting with the help of Unigraphics and CATIA

Elements and Performance Criteria

MSME/PGDTD/06

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

- PC1.** • Demonstrate the ability to create advanced tool designs using
 - Unigraphics and CATIA.
- PC2.** • Apply knowledge of tool design principles (moulds, dies, jigs, fixtures) in
 - the development of efficient tools.
- PC3.** • Ensure that the design meets the functional, dimensional, and quality
 - requirements of the tool
- PC4.** • Develop 3D models of tools with a high degree of accuracy using
 - Unigraphics and CATIA
- PC5.** • Implement advanced simulation techniques (e.g., finite element
 - analysis, motion simulation) to test tool performance under different
 - conditions
- PC6.** • Validate tool designs through simulation and make necessary
 - modifications for optimization.
- PC7.** • Validate tool designs through simulation and make necessary
 - modifications for optimization.



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- PC8.** • Utilize surface and solid modeling techniques to create complex geometries
- PC9.** • Create detailed assembly designs, ensuring all components of the tool fit and function together without interference
- PC10.** • Simulate tool assemblies to detect potential issues related to tolerance, clearances, and movements.
- PC11.** • Employ parametric modeling to allow flexibility and scalability in tool design.
- PC12.** • Modify and optimize tool designs efficiently using parametric constraints and design variables.
- PC13.** • Implement design iterations quickly using Unigraphics and CATIA's parametric capabilities
- PC14.** • Perform tool design optimization considering material selection, tool life, manufacturability, and cost-efficiency.
- PC15.** • Use Unigraphics and CATIA's built-in optimization tools to analyze design alternatives
- PC16.** • Implement modifications to improve the overall efficiency and performance of the tool based on analytical feedback
- PC17.** • Apply GD&T principles to ensure precision and accuracy in tool design.
- PC18.** • Interpret and apply appropriate tolerance and fit requirements to the tool design to ensure manufacturability
- PC19.** • Use Unigraphics and CATIA tools to verify tolerances and ensure that the designed tool meets stringent tolerance specifications.
- PC20.** • Analyze different material properties using software tools to select the most appropriate materials for tool design.
- PC21.** • Perform material cost-benefit analysis to ensure efficient tool performance while minimizing production costs.
- PC22.** • Use CATIA's material library and analysis tools to predict the behavior of materials under stress.
- PC23.** • Ensure that the designed tools are manufacturable with the available processes.
- PC24.** • Develop process plans using the manufacturing modules in Unigraphics or CATIA to simulate machining, tooling setup, and production workflows
- PC25.** • Analyze and mitigate potential manufacturing issues early in the design phase.
- PC26.** • Generate 2D drawings with all necessary dimensions, notes, and tolerances to aid in tool manufacturing.
- PC27.** • Produce detailed design documentation, including exploded views, BOM (Bill of Materials), and step-by-step assembly instructions.
- PC28.** • Use Unigraphics and CATIA to ensure that the documentation is updated and accurate throughout the tool development process.
- PC29.** • Implement custom design features and automation in Unigraphics and CATIA to improve efficiency
- PC30.** • Use scripting tools and design automation techniques to streamline repetitive tasks and complex calculations.



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- PC31.** • Customize tool templates and parametric constraints to suit specific
• tool design requirements
- PC32.** • Identify and resolve design issues using diagnostic tools available in
• Unigraphics and CATIA.
- PC33.** • Perform root-cause analysis of tool design problems and iterate
• quickly to implement solutions.
- PC34.** • Simulate tool behavior under various operational conditions to
• preempt potential failures.
- PC35.** • Interface tool design with CAM (Computer-Aided Manufacturing) for
• seamless transition to production.
- PC36.** • Ensure tool designs are compatible with CNC programming and
• advanced manufacturing techniques.
- PC37.** • Use the manufacturing modules in Unigraphics or CATIA to simulate
• machining operations and tool paths
- PC38.** • Explore new design techniques and leverage the latest features in
• Unigraphics and CATIA for innovative tool designs.
- PC39.** • Continuously improve design processes by incorporating feedback
• from manufacturing and operations teams.
- PC40.** • Implement design improvements based on performance data and
• analysis
- PC41.** • take into account the following factors, as appropriate to the model
• being produced Factors: function, cost, physical space, quality, lifetime
• of the product, operating environment, manufacturing method,
• tolerances, interfaces, ergonomics, clearance, safety, materials,
• aesthetics, apply rendering techniques



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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>MSME/PGDTD/06</i>	-	100	-	-
PC1. <ul style="list-style-type: none">• Demonstrate the ability to create advanced tool designs using• Unigraphics and CATIA.	-	-	-	-
PC2. <ul style="list-style-type: none">• Apply knowledge of tool design principles (moulds, dies, jigs, fixtures) in• the development of efficient tools.	-	-	-	-
PC3. <ul style="list-style-type: none">• Ensure that the design meets the functional, dimensional, and quality• requirements of the tool	-	-	-	-
PC4. <ul style="list-style-type: none">• Develop 3D models of tools with a high degree of accuracy using• Unigraphics and CATIA	-	-	-	-
PC5. <ul style="list-style-type: none">• Implement advanced simulation techniques (e.g., finite element• analysis, motion simulation) to test tool performance under different• conditions	-	-	-	-
PC6. <ul style="list-style-type: none">• Validate tool designs through simulation and make necessary• modifications for optimization.	-	-	-	-
PC7. <ul style="list-style-type: none">• Validate tool designs through simulation and make necessary• modifications for optimization.	-	-	-	-
PC8. <ul style="list-style-type: none">• Utilize surface and solid modeling techniques to create complex• geometries	-	-	-	-
PC9. <ul style="list-style-type: none">• Create detailed assembly designs, ensuring all components of the tool• fit and function together without interference	-	-	-	-



Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. <ul style="list-style-type: none">• Simulate tool assemblies to detect potential issues related to• tolerance, clearances, and movements.	-	-	-	-
PC11. <ul style="list-style-type: none">• Employ parametric modeling to allow flexibility and scalability in tool• design.	-	-	-	-
PC12. <ul style="list-style-type: none">• Modify and optimize tool designs efficiently using parametric• constraints and design variables.	-	-	-	-
PC13. <ul style="list-style-type: none">• Implement design iterations quickly using Unigraphics and CATIA's• parametric capabilities	-	-	-	-
PC14. <ul style="list-style-type: none">• Perform tool design optimization considering material selection, tool• life, manufacturability, and cost-efficiency.	-	-	-	-
PC15. <ul style="list-style-type: none">• Use Unigraphics and CATIA's built-in optimization tools to analyze• design alternatives	-	-	-	-
PC16. <ul style="list-style-type: none">• Implement modifications to improve the overall efficiency and• performance of the tool based on analytical feedback	-	-	-	-
PC17. <ul style="list-style-type: none">• Apply GD&T principles to ensure precision and accuracy in tool• design.	-	-	-	-
PC18. <ul style="list-style-type: none">• Interpret and apply appropriate tolerance and fit requirements to the• tool design to ensure manufacturability	-	-	-	-



Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC19. <ul style="list-style-type: none">• Use Unigraphics and CATIA tools to verify tolerances and ensure that• the designed tool meets stringent tolerance specifications.	-	-	-	-
PC20. <ul style="list-style-type: none">• Analyze different material properties using software tools to select• the most appropriate materials for tool design.	-	-	-	-
PC21. <ul style="list-style-type: none">• Perform material cost-benefit analysis to ensure efficient tool• performance while minimizing production costs.	-	-	-	-
PC22. <ul style="list-style-type: none">• Use CATIA's material library and analysis tools to predict the behavior• of materials under stress.	-	-	-	-
PC23. <ul style="list-style-type: none">• Ensure that the designed tools are manufacturable with the available• processes.	-	-	-	-
PC24. <ul style="list-style-type: none">• Develop process plans using the manufacturing modules in• Unigraphics or CATIA to simulate machining, tooling setup, and• production workflows	-	-	-	-
PC25. <ul style="list-style-type: none">• Analyze and mitigate potential manufacturing issues early in the• design phase.	-	-	-	-
PC26. <ul style="list-style-type: none">• Generate 2D drawings with all necessary dimensions, notes, and• tolerances to aid in tool manufacturing.	-	-	-	-
PC27. <ul style="list-style-type: none">• Produce detailed design documentation, including exploded views,• BOM (Bill of Materials), and step-by-step assembly instructions.	-	-	-	-



Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC28. <ul style="list-style-type: none"> • Use Unigraphics and CATIA to ensure that the documentation is • updated and accurate throughout the tool development process. 	-	-	-	-
PC29. <ul style="list-style-type: none"> • Implement custom design features and automation in Unigraphics • and CATIA to improve efficiency 	-	-	-	-
PC30. <ul style="list-style-type: none"> • Use scripting tools and design automation techniques to streamline • repetitive tasks and complex calculations. 	-	-	-	-
PC31. <ul style="list-style-type: none"> • Customize tool templates and parametric constraints to suit specific • tool design requirements 	-	-	-	-
PC32. <ul style="list-style-type: none"> • Identify and resolve design issues using diagnostic tools available in • Unigraphics and CATIA. 	-	-	-	-
PC33. <ul style="list-style-type: none"> • Perform root-cause analysis of tool design problems and iterate • quickly to implement solutions. 	-	-	-	-
PC34. <ul style="list-style-type: none"> • Simulate tool behavior under various operational conditions to • preempt potential failures. 	-	-	-	-
PC35. <ul style="list-style-type: none"> • Interface tool design with CAM (Computer-Aided Manufacturing) for • seamless transition to production. 	-	-	-	-
PC36. <ul style="list-style-type: none"> • Ensure tool designs are compatible with CNC programming and • advanced manufacturing techniques. 	-	-	-	-
PC37. <ul style="list-style-type: none"> • Use the manufacturing modules in Unigraphics or CATIA to simulate • machining operations and tool paths 	-	-	-	-



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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC38. <ul style="list-style-type: none">• Explore new design techniques and leverage the latest features in• Unigraphics and CATIA for innovative tool designs.	-	-	-	-
PC39. <ul style="list-style-type: none">• Continuously improve design processes by incorporating feedback• from manufacturing and operations teams.	-	-	-	-
PC40. <ul style="list-style-type: none">• Implement design improvements based on performance data and• analysis	-	-	-	-
PC41. <ul style="list-style-type: none">• take into account the following factors, as appropriate to the model• being produced Factors: function, cost, physical space, quality, lifetime• of the product, operating environment, manufacturing method,• tolerances, interfaces, ergonomics, clearance, safety, materials,• aesthetics, apply rendering techniques	-	-	-	-
NOS Total	-	100	-	-



Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3018
NOS Name	Design of Tools with Advance Cad Software Module I
Sector	Capital Goods
Sub-Sector	
Occupation	Designing
NSQF Level	6.5
Credits	4
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2030
NSQF Clearance Date	08/05/2025



Qualification Pack

MSME/CSC/N3017: Stamping Die Design p

Description

Grasp fundamental concepts of Stamping and Presses for Stamping. 2. Able to Understand and Analyse customers need, 3. Able discuss and finalize product needs 4. Conceptualize and Design Press Tool Assembly necessary for given Sheet Metal component 5. Conceive the Stamping Tool design parameters 6. Design against standard and parameters 7. Test against specifications and standards 8. Interpret of output and confirming to specifications 9. Communicate with manufacturing line 10. Take remedial action if required

Scope

The scope covers the following :

- Grasp fundamental concepts of Stamping and Presses for Stamping.
- 2. Able to Understand and Analyse customers need,
- 3. Able discuss and finalize product needs
- 4. Conceptualize and Design Press Tool Assembly necessary for given Sheet Metal component
- 5. Conceive the Stamping Tool design parameters
- 6. Design against standard and parameters
- 7. Test against specifications and standards
- 8. Interpret of output and confirming to specifications
- 9. Communicate with manufacturing line
- 10. Take remedial action if required

Elements and Performance Criteria

MSME/PGDTD/05

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

- PC1.** • Analyze and interpret complex technical specifications and design requirements for press tools, ensuring accurate and effective design solutions.
- PC2.** • Design advanced press tools, including dies, punches, and other components, using CAD software and adhering to industry standards for functionality and precision
- PC3.** • Select and utilize appropriate materials for tool components based on factors like durability, wear resistance, and cost, ensuring optimal performance
- PC4.** • Integrate various tooling components into a cohesive press tool design, ensuring compatibility with existing machinery and production processes
- PC5.** • Apply principles of Design for Manufacturing to ensure that press tools are easy to produce, assemble, and maintain, while minimizing production costs and complexity.
- PC6.** • Use simulation software to model and test press tool designs, validating performance and identifying potential issues before physical prototyping and production



Qualification Pack

- PC7.**
 - Optimize press tool designs to enhance manufacturing efficiency,
 - reduce cycle times, and minimize material waste, improving overall
 - production performance.
- PC8.**
 - Design press tools with consideration for ease of maintenance and
 - longevity, incorporating features that extend tool life and reduce
 - downtime
- PC9.**
 - Ensure that press tools meet stringent quality standards and
 - compliance regulations, conducting thorough inspections and testing
 - throughout the design process.
- PC10.**
 - Design press tools with a focus on cost efficiency, balancing material
 - and production costs with performance requirements to achieve
 - economical solutions
- PC11.**
 - Incorporate ergonomic and safety considerations into press tool
 - designs to ensure safe operation and ease of use for operators.
- PC12.**
 - Ensure that press tool designs are compatible with and enhance
 - existing production processes, facilitating smooth integration and
 - efficient workflow
- PC13.**
 - Identify and resolve design or performance issues with press tools
 - during development and production, implementing effective solutions
 - to address problems.
- PC14.**
 - Manage and coordinate press tool design and development projects,
 - ensuring adherence to timelines, budgets, and project goals while
 - maintaining high-quality standards.
- PC15.**
 - Provide training and mentorship to junior engineers and designers,
 - sharing knowledge and best practices in press tool design and process
 - optimization



Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>MSME/PGDTD/05</i>	-	100	-	-
PC1. <ul style="list-style-type: none"> Analyze and interpret complex technical specifications and design requirements for press tools, ensuring accurate and effective design solutions. 	-	-	-	-
PC2. <ul style="list-style-type: none"> Design advanced press tools, including dies, punches, and other components, using CAD software and adhering to industry standards for functionality and precision 	-	-	-	-
PC3. <ul style="list-style-type: none"> Select and utilize appropriate materials for tool components based on factors like durability, wear resistance, and cost, ensuring optimal performance 	-	-	-	-
PC4. <ul style="list-style-type: none"> Integrate various tooling components into a cohesive press tool design, ensuring compatibility with existing machinery and production processes 	-	-	-	-
PC5. <ul style="list-style-type: none"> Apply principles of Design for Manufacturing to ensure that press tools are easy to produce, assemble, and maintain, while minimizing production costs and complexity. 	-	-	-	-
PC6. <ul style="list-style-type: none"> Use simulation software to model and test press tool designs, validating performance and identifying potential issues before physical prototyping and production 	-	-	-	-



Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC7. <ul style="list-style-type: none">Optimize press tool designs to enhance manufacturing efficiency,reduce cycle times, and minimize material waste, improving overallproduction performance.	-	-	-	-
PC8. <ul style="list-style-type: none">Design press tools with consideration for ease of maintenance andlongevity, incorporating features that extend tool life and reducedowntime	-	-	-	-
PC9. <ul style="list-style-type: none">Ensure that press tools meet stringent quality standards andcompliance regulations, conducting thorough inspections and testingthroughout the design process.	-	-	-	-
PC10. <ul style="list-style-type: none">Design press tools with a focus on cost efficiency, balancing materialand production costs with performance requirements to achieveeconomical solutions	-	-	-	-
PC11. <ul style="list-style-type: none">Incorporate ergonomic and safety considerations into press tooldesigns to ensure safe operation and ease of use for operators.	-	-	-	-
PC12. <ul style="list-style-type: none">Ensure that press tool designs are compatible with and enhanceexisting production processes, facilitating smooth integration andefficient workflow	-	-	-	-
PC13. <ul style="list-style-type: none">Identify and resolve design or performance issues with press toolsduring development and production, implementing effective solutionsto address problems.	-	-	-	-



Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC14. <ul style="list-style-type: none">• Manage and coordinate press tool design and development projects,• ensuring adherence to timelines, budgets, and project goals while• maintaining high-quality standards.	-	-	-	-
PC15. <ul style="list-style-type: none">• Provide training and mentorship to junior engineers and designers,• sharing knowledge and best practices in press tool design and process• optimization	-	-	-	-
NOS Total	-	100	-	-



Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3017
NOS Name	Stamping Die Design p
Sector	Capital Goods
Sub-Sector	
Occupation	Designing
NSQF Level	6.5
Credits	3
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2030
NSQC Clearance Date	08/05/2025



Qualification Pack

MSME/CSC/N3016: Stamping Die Design

Description

Grasp fundamental concepts of Stamping and Presses for Stamping. 2. Able to Understand and Analyse customers need, 3. Able discuss and finalize product needs 4. Conceptualize and Design Press Tool Assembly necessary for given Sheet Metal component 5. Conceive the Stamping Tool design parameters 6. Design against standard and parameters 7. Test against specifications and standards 8. Interpret of output and confirming to specifications 9. Communicate with manufacturing line 10. Take remedial action if required

Scope

The scope covers the following :

- Grasp fundamental concepts of Stamping and Presses for Stamping.
- 2. Able to Understand and Analyse customers need,
- 3. Able discuss and finalize product needs
- 4. Conceptualize and Design Press Tool Assembly necessary for given Sheet Metal component
- 5. Conceive the Stamping Tool design parameters
- 6. Design against standard and parameters
- 7. Test against specifications and standards
- 8. Interpret of output and confirming to specifications
- 9. Communicate with manufacturing line
- 10. Take remedial action if required

Elements and Performance Criteria

MSME/PGDTD/05

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

- PC1.**
 - Analyze and interpret complex technical specifications and design requirements for press tools, ensuring accurate and effective design solutions.
- PC2.**
 - Design advanced press tools, including dies, punches, and other components, using CAD software and adhering to industry standards for functionality and precision
- PC3.**
 - Select and utilize appropriate materials for tool components based on factors like durability, wear resistance, and cost, ensuring optimal performance
- PC4.**
 - Integrate various tooling components into a cohesive press tool design, ensuring compatibility with existing machinery and production processes
- PC5.**
 - Apply principles of Design for Manufacturing to ensure that press tools are easy to produce, assemble, and maintain, while minimizing production costs and complexity.
- PC6.**
 - Use simulation software to model and test press tool designs, validating performance and identifying potential issues before physical prototyping and production



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- PC7.**
 - Optimize press tool designs to enhance manufacturing efficiency,
 - reduce cycle times, and minimize material waste, improving overall
 - production performance.
- PC8.**
 - Design press tools with consideration for ease of maintenance and
 - longevity, incorporating features that extend tool life and reduce
 - downtime
- PC9.**
 - Ensure that press tools meet stringent quality standards and
 - compliance regulations, conducting thorough inspections and testing
 - throughout the design process.
- PC10.**
 - Design press tools with a focus on cost efficiency, balancing material
 - and production costs with performance requirements to achieve
 - economical solutions
- PC11.**
 - Incorporate ergonomic and safety considerations into press tool
 - designs to ensure safe operation and ease of use for operators.
- PC12.**
 - Ensure that press tool designs are compatible with and enhance
 - existing production processes, facilitating smooth integration and
 - efficient workflow
- PC13.**
 - Identify and resolve design or performance issues with press tools
 - during development and production, implementing effective solutions
 - to address problems.
- PC14.**
 - Manage and coordinate press tool design and development projects,
 - ensuring adherence to timelines, budgets, and project goals while
 - maintaining high-quality standards.
- PC15.**
 - Provide training and mentorship to junior engineers and designers,
 - sharing knowledge and best practices in press tool design and process
 - optimization



Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>MSME/PGDTD/05</i>	100	-	-	-
PC1. <ul style="list-style-type: none"> Analyze and interpret complex technical specifications and design requirements for press tools, ensuring accurate and effective design solutions. 	-	-	-	-
PC2. <ul style="list-style-type: none"> Design advanced press tools, including dies, punches, and other components, using CAD software and adhering to industry standards for functionality and precision 	-	-	-	-
PC3. <ul style="list-style-type: none"> Select and utilize appropriate materials for tool components based on factors like durability, wear resistance, and cost, ensuring optimal performance 	-	-	-	-
PC4. <ul style="list-style-type: none"> Integrate various tooling components into a cohesive press tool design, ensuring compatibility with existing machinery and production processes 	-	-	-	-
PC5. <ul style="list-style-type: none"> Apply principles of Design for Manufacturing to ensure that press tools are easy to produce, assemble, and maintain, while minimizing production costs and complexity. 	-	-	-	-
PC6. <ul style="list-style-type: none"> Use simulation software to model and test press tool designs, validating performance and identifying potential issues before physical prototyping and production 	-	-	-	-



Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<p>PC7.</p> <ul style="list-style-type: none"> Optimize press tool designs to enhance manufacturing efficiency, reduce cycle times, and minimize material waste, improving overall production performance. 	-	-	-	-
<p>PC8.</p> <ul style="list-style-type: none"> Design press tools with consideration for ease of maintenance and longevity, incorporating features that extend tool life and reduce downtime 	-	-	-	-
<p>PC9.</p> <ul style="list-style-type: none"> Ensure that press tools meet stringent quality standards and compliance regulations, conducting thorough inspections and testing throughout the design process. 	-	-	-	-
<p>PC10.</p> <ul style="list-style-type: none"> Design press tools with a focus on cost efficiency, balancing material and production costs with performance requirements to achieve economical solutions 	-	-	-	-
<p>PC11.</p> <ul style="list-style-type: none"> Incorporate ergonomic and safety considerations into press tool designs to ensure safe operation and ease of use for operators. 	-	-	-	-
<p>PC12.</p> <ul style="list-style-type: none"> Ensure that press tool designs are compatible with and enhance existing production processes, facilitating smooth integration and efficient workflow 	-	-	-	-
<p>PC13.</p> <ul style="list-style-type: none"> Identify and resolve design or performance issues with press tools during development and production, implementing effective solutions to address problems. 	-	-	-	-



Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC14. <ul style="list-style-type: none">• Manage and coordinate press tool design and development projects,• ensuring adherence to timelines, budgets, and project goals while• maintaining high-quality standards.	-	-	-	-
PC15. <ul style="list-style-type: none">• Provide training and mentorship to junior engineers and designers,• sharing knowledge and best practices in press tool design and process• optimization	-	-	-	-
NOS Total	100	-	-	-



Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3016
NOS Name	Stamping Die Design
Sector	Capital Goods
Sub-Sector	
Occupation	Designing
NSQF Level	6.5
Credits	3
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2030
NSQC Clearance Date	08/05/2025



Qualification Pack

MSME/CSC/N3015: Design of Work holding Devices And Gauges p

Description

Understand and analyze customers need 2. discuss and finalize product needs 3. Decide suitable Jigs and work holding devices 4. Conceptualize Jigs, fixtures and Gauges Assembly Design necessary for given component 5. Conceive the tool design parameters 6. Design against standard and parameters 7. Test against specifications and standards 8. Interpret of output and confirming to specifications 9. Communicate with manufacturing line 10. Take remedial action if required

Scope

The scope covers the following :

- Understand and analyze customers need
- 2. discuss and finalize product needs
- 3. Decide suitable Jigs and work holding devices
- 4. Conceptualize Jigs, fixtures and Gauges Assembly Design necessary for given component
- 5. Conceive the tool design parameters
- 6. Design against standard and parameters
- 7. Test against specifications and standards
- 8. Interpret of output and confirming to specifications
- 9. Communicate with manufacturing line
- 10. Take remedial action if required

Elements and Performance Criteria

MSME/PGDTD/04

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

- PC1.** • Accurately interpret complex engineering drawings and specifications
• to design jigs and fixtures that meet precise functional requirements
- PC2.** • Create advanced jig and fixture designs that ensure accuracy,
• repeatability, and ease of use in manufacturing processes, using CAD
• tools and design principles.
- PC3.** • Select appropriate materials for jigs and fixtures based on strength,
• durability, and cost-effectiveness, while also considering the specific
• requirements of the machining or assembly process.
- PC4.** • Design custom jigs and fixtures tailored to specific production needs,
• focusing on improving speed, accuracy, and overall manufacturing
• efficiency.
- PC5.** • Use simulation tools to validate jig and fixture designs before
• production, ensuring they meet performance standards and eliminate
• potential design flaws.
- PC6.** • Incorporate ergonomic considerations and safety features into jig and
• fixture designs to enhance operator comfort and minimize the risk of
• injury during usage.



Qualification Pack

- PC7.**
 - Optimize the design and development process to minimize costs and
 - reduce manufacturing lead time without compromising on quality or
 - functionality
- PC8.**
 - Ensure that jigs and fixtures are compatible with existing machines,
 - tools, and production processes, facilitating seamless integration and
 - minimizing downtime
- PC9.**
 - Work closely with production, machining, and engineering teams to
 - ensure that jigs and fixtures align with overall production goals and
 - improve workflow efficiency
- PC10.**
 - Identify design or performance issues with jigs and fixtures during
 - production, making necessary modifications and continuously seeking
 - opportunities for process optimization
- PC11.** Design procedure for different gauges
- PC12.** Develop, analyze and evaluate various jigs and fixture designs



Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>MSME/PGDTD/04</i>	-	100	-	-
PC1. <ul style="list-style-type: none"> Accurately interpret complex engineering drawings and specifications to design jigs and fixtures that meet precise functional requirements 	-	-	-	-
PC2. <ul style="list-style-type: none"> Create advanced jig and fixture designs that ensure accuracy, repeatability, and ease of use in manufacturing processes, using CAD tools and design principles. 	-	-	-	-
PC3. <ul style="list-style-type: none"> Select appropriate materials for jigs and fixtures based on strength, durability, and cost-effectiveness, while also considering the specific requirements of the machining or assembly process. 	-	-	-	-
PC4. <ul style="list-style-type: none"> Design custom jigs and fixtures tailored to specific production needs, focusing on improving speed, accuracy, and overall manufacturing efficiency. 	-	-	-	-
PC5. <ul style="list-style-type: none"> Use simulation tools to validate jig and fixture designs before production, ensuring they meet performance standards and eliminate potential design flaws. 	-	-	-	-
PC6. <ul style="list-style-type: none"> Incorporate ergonomic considerations and safety features into jig and fixture designs to enhance operator comfort and minimize the risk of injury during usage. 	-	-	-	-



Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC7. <ul style="list-style-type: none">Optimize the design and development process to minimize costs andreduce manufacturing lead time without compromising on quality orfunctionality	-	-	-	-
PC8. <ul style="list-style-type: none">Ensure that jigs and fixtures are compatible with existing machines,tools, and production processes, facilitating seamless integration andminimizing downtime	-	-	-	-
PC9. <ul style="list-style-type: none">Work closely with production, machining, and engineering teams toensure that jigs and fixtures align with overall production goals andimprove workflow efficiency	-	-	-	-
PC10. <ul style="list-style-type: none">Identify design or performance issues with jigs and fixtures duringproduction, making necessary modifications and continuously seekingopportunities for process optimization	-	-	-	-
PC11. Design procedure for different gauges	-	-	-	-
PC12. Develop, analyze and evaluate various jigs and fixture designs	-	-	-	-
NOS Total	-	100	-	-



Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3015
NOS Name	Design of Work holding Devices And Gauges p
Sector	Capital Goods
Sub-Sector	
Occupation	Designing
NSQF Level	6.5
Credits	3
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2030
NSQF Clearance Date	08/05/2025



Qualification Pack

MSME/CSC/N3014: Design of Work holding Devices And Gauges

Description

Understand and analyze customers need 2. discuss and finalize product needs 3. Decide suitable Jigs and work holding devices 4. Conceptualize Jigs, fixtures and Gauges Assembly Design necessary for given component 5. Conceive the tool design parameters 6. Design against standard and parameters 7. Test against specifications and standards 8. Interpret of output and confirming to specifications 9. Communicate with manufacturing line 10. Take remedial action if required

Scope

The scope covers the following :

- Understand and analyze customers need
- 2. discuss and finalize product needs
- 3. Decide suitable Jigs and work holding devices
- 4. Conceptualize Jigs, fixtures and Gauges Assembly Design necessary for given component
- 5. Conceive the tool design parameters
- 6. Design against standard and parameters
- 7. Test against specifications and standards
- 8. Interpret of output and confirming to specifications
- 9. Communicate with manufacturing line
- 10. Take remedial action if required

Elements and Performance Criteria

MSME/PGDTD/04

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

- PC1.** • Accurately interpret complex engineering drawings and specifications
• to design jigs and fixtures that meet precise functional requirements
- PC2.** • Create advanced jig and fixture designs that ensure accuracy,
• repeatability, and ease of use in manufacturing processes, using CAD
• tools and design principles.
- PC3.** • Select appropriate materials for jigs and fixtures based on strength,
• durability, and cost-effectiveness, while also considering the specific
• requirements of the machining or assembly process.
- PC4.** • Design custom jigs and fixtures tailored to specific production needs,
• focusing on improving speed, accuracy, and overall manufacturing
• efficiency.
- PC5.** • Use simulation tools to validate jig and fixture designs before
• production, ensuring they meet performance standards and eliminate
• potential design flaws.
- PC6.** • Incorporate ergonomic considerations and safety features into jig and
• fixture designs to enhance operator comfort and minimize the risk of
• injury during usage.



Qualification Pack

- PC7.**
 - Optimize the design and development process to minimize costs and
 - reduce manufacturing lead time without compromising on quality or
 - functionality
- PC8.**
 - Ensure that jigs and fixtures are compatible with existing machines,
 - tools, and production processes, facilitating seamless integration and
 - minimizing downtime
- PC9.**
 - Work closely with production, machining, and engineering teams to
 - ensure that jigs and fixtures align with overall production goals and
 - improve workflow efficiency
- PC10.**
 - Identify design or performance issues with jigs and fixtures during
 - production, making necessary modifications and continuously seeking
 - opportunities for process optimization
- PC11.** Design procedure for different gauges
- PC12.** Develop, analyze and evaluate various jigs and fixture designs



Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>MSME/PGDTD/04</i>	100	-	-	-
PC1. <ul style="list-style-type: none">Accurately interpret complex engineering drawings and specificationsto design jigs and fixtures that meet precise functional requirements	-	-	-	-
PC2. <ul style="list-style-type: none">Create advanced jig and fixture designs that ensure accuracy,repeatability, and ease of use in manufacturing processes, using CADtools and design principles.	-	-	-	-
PC3. <ul style="list-style-type: none">Select appropriate materials for jigs and fixtures based on strength,durability, and cost-effectiveness, while also considering the specificrequirements of the machining or assembly process.	-	-	-	-
PC4. <ul style="list-style-type: none">Design custom jigs and fixtures tailored to specific production needs,focusing on improving speed, accuracy, and overall manufacturingefficiency.	-	-	-	-
PC5. <ul style="list-style-type: none">Use simulation tools to validate jig and fixture designs beforeproduction, ensuring they meet performance standards and eliminatepotential design flaws.	-	-	-	-
PC6. <ul style="list-style-type: none">Incorporate ergonomic considerations and safety features into jig andfixture designs to enhance operator comfort and minimize the risk ofinjury during usage.	-	-	-	-



Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC7. <ul style="list-style-type: none">Optimize the design and development process to minimize costs andreduce manufacturing lead time without compromising on quality orfunctionality	-	-	-	-
PC8. <ul style="list-style-type: none">Ensure that jigs and fixtures are compatible with existing machines,tools, and production processes, facilitating seamless integration andminimizing downtime	-	-	-	-
PC9. <ul style="list-style-type: none">Work closely with production, machining, and engineering teams toensure that jigs and fixtures align with overall production goals andimprove workflow efficiency	-	-	-	-
PC10. <ul style="list-style-type: none">Identify design or performance issues with jigs and fixtures duringproduction, making necessary modifications and continuously seekingopportunities for process optimization	-	-	-	-
PC11. Design procedure for different gauges	-	-	-	-
PC12. Develop, analyze and evaluate various jigs and fixture designs	-	-	-	-
NOS Total	100	-	-	-



Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3014
NOS Name	Design of Work holding Devices And Gauges
Sector	Capital Goods
Sub-Sector	
Occupation	Designing
NSQF Level	6.5
Credits	3
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2030
NSQF Clearance Date	08/05/2025



Qualification Pack

MSME/CSC/N3013: Advance Manufacturing Practices Using Cam Software

Description

Understand the concept of Advance Manufacturing Processes using conventional Machining and Non-Conventional Machining 2. Recognise the Manufacturing Processes using CNC Machines and their utilities 3. Understand and explain needs of CAM Software during for CNC Programming and Machining 4. Understand capabilities of CAM Software like Master CAM & UG CAM. 5. Create 2D geometric sketches by using Master CAM & UG CAM. 6. Develop 3d Models through Master CAM & UG CAM for CAM Toolpath Generation practices 7. Understand CNC Programming Concept 8. Generate 2D Toolpath for Roughing, Semi finishing and Finishing through Master CAM & UG CAM 9. Generate 3D Toolpath for Roughing, Semi finishing and Finishing through Master CAM & UG CAM 10. Execute Post processing 11. Verify and simulate Toolpath generated through Master CAM & UG CAM 12. Execute Manufacturing of Product by CNC Machining with the application of Master CAM & UG CAM

Scope

The scope covers the following :

- Understand the concept of Advance Manufacturing Processes using conventional Machining and Non-Conventional Machining
- 2. Recognise the Manufacturing Processes using CNC Machines and their utilities
- 3. Understand and explain needs of CAM Software during for CNC Programming and Machining
- 4. Understand capabilities of CAM Software like Master CAM & UG CAM.
- 5. Create 2D geometric sketches by using Master CAM & UG CAM.
- 6. Develop 3d Models through Master CAM & UG CAM for CAM Toolpath Generation practices
- 7. Understand CNC Programming Concept
- 8. Generate 2D Toolpath for Roughing, Semi finishing and Finishing through Master CAM & UG CAM
- 9. Generate 3D Toolpath for Roughing, Semi finishing and Finishing through Master CAM & UG CAM
- 10. Execute Post processing
- 11. Verify and simulate Toolpath generated through Master CAM & UG CAM
- 12. Execute Manufacturing of Product by CNC Machining with the application of Master CAM & UG CAM

Elements and Performance Criteria

MSME/PGDTD/03

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

- PC1.** • Accurately interpret detailed technical drawings and specifications to
• ensure precise translation into CAM programs using MasterCAM and
• Unigraphics NX CAM
- PC2.** • Develop complex tool paths and machining strategies in MasterCAM
• and Unigraphics NX CAM, optimizing for efficiency, precision, and
• material conservation.
- PC3.** • Optimize tool paths to reduce machining time, tool wear, and material
• wastage while maintaining the highest quality standards in production.



Qualification Pack

- PC4.** • Set up CNC machines and run simulations in CAM software to validate tool paths and machining processes before actual production
- PC5.** • Utilize advanced features such as 4-axis and 5-axis machining in CAM software to create complex parts, ensuring high precision and efficient machining
- PC6.** • Generate accurate and optimized G-code for various CNC machines, ensuring smooth operation and high-quality production outputs
- PC7.** • Design and simulate fixtures and work holding setups within CAM software to ensure secure, accurate, and efficient machining
- PC8.** • Select appropriate tools and cutting parameters for specific materials and machining operations, taking into account tool life, material characteristics, and surface finish requirements
- PC9.** • Use CAM software to simulate machining processes, identifying potential issues such as collisions or tool deflections before actual production begins.
- PC10.** • Ensure the CAM programs produce parts that meet tight tolerances and quality standards, performing regular inspections and adjustments as needed
- PC11.** • Streamline the production workflow by optimizing machine utilization, minimizing setup times, and reducing lead times.
- PC12.** • Diagnose and resolve machining problems, such as tool breakage or surface finish issues, by adjusting CAM programs and machining parameters
- PC13.** • Work closely with design and engineering teams to ensure that CAM programs are aligned with product design intent and manufacturing capabilities
- PC14.** • Oversee the coordination of CAM programming and machining activities, ensuring projects are completed on time and within budget while maintaining high-quality standards.
- PC15.** • Train and supervise junior CAM programmers and machinists, ensuring they follow best practices in CAM programming and CNC operation



Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>MSME/PGDTD/03</i>	-	100	-	-
PC1. <ul style="list-style-type: none">Accurately interpret detailed technical drawings and specifications toensure precise translation into CAM programs using MasterCAM andUnigraphics NX CAM	-	-	-	-
PC2. <ul style="list-style-type: none">Develop complex tool paths and machining strategies in MasterCAMand Unigraphics NX CAM, optimizing for efficiency, precision, andmaterial conservation.	-	-	-	-
PC3. <ul style="list-style-type: none">Optimize tool paths to reduce machining time, tool wear, and materialwastage while maintaining the highest quality standards in production.	-	-	-	-
PC4. <ul style="list-style-type: none">Set up CNC machines and run simulations in CAM software to validatetool paths and machining processes before actual production	-	-	-	-
PC5. <ul style="list-style-type: none">Utilize advanced features such as 4-axis and 5-axis machining in CAMsoftware to create complex parts, ensuring high precision and efficientmachining	-	-	-	-
PC6. <ul style="list-style-type: none">Generate accurate and optimized G-code for various CNC machines,ensuring smooth operation and high-quality production outputs	-	-	-	-
PC7. <ul style="list-style-type: none">Design and simulate fixtures and work holding setups within CAMsoftware to ensure secure, accurate, and efficient machining	-	-	-	-



Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC8. <ul style="list-style-type: none">• Select appropriate tools and cutting parameters for specific materials• and machining operations, taking into account tool life, material• characteristics, and surface finish requirements	-	-	-	-
PC9. <ul style="list-style-type: none">• Use CAM software to simulate machining processes, identifying• potential issues such as collisions or tool deflections before actual• production begins.	-	-	-	-
PC10. <ul style="list-style-type: none">• Ensure the CAM programs produce parts that meet tight tolerances• and quality standards, performing regular inspections and adjustments• as needed	-	-	-	-
PC11. <ul style="list-style-type: none">• Streamline the production workflow by optimizing machine• utilization, minimizing setup times, and reducing lead times.	-	-	-	-
PC12. <ul style="list-style-type: none">• Diagnose and resolve machining problems, such as tool breakage or• surface finish issues, by adjusting CAM programs and machining• parameters	-	-	-	-
PC13. <ul style="list-style-type: none">• Work closely with design and engineering teams to ensure that CAM• programs are aligned with product design intent and manufacturing• capabilities	-	-	-	-
PC14. <ul style="list-style-type: none">• Oversee the coordination of CAM programming and machining• activities, ensuring projects are completed on time and within budget• while maintaining high-quality standards.	-	-	-	-



Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC15. <ul style="list-style-type: none">• Train and supervise junior CAM programmers and machinists,• ensuring they follow best practices in CAM programming and CNC• operation	-	-	-	-
NOS Total	-	100	-	-



Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3013
NOS Name	Advance Manufacturing Practices Using Cam Software
Sector	Capital Goods
Sub-Sector	
Occupation	Designing
NSQF Level	6.5
Credits	2
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2030
NSQF Clearance Date	08/05/2025



Qualification Pack

MSME/CSC/N3012: Engineering Drafting And Modelling Using CAD Software

Description

Understand and explain the concept of engineering drafting and modelling using CAD software Understand types of different CAD CAM CAE software Create 2D geometric sketches by using general drafting and design application AutoCAD and multifaceted CAD software modeling software SolidWorks Develop 3D modeling by using advanced commands available in the general drafting and design application AutoCAD and multifaceted CAD software modeling software SolidWorks Understand assembly constraints and develop different types of assembly design by using multifaceted CAD software modeling software SolidWorks Understand design with generative and interactive drafting concepts and their applications

Scope

The scope covers the following :

- Understand and explain the concept of engineering drafting and modelling using CAD software
- Understand types of different CAD CAM CAE software
- Create 2D geometric sketches by using general drafting and design application AutoCAD and multifaceted CAD software modeling software SolidWorks
- Develop 3D modeling by using advanced commands available in the general drafting and design application AutoCAD and multifaceted CAD software modeling software SolidWorks
- Understand assembly constraints and develop different types of assembly design by using multifaceted CAD software modeling software SolidWorks
- Understand design with generative and interactive drafting concepts and their applications

Elements and Performance Criteria

MSME/PGDTD/02

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

- PC1.** • Accurately interpret detailed design briefs, technical specifications, and client requirements, ensuring that all project objectives are clearly understood
- PC2.** • Develop complex 2D and 3D CAD models using AutoCAD, and SolidWorks, ensuring precision in design and adherence to industry standards
- PC3.** • Utilize parametric design and simulation features within SolidWorks to analyze and test design feasibility, functionality, and performance
- PC4.** • Perform design optimization to improve functionality, material usage, and cost-effectiveness, while maintaining design integrity and meeting project constraints
- PC5.** • Coordinate design and drafting activities across multidisciplinary teams, ensuring efficient communication and timely delivery of design outputs



Qualification Pack

- PC6.** • Ensure all designs meet relevant industry standards, compliance regulations, and project-specific requirements, conducting thorough reviews and validations
- PC7.** • Manage and organize design files effectively in collaborative environments, ensuring seamless sharing and version control using tools like AutoCAD and Solidworks
- PC8.** • Identify and troubleshoot design-related issues during the development phase, offering quick and effective solutions to maintain project timelines
- PC9.** • Provide guidance and mentorship to junior CAD technicians and drafters, ensuring adherence to best practices in design and drafting
- PC10.** • Prepare comprehensive design reports, technical documentation, and drawings for submission to clients or engineering teams, ensuring clarity and accuracy
- PC11.** • identify and use key features of solid modeling software package to produce models Key features: extrude, extrude cut, solid model, mirror, revolve, wireframe, radius/chamfer, hide, rib, rectangular pattern, fillet, cut/remove, circular pattern, shell, development view, motion analysis, animation, defining material property, exploded views
- PC12.** perform and analyze drawing for solid modeling
- PC13.** • extract physical properties as per job requirement, including volume, mass and center of gravity
- PC14.** • take into account the following factors, as appropriate to the model being produced Factors: function, cost, physical space, quality, lifetime of the product, operating environment, manufacturing method, tolerances, interfaces, ergonomics, clearance, safety, materials, aesthetics, apply rendering techniques
- PC15.** • Effectively handle and team of designers using CAD software as well as able to create, analyze and evaluate CAD models and drafting



Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>MSME/PGDTD/02</i>	-	100	-	-
PC1. <ul style="list-style-type: none">• Accurately interpret detailed design briefs, technical specifications, and• client requirements, ensuring that all project objectives are clearly• understood	-	-	-	-
PC2. <ul style="list-style-type: none">• Develop complex 2D and 3D CAD models using AutoCAD, and• SolidWorks, ensuring precision in design and adherence to industry• standards	-	-	-	-
PC3. <ul style="list-style-type: none">• Utilize parametric design and simulation features within SolidWorks to• analyze and test design feasibility, functionality, and performance	-	-	-	-
PC4. <ul style="list-style-type: none">• Perform design optimization to improve functionality, material usage,• and cost-effectiveness, while maintaining design integrity and meeting• project constraints	-	-	-	-
PC5. <ul style="list-style-type: none">• Coordinate design and drafting activities across multidisciplinary• teams, ensuring efficient communication and timely delivery of design• outputs	-	-	-	-
PC6. <ul style="list-style-type: none">• Ensure all designs meet relevant industry standards, compliance• regulations, and project-specific requirements, conducting thorough• reviews and validations	-	-	-	-



Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC7. <ul style="list-style-type: none">• Manage and organize design files effectively in collaborative environments, ensuring seamless sharing and version control using tools like AutoCAD and Solidworks	-	-	-	-
PC8. <ul style="list-style-type: none">• Identify and troubleshoot design-related issues during the development phase, offering quick and effective solutions to maintain project timelines	-	-	-	-
PC9. <ul style="list-style-type: none">• Provide guidance and mentorship to junior CAD technicians and drafters, ensuring adherence to best practices in design and drafting	-	-	-	-
PC10. <ul style="list-style-type: none">• Prepare comprehensive design reports, technical documentation, and drawings for submission to clients or engineering teams, ensuring clarity and accuracy	-	-	-	-
PC11. <ul style="list-style-type: none">• identify and use key features of solid modeling software package to produce models Key features: extrude, extrude cut, solid model, mirror, revolve, wireframe, radius/chamfer, hide, rib, rectangular pattern, fillet, cut/remove, circular pattern, shell, development view, motion analysis, animation, defining material property, exploded views	-	-	-	-
PC12. perform and analyze drawing for solid modeling	-	-	-	-
PC13. <ul style="list-style-type: none">• extract physical properties as per job requirement, including volume, mass and center of gravity	-	-	-	-



Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC14. <ul style="list-style-type: none">• take into account the following factors, as appropriate to the model• being produced Factors: function, cost, physical space, quality, lifetime of• the product, operating environment, manufacturing method, tolerances, interfaces, ergonomics, clearance, safety, materials, aesthetics, apply• rendering techniques	-	-	-	-
PC15. <ul style="list-style-type: none">• Effectively handle and team of designers using CAD software as well• as able to create, analyze and evaluate CAD models and drafting	-	-	-	-
NOS Total	-	100	-	-



Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3012
NOS Name	Engineering Drafting And Modelling Using CAD Software
Sector	Capital Goods
Sub-Sector	
Occupation	Designing
NSQF Level	6.5
Credits	4
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2030
NSQF Clearance Date	08/05/2025



Qualification Pack

MSME/CSC/N3009: Product Manufacturing with CNC Programming And Machining

Description

Explain applications and advantages of CNC machines and technology. 2. Demonstrate and explain various CNC control 3. Calculate technological data for CNC machining. 4. Explain the JH system, its use and application Understand the importance and use of PPEs 5. Prepare and understand line program for various profiles Identify and set parameters for various simulators. 6. Prepare programs, demonstrate, simulate and operate CNC lathe machines for various machining operations 7. Prepare programs, demonstrate, simulate and operate CNC milling machines for various machining operations 8. Prepare programs, demonstrate, simulate and operate CNC EDM & WEDM machines for various machining operations 9. Define and explain Modern CNC systems and explain its importance in manufacturing.

Scope

The scope covers the following :

- Explain applications and advantages of CNC machines and technology.
- 2. Demonstrate and explain various CNC control
- 3. Calculate technological data for CNC machining.
- 4. Explain the JH system, its use and application Understand the importance and use of PPEs
- 5. Prepare and understand line program for various profiles Identify and set parameters for various simulators.
- 6. Prepare programs, demonstrate, simulate and operate CNC lathe machines for various machining operations
- 7. Prepare programs, demonstrate, simulate and operate CNC milling machines for various machining operations
- 8. Prepare programs, demonstrate, simulate and operate CNC EDM & WEDM machines for various machining operations
- 9. Define and explain Modern CNC systems and explain its importance in manufacturing.

Elements and Performance Criteria

MSME/PGDTD/01

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

- PC1.** • Accurately interpret complex technical drawings and blueprints for CNC machining tasks, ensuring specifications are understood and met
- PC2.** • Develop, input, and optimize advanced CNC programs, ensuring efficient tool paths, minimal waste, and precise machining outcomes.
- PC3.** • Oversee and perform the setup, calibration, and alignment of CNC machines for a variety of materials and components, ensuring high accuracy and quality.
- PC4.** • Select appropriate tools and cutting parameters for specific machining tasks, ensuring optimal performance and tool longevity, analyze and evaluate the selection criteria



Qualification Pack

- PC5.** • Implement advanced quality control techniques, inspecting machined parts for accuracy, and adjusting processes to meet tight tolerances.
- PC6.** • Provide guidance and training to junior machinists and operators, ensuring adherence to safety protocols and quality standards.
- PC7.** • Diagnose and resolve complex CNC programming or machining issues, ensuring minimal downtime and maintaining productivity
- PC8.** • Identify opportunities for process improvement and implement changes to optimize production efficiency and reduce costs.
- PC9.** • Ensure adherence to workplace safety standards and CNC machine operating procedures, complying with all relevant regulations and guidelines.
- PC10.** • Collaborate with engineering, production, and quality assurance teams to ensure that all machining processes meet project goals and timelines.



Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>MSME/PGDTD/01</i>	-	100	-	-
PC1. <ul style="list-style-type: none"> Accurately interpret complex technical drawings and blueprints for CNC machining tasks, ensuring specifications are understood and met 	-	-	-	-
PC2. <ul style="list-style-type: none"> Develop, input, and optimize advanced CNC programs, ensuring efficient tool paths, minimal waste, and precise machining outcomes. 	-	-	-	-
PC3. <ul style="list-style-type: none"> Oversee and perform the setup, calibration, and alignment of CNC machines for a variety of materials and components, ensuring high accuracy and quality. 	-	-	-	-
PC4. <ul style="list-style-type: none"> Select appropriate tools and cutting parameters for specific machining tasks, ensuring optimal performance and tool longevity, analyze and evaluate the selection criteria 	-	-	-	-
PC5. <ul style="list-style-type: none"> Implement advanced quality control techniques, inspecting machined parts for accuracy, and adjusting processes to meet tight tolerances. 	-	-	-	-
PC6. <ul style="list-style-type: none"> Provide guidance and training to junior machinists and operators, ensuring adherence to safety protocols and quality standards. 	-	-	-	-
PC7. <ul style="list-style-type: none"> Diagnose and resolve complex CNC programming or machining issues, ensuring minimal downtime and maintaining productivity 	-	-	-	-



Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC8. <ul style="list-style-type: none">Identify opportunities for process improvement and implement changes tooptimize production efficiency and reduce costs.	-	-	-	-
PC9. <ul style="list-style-type: none">Ensure adherence to workplace safety standards and CNC machineoperating procedures, complying with all relevant regulations and guidelines.	-	-	-	-
PC10. <ul style="list-style-type: none">Collaborate with engineering, production, and quality assurance teams toensure that all machining processes meet project goals and timelines.	-	-	-	-
NOS Total	-	100	-	-



Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3009
NOS Name	Product Manufacturing with CNC Programming And Machining
Sector	Capital Goods
Sub-Sector	
Occupation	Designing
NSQF Level	6.5
Credits	3
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2030
NSQF Clearance Date	08/05/2025



Qualification Pack

MSME/CSC/N3029: Employability Skills / Entrepreneurship

Description

Developing a detailed understanding of entrepreneurship along with the perspective of initiating and propelling new ventures. 2) Developing the linkage between strategy, innovation, entrepreneurship and creativity. 3) Inculcating the role of Intellectual Property perspective and Innovation as the key to entrepreneurship

Scope

The scope covers the following :

- Developing a detailed understanding of entrepreneurship along with the perspective of initiating and propelling new ventures.
- 2) Developing the linkage between strategy, innovation, entrepreneurship and creativity.
- 3) Inculcating the role of Intellectual Property perspective and Innovation as the key to entrepreneurship

Elements and Performance Criteria

MSME/ES/02

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

- PC1.** Introduction to Employability Skills
- PC2.** Constitutional values - Citizenship Entrepreneurial process
- PC3.** Becoming a Professional in the 21st Century
- PC4.** Basic English Skills
- PC5.** Career Development & Goal Setting
- PC6.** Communication Skills
- PC7.** Diversity & Inclusion
- PC8.** Financial and Legal Literacy
- PC9.** Essential Digital Skills
- PC10.** Entrepreneurship
- PC11.** Customer Service



Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>MSME/ES/02</i>	100	-	-	-
PC1. Introduction to Employability Skills	-	-	-	-
PC2. Constitutional values - Citizenship Entrepreneurial process	-	-	-	-
PC3. Becoming a Professional in the 21st Century	-	-	-	-
PC4. Basic English Skills	-	-	-	-
PC5. Career Development & Goal Setting	-	-	-	-
PC6. Communication Skills	-	-	-	-
PC7. Diversity & Inclusion	-	-	-	-
PC8. Financial and Legal Literacy	-	-	-	-
PC9. Essential Digital Skills	-	-	-	-
PC10. Entrepreneurship	-	-	-	-
PC11. Customer Service	-	-	-	-
NOS Total	100	-	-	-



Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3029
NOS Name	Employability Skills / Entrepreneurship
Sector	Capital Goods
Sub-Sector	
Occupation	Designing
NSQF Level	6.5
Credits	4
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2030
NSQF Clearance Date	08/05/2025



Qualification Pack

MSME/CSC/N3011: OJT-1

Description

On-the-Job Training (OJT) is a structured program designed to provide practical, hands-on experience in a real work environment. It enables trainees to apply the knowledge and skills learned in the classroom to actual job situations under the guidance of experienced mentors or supervisors. During OJT, participants learn industry-relevant tools, techniques, and work processes that enhance their technical competence, problem-solving abilities, and professional behavior.

Scope

The scope covers the following :

- On-the-Job Training (OJT) is a structured program designed to provide practical, hands-on experience in a real work environment. It enables trainees to apply the knowledge and skills learned in the classroom to actual job situations under the guidance of experienced mentors or supervisors. During OJT, participants learn industry-relevant tools, techniques, and work processes that enhance their technical competence, problem-solving abilities, and professional behavior.

Elements and Performance Criteria

OJT

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

PC1. viva voce



Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>OJT</i>	-	-	-	100
PC1. viva voce	-	-	-	-
NOS Total	-	-	-	100



Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3011
NOS Name	OJT-1
Sector	Capital Goods
Sub-Sector	
Occupation	Designing
NSQF Level	6.5
Credits	10
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2030
NSQC Clearance Date	08/05/2025

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



Qualification Pack

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
MSME/CSC/N3030.Additive manufacturing	100	-	-	-	100	5
MSME/CSC/N3028.Innovative Design Techniques and Research Methodology	100	-	-	-	100	5
MSME/CSC/N3027.FEA using CAE Software	-	100	-	-	100	5
MSME/CSC/N3026.Design of Tools with Advance CAD Software Module II (Creoparametric)	-	100	-	-	100	5
MSME/CSC/N3025.Manufacturing Process Planning and Heat Treatment	100	-	-	-	100	5
MSME/CSC/N3024.Mechanical Measurement and Total Quality Management p	-	100	-	-	100	5
MSME/CSC/N3023.Mechanical Measurements and Total Quality Management	100	-	-	-	100	5
MSME/CSC/N3022.Design of Metal Die Casting P	-	100	-	-	100	5
MSME/CSC/N3021.Design of Metal Die Casting	100	-	-	-	100	5
MSME/CSC/N3020.Mold Design for Plastic Parts Practical	-	100	-	-	100	5
MSME/CSC/N3019.Mold Design for Plastic Part	100	-	-	-	100	5
MSME/CSC/N3018.Design of Tools with Advance Cad Software Module I	-	100	-	-	100	5
MSME/CSC/N3017.Stamping Die Design p	-	100	-	-	100	5
MSME/CSC/N3016.Stamping Die Design	100	-	-	-	100	5



Qualification Pack

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
MSME/CSC/N3015.Design of Work holding Devices And Gauges p	-	100	-	-	100	5
MSME/CSC/N3014.Design of Work holding Devices And Gauges	100	-	-	-	100	5
MSME/CSC/N3013.Advance Manufacturing Practices Using Cam Software	-	100	-	-	100	5
MSME/CSC/N3012.Engineering Drafting And Modelling Using CAD Software	-	100	-	-	100	5
MSME/CSC/N3009.Product Manufacturing with CNC Programming And Machining	-	100	-	-	100	5
MSME/CSC/N3029.Employability Skills / Entrepreneurship	100	-	-	-	100	3
MSME/CSC/N3011.OJT-1	-	-	-	100	100	2
Total	900	1100	-	100	2100	100



Qualification Pack

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.



Qualification Pack

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.