Qualification Pack

TECHNICIAN -CNC MACHINING

QP Code: MSME/CSC/Q3501

Version: 1.0

NSQF Level: 4

MSME TECHNOLOGY CENTRE ||
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Contents

Qualification Pack

MSME/CSC/Q3501: TECHNICIAN -CNC MACHINING

Brief Job Description

After attaining this qualification, learner will be able to Perform Machine setup , Job setup and operate the machine.

Personal Attributes

After attaining this qualification, learner will be able to Perform Machine setup , Job setup and operate the machine.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. MSME/CSC/N3505: Generate part Programms using CAM Tools

2. MSME/CSC/N3504: Create Part drwaing using CAD Software

3. MSME/CSC/N3503: Create CNC Programms and carry out CNC Machining operations

4. MSME/CSC/N3502: Create CNC Programms and carry out CNC Machining operations

5. MSME/CSC/N3501: Fundamentals of CNC Technology

6. MSME/CSC/N3506: Employability Skills 05

Qualification Pack (QP) Parameters

Sector	Capital Goods
Sub-Sector	Machine Tools
Occupation	Machine Operation 02
Country	India
NSQF Level	4
Credits	20
Aligned to NCO/ISCO/ISIC Code	(Metal Working Machine Tool Setters and Operators)

Qualification Pack

Minimum Educational Qualification & Experience	10th grade pass plus 2-year NTC (10th grade pass with two years of any combination of NTC/NAC/CITS /ITI in relevant trades or equivalent.) with NA of experience OR Previous relevant Qualification of NSQF Level (Previous relevant Qualification of NSQF Level 3.5) with 1.5 years of experience OR Previous relevant Qualification of NSQF Level (Previous relevant Qualification of NSQF Level 3) with 3 Years of experience OR 12th grade Pass with NA of experience
Minimum Level of Education for Training in School	
Pre-Requisite License or Training	NA
Minimum Job Entry Age	17 Years
Last Reviewed On	NA
Next Review Date	30/04/2027
NSQC Approval Date	30/04/2024
Version	1.0
Reference code on NQR	NCVET- QG-04-CG-02411-2024-V1-MSME
NQR Version	1.0

MSME/CSC/N3505: Generate part Programms using CAM Tools

Description

The aim of this course student should be able to Understand capabilities of CAM Software like Master CAM.

Scope

The scope covers the following :

- The aim of this course student should be able to Understand capabilities of CAM Software like Master CAM.

Elements and Performance Criteria

MSME/ACCCM/04 Generate part Programs using CAM Tools.

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

PC1. • Compare the conventional machines with CNC machines & Describe the codes and its • function

PC2. Use codes and Write programmes& Do practice on CNC by using G-codes and M-codes.

PC3. Write a programme for Chamfer, circular movement, label setting

PC4. write a program for contouring operation taking tool compensation by setting the label.

PC5. • Describe pocketing , polar movement, peck drilling, mirror cycle, datum shift in CNC • programming

PC6. Do the pocketing practice of rectangular and circular type.

PC7. • Use polar movement, peck drilling, mirror cycle, datum shift, and peck drilling cycle on the • machine

PC8. • Do practice on m-codes and g-codes for turning. & Run the cycle for rough turning, facing, • chamfering.

PC9. Write codes for grooving and peck drilling and threading

PC10. Demonstrate grooving and peck drilling and threading (internal & external)

PC11. Do practice by running the machine using sub-programme for boring, centre drilling

PC12. • Describe CAM technology & Explain the benefits of CAM & Identify the toolbar and use • functional key.

PC13. • Describe line , rectangle , rectangle shape, circle & arc, fillet ,fillet chain, chamfer , • chamfer chain , polygon , ellipse & Use the icon for the required command to draw • the assigned geometry

PC14. • Describe translate, mirror, rotate, trim, spline, scale, move to origin, offset, offset • contour, rectangular array & Do the 2-D modeling by using the icons for different • command.

PC15. • Describe the purpose, function and procedure for letter, point, spiral, and helix, break • two pieces, trim many joint entity, close arc, break many pieces, simplify. & Do • modeling using these icons of Master-CAM.

PC16. • Describe break at intersection, break circle, break drafting into line, convert to nurbs, • modify spline, x hatch , dimension tools , dimension option , note.& Do modeling • using these icons of Master-CAM.

PC17. • Explain surface modeling, 3D Environment, & Describe the use of 3D tool bar, draft,
• extrude, fillet, trim.

PC18. • Demonstrate introduction to surface modeling, 3D Environment, used of 3D tool bar,
• draft, extrude, fillet, trim.Create 3-D models using these icons.

PC19. • Describe the function of icons such as ruled / lofted, revolved, offset, swept & Generate
• 3-Dprofile using those icons.

PC20. • Describe net surface, fence, extend, flat boundary, fill holes, remove boundary.
• Demonstrate split, untrim , 2 surface blend , 3 surface blend , 3fillet blend , project.

PC21. Explain types of tool path, step to generate a tool path.

PC22. Describe use of machining tool bars

PC23. Generate tool path using machining toolbar and other commands

PC24. Do the machining using the options like 2-D countering, pocketing, 2-D drilling, etc

PC25. • Describe the function of the commands, surface rough (pocket , parallel , radial) surface
• finish (parallel , radial), flow line , contour , shallow , project , pencil.

PC26. Demonstrate the use of those commands and its use.

PC27. Do practice of generating the tool path and programmes for lathe operation.

PC28. • OJT Report:
• Mentioning the process and procedure
• carried by the trainee on daily basis for
• completing the assign task duly endorsed by
• the authorized personnel and The report
• must contain:
• ☐ Details of Department/ Organization
• ☐ Brief Job description
• ☐ Daily work activity
• ☐ Specific problem face if any with the solution.
• ☐ Technical Books referred during the OJT
• Conclusion

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
MSME/ACCCM/04 Generate part Programs using CAM Tools.	-	**100**	-	-
PC1. • Compare the conventional machines with CNC machines & Describe the codes and its • function	-	-	-	-
PC2. Use codes and Write programmes& Do practice on CNC by using G-codes and M-codes.	-	-	-	-
PC3. Write a programme for Chamfer, circular movement, label setting	-	-	-	-
PC4. write a program for contouring operation taking tool compensation by setting the label.	-	-	-	-
PC5. • Describe pocketing , polar movement, peck drilling, mirror cycle, datum shift in CNC • programming	-	-	-	-
PC6. Do the pocketing practice of rectangular and circular type.	-	-	-	-
PC7. • Use polar movement, peck drilling, mirror cycle, datum shift, and peck drilling cycle on the • machine	-	-	-	-
PC8. • Do practice on m-codes and g-codes for turning. & Run the cycle for rough turning, facing, • chamfering.	-	-	-	-
PC9. Write codes for grooving and peck drilling and threading	-	-	-	-
PC10. Demonstrate grooving and peck drilling and threading (internal & external)	-	-	-	-
PC11. Do practice by running the machine using sub-programme for boring, centre drilling	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC12. • Describe CAM technology & Explain the benefits of CAM & Identify the toolbar and use • functional key.	-	-	-	-
PC13. • Describe line , rectangle , rectangle shape, circle & arc, fillet ,fillet chain, chamfer , • chamfer chain , polygon , ellipse & Use the icon for the required command to draw • the assigned geometry	-	-	-	-
PC14. • Describe translate, mirror, rotate, trim, spline, scale, move to origin, offset, offset • contour, rectangular array & Do the 2-D modeling by using the icons for different • command.	-	-	-	-
PC15. • Describe the purpose, function and procedure for letter, point, spiral, and helix, break • two pieces, trim many joint entity, close arc, break many pieces, simplify. & Do • modeling using these icons of Master-CAM.	-	-	-	-
PC16. • Describe break at intersection, break circle, break drafting into line, convert to nurbs, • modify spline, x hatch , dimension tools , dimension option , note.& Do modeling • using these icons of Master-CAM.	-	-	-	-
PC17. • Explain surface modeling, 3D Environment, & Describe the use of 3D tool bar, draft, • extrude, fillet, trim.	-	-	-	-
PC18. • Demonstrate introduction to surface modeling, 3D Environment, used of 3D tool bar, • draft, extrude, fillet, trim.Create 3-D models using these icons.	-	-	-	-
PC19. • Describe the function of icons such as ruled / lofted, revolved, offset, swept & Generate • 3-Dprofile using those icons.	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC20. • Describe net surface, fence, extend, flat boundary, fill holes, remove boundary. • Demonstrate split, untrim , 2 surface blend , 3 surface blend , 3fillet blend , project.	-	-	-	-
PC21. Explain types of tool path, step to generate a tool path.	-	-	-	-
PC22. Describe use of machining tool bars	-	-	-	-
PC23. Generate tool path using machining toolbar and other commands	-	-	-	-
PC24. Do the machining using the options like 2-D countering, pocketing, 2-D drilling, etc	-	-	-	-
PC25. • Describe the function of the commands, surface rough (pocket , parallel , radial) surface • finish (parallel , radial), flow line , contour , shallow , project , pencil.	-	-	-	-
PC26. Demonstrate the use of those commands and its use.	-	-	-	-
PC27. Do practice of generating the tool path and programmes for lathe operation.	-	-	-	-
PC28. • OJT Report: • Mentioning the process and procedure • carried by the trainee on daily basis for • completing the assign task duly endorsed by • the authorized personnel and The report • must contain: • ⬜ Details of Department/ Organization • ⬜ Brief Job description • ⬜ Daily work activity • ⬜ Specific problem face if any with the solution. • ⬜ Technical Books referred during the OJT • Conclusion	-	-	-	-
NOS Total	-	100	-	-

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3505
NOS Name	Generate part Programms using CAM Tools
Sector	Capital Goods
Sub-Sector	
Occupation	Machine Operation 02
NSQF Level	4
Credits	2
Version	1.0
Last Reviewed Date	30/04/2024
Next Review Date	30/04/2027
NSQC Clearance Date	30/04/2024

MSME/CSC/N3504: Create Part drwaing using CAD Software

Description

After completion of course Student should be able to Explain the application of engineering drawing.

Scope

The scope covers the following :

- After completion of course Student should be able to Explain the application of engineering drawing.

Elements and Performance Criteria

MSME/ACCCM/03 Create Part drawing using CAD Software

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

PC1. Describe co-ordinate system used in CAD/CAM & Describe the CAD/CAM software.

PC2. Use auto-cad to draw geometry by co-ordinate system.

PC3. Describe the functions used in using AutoCAD software

PC4. Write the purpose of each function/mouse function, functional keys

PC5. Set the standard paper size in the AutoCAD

PC6. • Prepare the drawings in auto-cad by using limits, line, construction line, ray, trim, extend, • erase.

PC7. Use commands to prepare the drawings- circle, rectangle, copy, move, offset, rotate

PC8. Describe the purpose of array, mirror, scale, stretch, polyline, polygon, and arc.

PC9. Use commands array, mirror, scale, stretch, polyline, polygon, and arc.

PC10. Identify the proper commands and draw the given drawings in auto-cad

PC11. • Describe the purpose of commands spline, ellipse, revision cloud, region, explode, join, • break, break at a point.

PC12. Use the commands properly while drafting in Auto-CAD.

PC13. Describe point, point style, divide, measure, fillet, chamfer, blend curve

PC14. Use commands point, point style, divide, measure, fillet, chamfer, blend curve

PC15. Identify the proper commands and draw the given drawings in auto-cad.

PC16. Describe the commands hatch, gradient, details of sectional view.

PC17. Use/operate the commands hatch, gradient, details of sectional view.

PC18. Identify the commands for proper sectioning methods as per the material

PC19. Describe the commands text, mtext, text style, arc aligned text, mirror text

PC20. Use the commands text, mtext, text style, arc aligned text, mirror text

PC21. Use the commands for putting the text on the drawing.

PC22. • Draw the title block using those commands using auto-cad. & Provide dimension on the • geometry by using auto-cad software.

PC23. • Describe solid modeling, 3d environment & toolbars, extrude, revolve, Boolean
• operation, sweep, loft, press pull, 3d move, 3d rotate, 3d array, 3d align, solid editing
• toolbar, primitives.

PC24. • Prepare the solid model by using the commands in auto-cad and do the editing whenever
• it is necessary to modify.

PC25. Explain the types of plotters & Plot the drawing with the help of auto-cad software.

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
MSME/ACCCM/03 Create Part drawing using CAD Software	-	**100**	-	-
PC1. Describe co-ordinate system used in CAD/CAM & Describe the CAD/CAM software.	-	-	-	-
PC2. Use auto-cad to draw geometry by co-ordinate system.	-	-	-	-
PC3. Describe the functions used in using AutoCAD software	-	-	-	-
PC4. Write the purpose of each function/mouse function, functional keys	-	-	-	-
PC5. Set the standard paper size in the AutoCAD	-	-	-	-
PC6. • Prepare the drawings in auto-cad by using limits, line, construction line, ray, trim, extend, • erase.	-	-	-	-
PC7. Use commands to prepare the drawings- circle, rectangle, copy, move, offset, rotate	-	-	-	-
PC8. Describe the purpose of array, mirror, scale, stretch, polyline, polygon, and arc.	-	-	-	-
PC9. Use commands array, mirror, scale, stretch, polyline, polygon, and arc.	-	-	-	-
PC10. Identify the proper commands and draw the given drawings in auto-cad	-	-	-	-
PC11. • Describe the purpose of commands spline, ellipse, revision cloud, region, explode, join, • break, break at a point.	-	-	-	-
PC12. Use the commands properly while drafting in Auto-CAD.	-	-	-	-
PC13. Describe point, point style, divide, measure, fillet, chamfer, blend curve	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC14. Use commands point, point style, divide, measure, fillet, chamfer, blend curve	-	-	-	-
PC15. Identify the proper commands and draw the given drawings in auto-cad.	-	-	-	-
PC16. Describe the commands hatch, gradient, details of sectional view.	-	-	-	-
PC17. Use/operate the commands hatch, gradient, details of sectional view.	-	-	-	-
PC18. Identify the commands for proper sectioning methods as per the material	-	-	-	-
PC19. Describe the commands text, mtext, text style, arc aligned text, mirror text	-	-	-	-
PC20. Use the commands text, mtext, text style, arc aligned text, mirror text	-	-	-	-
PC21. Use the commands for putting the text on the drawing.	-	-	-	-
PC22. • Draw the title block using those commands using auto-cad. & Provide dimension on the • geometry by using auto-cad software.	-	-	-	-
PC23. • Describe solid modeling, 3d environment & toolbars, extrude, revolve, Boolean • operation, sweep, loft, press pull, 3d move, 3d rotate, 3d array, 3d align, solid editing • toolbar, primitives.	-	-	-	-
PC24. • Prepare the solid model by using the commands in auto-cad and do the editing whenever • it is necessary to modify.	-	-	-	-
PC25. Explain the types of plotters & Plot the drawing with the help of auto-cad software.	-	-	-	-
NOS Total	**-**	**100**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3504
NOS Name	Create Part drwaing using CAD Software
Sector	Capital Goods
Sub-Sector	
Occupation	Machine Operation 02
NSQF Level	4
Credits	2
Version	1.0
Last Reviewed Date	30/04/2024
Next Review Date	30/04/2027
NSQC Clearance Date	30/04/2024

MSME/CSC/N3503: Create CNC Programms and carry out CNC Machining operations

Description

After completion of course Student should be able to Explain applications and advantages of CNC machines

Scope

The scope covers the following :

- After completion of course Student should be able to Explain applications and advantages of CNC machines

Elements and Performance Criteria

MSME/ACCCM/02 Create CNC Programs and carry out CNC Machining operations

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

PC1. Explain the types of CNC Machines, Advantages & Limitations of CNC applications

PC2. Explain CNC interpolation, open loop & close loop control systems with feedback devices

PC3. Explain co-ordinate systems & points mode.

PC4. Identify Cutting Tools and Tool Holders from the standard (ISO Standard)

PC5. Discuss operations of single& Multi point cutting tool

PC6. Selection of standard tools/ cutters/Tool Holders as per requirement

PC7. Explain Tool Holder Types

PC8. Define Milling Insert Shapes

PC9. Describe Operating Conditions

PC10. Explain Work holding methods

PC11. Identify and Explain Tool holding Devices

PC12. Explain Cutting parameters

PC13. Discuss the need of different oils & lubricants used

PC14. • Describe standard mathematical formulae used in calculation required for machine tool • operation.

PC15. Calculations of machining parameters like cutting speed, cutting feed, depth of cut etc.

PC16. Explain Coordinate System and Machine Geometry

PC17. Explain Axis – Orientation

PC18. Define Work sketch and Calculation

PC19. • Use appropriate sources to obtain the required information e.g. Numerical control on CNC • machine, types of CNC control

PC20. Check that all the equipment is correctly connected and in a safe and usable working condition

PC21. • Select Appropriate Raw Material as per size of the Parts to be manufactured mentioned in
• drawing and specification

PC22. Calculate parameters &set a references for the various operations

PC23. Use appropriate techniques to create CNC program that are sufficiently and clearly detailed

PC24. Use codes and other references that follow the required conventions

PC25. Plan the machining activities before starting them.

PC26. Set up the suitable template/folder

PC27. Set up and check that all peripheral devices are connected and correctly operating

PC28. Confirm that the program is as per job specifications and contains all relevant information

PC29. Make sure that programs are checked and approved by the appropriate person

PC30. Save the program in the appropriate file type and location

PC31. • Prepare programs, demonstrate, simulate and operate CNC Milling, machines for various
• machining operations.

PC32. Execute program and inspect simple geometrical forms / standard parts

PC33. Explain the type of maintenance and Maintenance checklist

PC34. Carry out Routine Maintenance activity as per standard / checklist

PC35. • Safe handling of tools, equipment & CNC Machines & Personal safety tool as per company
• product requirement.

PC36. Use protective clothing/equipment for specific tasks on CNC Machine

PC37. • OJT Report:
• Mentioning the process and procedure carried by the trainee for completing the assign task duly
• endorsed by the authorized personnel and The report must contain:
• ⬜ Details of Department/ Organization
• ⬜ Brief Job description&work activity
• ⬜ Specific problem face if any with the solution.
• ⬜ Technical Books referred during the OJT
• ⬜ Conclusion

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
MSME/ACCCM/02 Create CNC Programs and carry out CNC Machining operations	-	**100**	-	-
PC1. Explain the types of CNC Machines, Advantages & Limitations of CNC applications	-	-	-	-
PC2. Explain CNC interpolation, open loop & close loop control systems with feedback devices	-	-	-	-
PC3. Explain co-ordinate systems & points mode.	-	-	-	-
PC4. Identify Cutting Tools and Tool Holders from the standard (ISO Standard)	-	-	-	-
PC5. Discuss operations of single& Multi point cutting tool	-	-	-	-
PC6. Selection of standard tools/ cutters/Tool Holders as per requirement	-	-	-	-
PC7. Explain Tool Holder Types	-	-	-	-
PC8. Define Milling Insert Shapes	-	-	-	-
PC9. Describe Operating Conditions	-	-	-	-
PC10. Explain Work holding methods	-	-	-	-
PC11. Identify and Explain Tool holding Devices	-	-	-	-
PC12. Explain Cutting parameters	-	-	-	-
PC13. Discuss the need of different oils & lubricants used	-	-	-	-
PC14. • Describe standard mathematical formulae used in calculation required for machine tool • operation.	-	-	-	-
PC15. Calculations of machining parameters like cutting speed, cutting feed, depth of cut etc.	-	-	-	-
PC16. Explain Coordinate System and Machine Geometry	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC17. Explain Axis – Orientation	-	-	-	-
PC18. Define Work sketch and Calculation	-	-	-	-
PC19. • Use appropriate sources to obtain the required information e.g. Numerical control on CNC • machine, types of CNC control	-	-	-	-
PC20. Check that all the equipment is correctly connected and in a safe and usable working condition	-	-	-	-
PC21. • Select Appropriate Raw Material as per size of the Parts to be manufactured mentioned in • drawing and specification	-	-	-	-
PC22. Calculate parameters &set a references for the various operations	-	-	-	-
PC23. Use appropriate techniques to create CNC program that are sufficiently and clearly detailed	-	-	-	-
PC24. Use codes and other references that follow the required conventions	-	-	-	-
PC25. Plan the machining activities before starting them.	-	-	-	-
PC26. Set up the suitable template/folder	-	-	-	-
PC27. Set up and check that all peripheral devices are connected and correctly operating	-	-	-	-
PC28. Confirm that the program is as per job specifications and contains all relevant information	-	-	-	-
PC29. Make sure that programs are checked and approved by the appropriate person	-	-	-	-
PC30. Save the program in the appropriate file type and location	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC31. • Prepare programs, demonstrate, simulate and operate CNC Milling, machines for various • machining operations.	-	-	-	-
PC32. Execute program and inspect simple geometrical forms / standard parts	-	-	-	-
PC33. Explain the type of maintenance and Maintenance checklist	-	-	-	-
PC34. Carry out Routine Maintenance activity as per standard / checklist	-	-	-	-
PC35. • Safe handling of tools, equipment & CNC Machines & Personal safety tool as per company • product requirement.	-	-	-	-
PC36. Use protective clothing/equipment for specific tasks on CNC Machine	-	-	-	-
PC37. • OJT Report: • Mentioning the process and procedure carried by the trainee for completing the assign task duly • endorsed by the authorized personnel and The report must contain: • ⬜ Details of Department/ Organization • ⬜ Brief Job description&work activity • ⬜ Specific problem face if any with the solution. • ⬜ Technical Books referred during the OJT • ⬜ Conclusion	-	-	-	-
NOS Total	**-**	**100**	**-**	**-**

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3503
NOS Name	Create CNC Programms and carry out CNC Machining operations
Sector	Capital Goods
Sub-Sector	
Occupation	Machine Operation 02
NSQF Level	4
Credits	12
Version	1.0
Last Reviewed Date	30/04/2024
Next Review Date	30/04/2027
NSQC Clearance Date	30/04/2024

MSME/CSC/N3502: Create CNC Programms and carry out CNC Machining operations

Description

After completion of course Student should be able to Explain applications and advantages of CNC machines

Scope

The scope covers the following :

- After completion of course Student should be able to Explain applications and advantages of CNC machines

Elements and Performance Criteria

MSME/ACCCM/02 Create CNC Programs and carry out CNC Machining operations

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

PC1. Explain the types of CNC Machines, Advantages & Limitations of CNC applications

PC2. Explain CNC interpolation, open loop & close loop control systems with feedback devices

PC3. Explain co-ordinate systems & points mode.

PC4. Identify Cutting Tools and Tool Holders from the standard (ISO Standard)

PC5. Discuss operations of single& Multi point cutting tool

PC6. Selection of standard tools/ cutters/Tool Holders as per requirement

PC7. Explain Tool Holder Types

PC8. Define Milling Insert Shapes

PC9. Describe Operating Conditions

PC10. Explain Work holding methods

PC11. Identify and Explain Tool holding Devices

PC12. Explain Cutting parameters

PC13. Discuss the need of different oils & lubricants used

PC14. • Describe standard mathematical formulae used in calculation required for machine tool • operation.

PC15. Calculations of machining parameters like cutting speed, cutting feed, depth of cut etc.

PC16. Explain Coordinate System and Machine Geometry

PC17. Explain Axis – Orientation

PC18. Define Work sketch and Calculation

PC19. • Use appropriate sources to obtain the required information e.g. Numerical control on CNC • machine, types of CNC control

PC20. Check that all the equipment is correctly connected and in a safe and usable working condition

PC21. • Select Appropriate Raw Material as per size of the Parts to be manufactured mentioned in
• drawing and specification

PC22. Calculate parameters &set a references for the various operations

PC23. Use appropriate techniques to create CNC program that are sufficiently and clearly detailed

PC24. Use codes and other references that follow the required conventions

PC25. Plan the machining activities before starting them.

PC26. Set up the suitable template/folder

PC27. Set up and check that all peripheral devices are connected and correctly operating

PC28. Confirm that the program is as per job specifications and contains all relevant information

PC29. Make sure that programs are checked and approved by the appropriate person

PC30. Save the program in the appropriate file type and location

PC31. • Prepare programs, demonstrate, simulate and operate CNC Milling, machines for various
• machining operations.

PC32. Execute program and inspect simple geometrical forms / standard parts

PC33. Explain the type of maintenance and Maintenance checklist

PC34. Carry out Routine Maintenance activity as per standard / checklist

PC35. • Safe handling of tools, equipment & CNC Machines & Personal safety tool as per company
• product requirement.

PC36. Use protective clothing/equipment for specific tasks on CNC Machine

PC37. • OJT Report:
• Mentioning the process and procedure carried by the trainee for completing the assign task duly
• endorsed by the authorized personnel and The report must contain:
• ⬜ Details of Department/ Organization
• ⬜ Brief Job description&work activity
• ⬜ Specific problem face if any with the solution.
• ⬜ Technical Books referred during the OJT
• ⬜ Conclusion

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
MSME/ACCCM/02 Create CNC Programs and carry out CNC Machining operations	**100**	-	-	-
PC1. Explain the types of CNC Machines, Advantages & Limitations of CNC applications	-	-	-	-
PC2. Explain CNC interpolation, open loop & close loop control systems with feedback devices	-	-	-	-
PC3. Explain co-ordinate systems & points mode.	-	-	-	-
PC4. Identify Cutting Tools and Tool Holders from the standard (ISO Standard)	-	-	-	-
PC5. Discuss operations of single& Multi point cutting tool	-	-	-	-
PC6. Selection of standard tools/ cutters/Tool Holders as per requirement	-	-	-	-
PC7. Explain Tool Holder Types	-	-	-	-
PC8. Define Milling Insert Shapes	-	-	-	-
PC9. Describe Operating Conditions	-	-	-	-
PC10. Explain Work holding methods	-	-	-	-
PC11. Identify and Explain Tool holding Devices	-	-	-	-
PC12. Explain Cutting parameters	-	-	-	-
PC13. Discuss the need of different oils & lubricants used	-	-	-	-
PC14. • Describe standard mathematical formulae used in calculation required for machine tool • operation.	-	-	-	-
PC15. Calculations of machining parameters like cutting speed, cutting feed, depth of cut etc.	-	-	-	-
PC16. Explain Coordinate System and Machine Geometry	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC17. Explain Axis – Orientation	-	-	-	-
PC18. Define Work sketch and Calculation	-	-	-	-
PC19. • Use appropriate sources to obtain the required information e.g. Numerical control on CNC • machine, types of CNC control	-	-	-	-
PC20. Check that all the equipment is correctly connected and in a safe and usable working condition	-	-	-	-
PC21. • Select Appropriate Raw Material as per size of the Parts to be manufactured mentioned in • drawing and specification	-	-	-	-
PC22. Calculate parameters &set a references for the various operations	-	-	-	-
PC23. Use appropriate techniques to create CNC program that are sufficiently and clearly detailed	-	-	-	-
PC24. Use codes and other references that follow the required conventions	-	-	-	-
PC25. Plan the machining activities before starting them.	-	-	-	-
PC26. Set up the suitable template/folder	-	-	-	-
PC27. Set up and check that all peripheral devices are connected and correctly operating	-	-	-	-
PC28. Confirm that the program is as per job specifications and contains all relevant information	-	-	-	-
PC29. Make sure that programs are checked and approved by the appropriate person	-	-	-	-
PC30. Save the program in the appropriate file type and location	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC31. • Prepare programs, demonstrate, simulate and operate CNC Milling, machines for various • machining operations.	-	-	-	-
PC32. Execute program and inspect simple geometrical forms / standard parts	-	-	-	-
PC33. Explain the type of maintenance and Maintenance checklist	-	-	-	-
PC34. Carry out Routine Maintenance activity as per standard / checklist	-	-	-	-
PC35. • Safe handling of tools, equipment & CNC Machines & Personal safety tool as per company • product requirement.	-	-	-	-
PC36. Use protective clothing/equipment for specific tasks on CNC Machine	-	-	-	-
PC37. • OJT Report: • Mentioning the process and procedure carried by the trainee for completing the assign task duly • endorsed by the authorized personnel and The report must contain: • ⬜ Details of Department/ Organization • ⬜ Brief Job description&work activity • ⬜ Specific problem face if any with the solution. • ⬜ Technical Books referred during the OJT • ⬜ Conclusion	-	-	-	-
NOS Total	**100**	-	-	-

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3502
NOS Name	Create CNC Programms and carry out CNC Machining operations
Sector	Capital Goods
Sub-Sector	
Occupation	Machine Operation 02
NSQF Level	4
Credits	1
Version	1.0
Last Reviewed Date	30/04/2024
Next Review Date	30/04/2027
NSQC Clearance Date	30/04/2024

MSME/CSC/N3501: Fundamentals of CNC Technology

Description

After completion of course Student should be able to Explain applications and advantages of CNC machines

Scope

The scope covers the following :

- After completion of course Student should be able to Explain applications and advantages of CNC machines

Elements and Performance Criteria

MSME/ACCCM/01 Fundamentals of CNC Technology

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

PC1. Explain the types of CNC Machines, Advantages & Limitations of CNC applications.

PC2. • Explain CNC interpolation, open loop & close loop control systems with feedback
• devices

PC3. Explain co-ordinate systems & points mode.

PC4. Identify Cutting Tools and Tool Holders from the standard (ISO Standard)

PC5. Discuss operations of single point cutting tool

PC6. Selection of standard tools/ cutters/Tool Holders as per requirement

PC7. Explain Tool Holder Types / Styles (LH, RH and Neutral)

PC8. Define Turning Insert Shapes

PC9. Describe Operating Conditions

PC10. Explain Work holding methods

PC11. Identify and Explain Tool holding Devices

PC12. Explain Cutting parameters

PC13. Discuss the need of different oils & lubricants used

PC14. • Describe standard mathematical formulae used in calculation required for machine
• tool operation.

PC15. Calculations of machining parameters like cutting speed, cutting feed, depth of cut etc.

PC16. Explain Coordinate System and Machine Geometry

PC17. Explain Axis – Orientation

PC18. Define Work sketch and Calculation

PC19. • Use appropriate sources to obtain the required information e.g. Numerical control on
• CNC machine, types of CNC control

PC20. • Check that all the equipment is correctly connected and in a safe and usable working
• condition

PC21. • Select Appropriate Raw Material as per size of the Parts to be manufactured
• mentioned in drawing and specification

PC22. Calculate parameters & set a references for the various operations

PC23. • Use appropriate techniques to create CNC program that are sufficiently and clearly
• detailed

PC24. Use codes and other references that follow the required conventions

PC25. Plan the machining activities before starting them.

PC26. Set up the suitable template/folder

PC27. Set up and check that all peripheral devices are connected and correctly operating

PC28. • Confirm that the program is as per job specifications and contains all relevant
• information

PC29. Make sure that programs are checked and approved by the appropriate person

PC30. Save the program in the appropriate file type and location

PC31. • Prepare programs, demonstrate, simulate and operate CNC lathe, machines for various
• machining operations.

PC32. Execute program and inspect simple geometrical forms / standard parts

PC33. Explain the type of maintenance and Maintenance checklist

PC34. Carry out Routine Maintenance activity as per standard / checklist

PC35. • Safe handling of tools, equipment & CNC Machines & Personal safety tool as per
• company product requirement.

PC36. Use protective clothing / equipment for specific tasks on CNC Machine

PC37. • OJT Report:
• Mentioning the process and procedure carried by the trainee for completing the assign
• task duly endorsed by the authorized personnel and The report must contain:
• ● Details of Department/ Organization
• ● Brief Job description & work activity
• ● Specific problem face if any with the solution.
• ● Technical Books referred during the OJT
• ● Conclusion

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
MSME/ACCCM/01 Fundamentals of CNC Technology	**100**	-	-	-
PC1. Explain the types of CNC Machines, Advantages & Limitations of CNC applications.	-	-	-	-
PC2. • Explain CNC interpolation, open loop & close loop control systems with feedback • devices	-	-	-	-
PC3. Explain co-ordinate systems & points mode.	-	-	-	-
PC4. Identify Cutting Tools and Tool Holders from the standard (ISO Standard)	-	-	-	-
PC5. Discuss operations of single point cutting tool	-	-	-	-
PC6. Selection of standard tools/ cutters/Tool Holders as per requirement	-	-	-	-
PC7. Explain Tool Holder Types / Styles (LH, RH and Neutral)	-	-	-	-
PC8. Define Turning Insert Shapes	-	-	-	-
PC9. Describe Operating Conditions	-	-	-	-
PC10. Explain Work holding methods	-	-	-	-
PC11. Identify and Explain Tool holding Devices	-	-	-	-
PC12. Explain Cutting parameters	-	-	-	-
PC13. Discuss the need of different oils & lubricants used	-	-	-	-
PC14. • Describe standard mathematical formulae used in calculation required for machine • tool operation.	-	-	-	-
PC15. Calculations of machining parameters like cutting speed, cutting feed, depth of cut etc.	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC16. Explain Coordinate System and Machine Geometry	-	-	-	-
PC17. Explain Axis – Orientation	-	-	-	-
PC18. Define Work sketch and Calculation	-	-	-	-
PC19. • Use appropriate sources to obtain the required information e.g. Numerical control on • CNC machine, types of CNC control	-	-	-	-
PC20. • Check that all the equipment is correctly connected and in a safe and usable working • condition	-	-	-	-
PC21. • Select Appropriate Raw Material as per size of the Parts to be manufactured • mentioned in drawing and specification	-	-	-	-
PC22. Calculate parameters & set a references for the various operations	-	-	-	-
PC23. • Use appropriate techniques to create CNC program that are sufficiently and clearly • detailed	-	-	-	-
PC24. Use codes and other references that follow the required conventions	-	-	-	-
PC25. Plan the machining activities before starting them.	-	-	-	-
PC26. Set up the suitable template/folder	-	-	-	-
PC27. Set up and check that all peripheral devices are connected and correctly operating	-	-	-	-
PC28. • Confirm that the program is as per job specifications and contains all relevant • information	-	-	-	-
PC29. Make sure that programs are checked and approved by the appropriate person	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC30. Save the program in the appropriate file type and location	-	-	-	-
PC31. • Prepare programs, demonstrate, simulate and operate CNC lathe, machines for various • machining operations.	-	-	-	-
PC32. Execute program and inspect simple geometrical forms / standard parts	-	-	-	-
PC33. Explain the type of maintenance and Maintenance checklist	-	-	-	-
PC34. Carry out Routine Maintenance activity as per standard / checklist	-	-	-	-
PC35. • Safe handling of tools, equipment & CNC Machines & Personal safety tool as per • company product requirement.	-	-	-	-
PC36. Use protective clothing / equipment for specific tasks on CNC Machine	-	-	-	-
PC37. • OJT Report: • Mentioning the process and procedure carried by the trainee for completing the assign • task duly endorsed by the authorized personnel and The report must contain: • ● Details of Department/ Organization • ● Brief Job description & work activity • ● Specific problem face if any with the solution. • ● Technical Books referred during the OJT • ● Conclusion	-	-	-	-
NOS Total	**100**	-	-	-

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3501
NOS Name	Fundamentals of CNC Technology
Sector	Capital Goods
Sub-Sector	
Occupation	Machine Operation 02
NSQF Level	4
Credits	2
Version	1.0
Last Reviewed Date	30/04/2024
Next Review Date	30/04/2027
NSQC Clearance Date	30/04/2024

MSME/CSC/N3506: Employability Skills 05

Description

This NOS unit is about carrying out operations about learners applying basic and advanced Employability Skills concepts in real life situations to become a successful 21st century professional

Scope

The scope covers the following :

- The scope covers the following:
- plan and prepare advance employability skills activities carry out the work to plan and prepare the learners to build key knowledge and skills for career
- development in the 21st century using advanced employability skills
- documenting the record

Elements and Performance Criteria

MSME/ES/01 Employability skills

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

PC1. Explain occupational health and Safety.

PC2. Explain about safety rules.

PC3. State the name and location of people

PC4. responsible for health and safety in theworkplace

PC5. • Identify employability skills required for jobs in various industries.&Identify and
• explore learning and employability portals

PC6. • Recognize the significance of constitutional values, including civic rights and duties,
• citizenship, responsibility towards society etc. and personal values and ethics such as
• honesty, integrity, caring and respecting others, etc.

PC7. • Follow environmentally sustainable practices.&Recognize the significance of 21st
• Century Skills for employment

PC8. • Practice the 21st Century Skills such as Self-Awareness, Behavior Skills, time
• management, critical and adaptive thinking, problem-solving, creative thinking, social
• and cultural awareness, emotional awareness, learning to learn for continuous
• learning etc. in personal and professional life

PC9. • Use basic English for everyday conversation in different contexts, in person and over
• the telephone.

PC10. How to Minimize the team conflicts&Explain Ethics & values

PC11. Read and understand routine information, notes, instructions, mails, letters etc.written in English

PC12. • Write short messages, notes, letters, e-mails etc. in English & Understand the
• difference between job and career

PC13. • Prepare a career development plan with short- and long-term goals, based on
• aptitude &Discuss the main types of electronic funds transfers

PC14. • Follow verbal and non-verbal communication etiquette and active listening
  • techniques in various settings & work collaboratively with others in a team

PC15. • Communicate and behave appropriately with all genders and PwD& escalate any
  • issues related to sexual harassment at workplace according to POSH Act.

PC16. • Select financial institutions, products and services as per requirement & carry out
  • offline and online financial transactions, safely and securely.

PC17. • Identify common components of salary and compute income, expenses, taxes,
  • investments etc& identify relevant rights and laws and use legal aids to fight against
  • legal exploitation

PC18. • Operate digital devices and carry out basic internet operations securely and safely &
  • use e- mail and social media platforms and virtual collaboration tools to work
  • effectively

PC19. Use basic features of word processor, spreadsheets, and presentations.

PC20. • Identify different types of Entrepreneurship and Enterprises and assess opportunities
  • for potential business through research & develop a business plan and a work model,
  • considering the 4Ps of Marketing Product, Price, Place andPromotion.

PC21. • Identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the
  • potential business opportunity

PC22. • Identify different types of customers & identify and respond to customer requests and
  • needs in a professional manner.

PC23. Follow appropriate hygiene and grooming standards

PC24. • Create a professional Curriculum vitae (Résumé) & search for suitable jobs using
  • reliable offline and online sources such as Employment exchange, recruitment
  • agencies, newspapers etc. and job portals, respectively

PC25. • Create a professional Curriculum vitae (Résumé) & search for suitable jobs using
  • reliable offline and online sources such as Employment exchange, recruitment
  • agencies, newspapers etc. and job portals, respectively

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
MSME/ES/01 Employability skills	**100**	-	-	-
PC1. Explain occupational health and Safety.	-	-	-	-
PC2. Explain about safety rules.	-	-	-	-
PC3. State the name and location of people	-	-	-	-
PC4. responsible for health and safety in theworkplace	-	-	-	-
PC5. • Identify employability skills required for jobs in various industries.&Identify and • explore learning and employability portals	-	-	-	-
PC6. • Recognize the significance of constitutional values, including civic rights and duties, • citizenship, responsibility towards society etc. and personal values and ethics such as • honesty, integrity, caring and respecting others, etc.	-	-	-	-
PC7. • Follow environmentally sustainable practices.&Recognize the significance of 21st • Century Skills for employment	-	-	-	-
PC8. • Practice the 21st Century Skills such as Self-Awareness, Behavior Skills, time • management, critical and adaptive thinking, problem-solving, creative thinking, social • and cultural awareness, emotional awareness, learning to learn for continuous • learning etc. in personal and professional life	-	-	-	-
PC9. • Use basic English for everyday conversation in different contexts, in person and over • the telephone.	-	-	-	-
PC10. How to Minimize the team conflicts&Explain Ethics & values	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. Read and understand routine information, notes, instructions, mails, letters etc.written in English	-	-	-	-
PC12. • Write short messages, notes, letters, e-mails etc. in English & Understand the • difference between job and career	-	-	-	-
PC13. • Prepare a career development plan with short- and long-term goals, based on • aptitude &Discuss the main types of electronic funds transfers	-	-	-	-
PC14. • Follow verbal and non-verbal communication etiquette and active listening • techniques in various settings & work collaboratively with others in a team	-	-	-	-
PC15. • Communicate and behave appropriately with all genders and PwD& escalate any • issues related to sexual harassment at workplace according to POSH Act.	-	-	-	-
PC16. • Select financial institutions, products and services as per requirement & carry out • offline and online financial transactions, safely and securely.	-	-	-	-
PC17. • Identify common components of salary and compute income, expenses, taxes, • investments etc& identify relevant rights and laws and use legal aids to fight against • legal exploitation	-	-	-	-
PC18. • Operate digital devices and carry out basic internet operations securely and safely & • use e- mail and social media platforms and virtual collaboration tools to work • effectively	-	-	-	-
PC19. Use basic features of word processor, spreadsheets, and presentations.	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC20. • Identify different types of Entrepreneurship and Enterprises and assess opportunities • for potential business through research & develop a business plan and a work model, • considering the 4Ps of Marketing Product, Price, Place andPromotion.	-	-	-	-
PC21. • Identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the • potential business opportunity	-	-	-	-
PC22. • Identify different types of customers & identify and respond to customer requests and • needs in a professional manner.	-	-	-	-
PC23. Follow appropriate hygiene and grooming standards	-	-	-	-
PC24. • Create a professional Curriculum vitae (Résumé) & search for suitable jobs using • reliable offline and online sources such as Employment exchange, recruitment • agencies, newspapers etc. and job portals, respectively	-	-	-	-
PC25. • Create a professional Curriculum vitae (Résumé) & search for suitable jobs using • reliable offline and online sources such as Employment exchange, recruitment • agencies, newspapers etc. and job portals, respectively	-	-	-	-
NOS Total	**100**	-	-	-

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N3506
NOS Name	Employability Skills 05
Sector	Capital Goods
Sub-Sector	
Occupation	Machine Operation 02
NSQF Level	4
Credits	1
Version	1.0
Last Reviewed Date	30/04/2024
Next Review Date	30/04/2027
NSQC Clearance Date	30/04/2024

Assessment Guidelines and Assessment Weightage

Assessment Guidelines

As per QP

Minimum Aggregate Passing % at QP Level : 40

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

Assessment Weightage

Compulsory NOS

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
MSME/CSC/N3505.Generate part Programms using CAM Tools	-	100	-	-	100	20
MSME/CSC/N3504.Create Part drwaing using CAD Software	-	100	-	-	100	20
MSME/CSC/N3503.Create CNC Programms and carry out CNC Machining operations	-	100	-	-	100	20
MSME/CSC/N3502.Create CNC Programms and carry out CNC Machining operations	100	-	-	-	100	20
MSME/CSC/N3501.Fundamentals of CNC Technology	100	-	-	-	100	10
MSME/CSC/N3506.Employability Skills 05	100	-	-	-	100	10
Total	**300**	**300**	**-**	**-**	**600**	**100**

Acronyms

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

Glossary

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

Knowledge and Understanding (KU)	Knowledge and Understanding (KU) are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard.
Organisational Context	Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Technical Knowledge	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Core Skills/ Generic Skills (GS)	Core skills or Generic Skills (GS) are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles.
Electives	Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.
Options	Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.