SR. TECHNICIAN -MACHINE MAINTENANCE AND AUTOMATION

QP Code: MSME/CSC/Q0601

Version: 1.0

NSQF Level: 4.5

Qualification Pack

Contents

Qualification Pack

MSME/CSC/Q0601: SR. TECHNICIAN -MACHINE MAINTENANCE AND AUTOMATION

Brief Job Description

This qualification contain various module for the job role Sr, Technician (maintenance) in which students tend to get excellent career opportunities in the field of Machine Maintenance and shall be able to Upgrade professional skills of the learner to deal with technological change

Personal Attributes

This qualification contain various module for the job role Sr, Technician (maintenance) in which students tend to get excellent career opportunities in the field of Machine Maintenance and shall be able to Upgrade professional skills of the learner to deal with technological change

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. MSME/CSC/N0602: Demonstrate the Basic Machine Operation

2. MSME/CSC/N0601: Demonstrate the Basic Machine Operation

3. MSME/CSC/N0605: Maintenance of Hydraulics & Pneumatics Components.

4. MSME/CSC/N0604: Maintenance of Hydraulics & Pneumatics Components.

5. MSME/CSC/N0606: Create & Modify the Electrical circuit diagram using CAD software

6. MSME/CSC/N0612: Carry out Machine Maintenance activities (Electrical)

7. MSME/CSC/N0607: Carry out Machine Maintenance activities (Electrical)

8. MSME/CSC/N0610: Basics of Industrial Automation

9. MSME/CSC/N0609: Basics of Industrial Automation

10. MSME/CSC/N0611: Employability skills

Qualification Pack (QP) Parameters

Sector	Capital Goods
Sub-Sector	Machine Tools

Qualification Pack

Occupation	Maintenance & Automation
Country	India
NSQF Level	4.5
Credits	20
Aligned to NCO/ISCO/ISIC Code	(Maintenance Technician)
Minimum Educational Qualification & Experience	Completed 3 year diploma after 10th with NA of experience OR Pursuing 3rd year of 3-year diploma after 10th with NA of experience OR Certificate-NSQF (NSQF Level 4 in the field of Machine Maintenance & Automation.) with 1.5 years of experience OR 12th Class/I.T.I (2 year ITI in relevant Trade) with 1 Year of experience
Minimum Level of Education for Training in School	10th Class
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-4.5-CG-02403-2024-V1-MSME
NQR Version	1.0

MSME/CSC/N0602: Demonstrate the Basic Machine Operation

Description

After completion of course Student should be able to: Explain applications and advantages of Tool Room machines

Scope

The scope covers the following :

- After completion of course Student should be able to:
- Explain applications and advantages of Tool Room machines

Elements and Performance Criteria

MSME/ADMMA/01Demonstrate the Basic Machine Operation

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

PC1. • Explain the types of Conventional & Non-Conventional Machines,
• Advantages & Limitations of CNC applications.

PC2. Discuss safety precautions.Demonstrate machines

PC3. Explain Co-ordinate systems & points mode.

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

PC5. Selection of standard tools/ cutters/Tool Holders as per requirement

PC6. Define Turning Insert Shapes

PC7. Describe Operating Conditions

PC8. Explain Work holding methods

PC9. Identify and Explain Tool holding Devices

PC10. Discuss the need of different oils & lubricants used

PC11. • Explain different conventional machine like lathe, milling, grinding
• machine etc.

PC12. • Describe different machine parts & accessories. Understand about the
• different types of operations.

PC13. Explain the methods of machining.

PC14. • Explain different cutting techniques like milling, turning, drilling, grinding
• etc.

PC15. • Describe different machine operations like: Plain & Step turning,
• Parting, Boring, Grooving, Facing, Threading, Profile, Drilling, Tapping,
• Reaming, Counter boring, Knurling, polishing etc.

PC16. • Describe standard mathematical formulae used in calculation required
• for machine tool operation

PC17. • Calculations of machining parameters like cutting speed, cutting feed,
• depth of cut etc.

PC18. • Explain CNC interpolation, open loop & close loop control systems with
• feedback devices

PC19. Explain Axis – Orientation

PC20. Define Work sketch and Calculation

PC21. • Use appropriate sources to obtain the required information e.g.
• Numerical control on CNC machine, types of CNC control

PC22. • Check that all the equipment is correctly connected and in a safe and
• usable working condition

PC23. Use codes and other references that follow the required conventions

PC24. Plan the machining activities before starting them.

PC25. • Set up and check that all peripheral devices are connected and correctly
• operating

PC26. • Confirm that the program is as per job specifications and contains all
• relevant information

PC27. • Make sure that programs are checked and approved by the appropriate
• person

PC28. Save the program in the appropriate file type and location

PC29. • Prepare programs, demonstrate, simulate and operate CNC lathe,
• machines for various machining operations.

PC30. Execute program and inspect simple geometrical forms / standard parts

PC31. Explain the type of maintenance and Maintenance checklist

PC32. Carry out Routine Maintenance activity as per standard / checklist

PC33. • Safe handling of tools, equipment & CNC Machines & Personal safety
• tool as per company product requirement.

PC34. Use protective clothing / equipment for specific tasks on CNC Machine

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
MSME/ADMMA/01Demonstrate the Basic Machine Operation	-	**100**	-	-
PC1. • Explain the types of Conventional & Non-Conventional Machines, • Advantages & Limitations of CNC applications.	-	-	-	-
PC2. Discuss safety precautions.Demonstrate machines	-	-	-	-
PC3. Explain Co-ordinate systems & points mode.	-	-	-	-
PC4. • Identify Cutting Tools and Tool Holders from the standard (ISO • Standard)	-	-	-	-
PC5. Selection of standard tools/ cutters/Tool Holders as per requirement	-	-	-	-
PC6. Define Turning Insert Shapes	-	-	-	-
PC7. Describe Operating Conditions	-	-	-	-
PC8. Explain Work holding methods	-	-	-	-
PC9. Identify and Explain Tool holding Devices	-	-	-	-
PC10. Discuss the need of different oils & lubricants used	-	-	-	-
PC11. • Explain different conventional machine like lathe, milling, grinding • machine etc.	-	-	-	-
PC12. • Describe different machine parts & accessories. Understand about the • different types of operations.	-	-	-	-
PC13. Explain the methods of machining.	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC14. • Explain different cutting techniques like milling, turning, drilling, grinding • etc.	-	-	-	-
PC15. • Describe different machine operations like: Plain & Step turning, • Parting, Boring, Grooving, Facing, Threading, Profile, Drilling, Tapping, • Reaming, Counter boring, Knurling, polishing etc.	-	-	-	-
PC16. • Describe standard mathematical formulae used in calculation required • for machine tool operation	-	-	-	-
PC17. • Calculations of machining parameters like cutting speed, cutting feed, • depth of cut etc.	-	-	-	-
PC18. • Explain CNC interpolation, open loop & close loop control systems with • feedback devices	-	-	-	-
PC19. Explain Axis – Orientation	-	-	-	-
PC20. Define Work sketch and Calculation	-	-	-	-
PC21. • Use appropriate sources to obtain the required information e.g. • Numerical control on CNC machine, types of CNC control	-	-	-	-
PC22. • Check that all the equipment is correctly connected and in a safe and • usable working condition	-	-	-	-
PC23. Use codes and other references that follow the required conventions	-	-	-	-
PC24. Plan the machining activities before starting them.	-	-	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC25. • Set up and check that all peripheral devices are connected and correctly • operating	-	-	-	-
PC26. • Confirm that the program is as per job specifications and contains all • relevant information	-	-	-	-
PC27. • Make sure that programs are checked and approved by the appropriate • person	-	-	-	-
PC28. Save the program in the appropriate file type and location	-	-	-	-
PC29. • Prepare programs, demonstrate, simulate and operate CNC lathe, • machines for various machining operations.	-	-	-	-
PC30. Execute program and inspect simple geometrical forms / standard parts	-	-	-	-
PC31. Explain the type of maintenance and Maintenance checklist	-	-	-	-
PC32. Carry out Routine Maintenance activity as per standard / checklist	-	-	-	-
PC33. • Safe handling of tools, equipment & CNC Machines & Personal safety • tool as per company product requirement.	-	-	-	-
PC34. Use protective clothing / equipment for specific tasks on CNC Machine	-	-	-	-
NOS Total	**-**	**100**	**-**	**-**

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N0602
NOS Name	Demonstrate the Basic Machine Operation
Sector	Capital Goods
Sub-Sector	
Occupation	Maintenance & Automation
NSQF Level	4.5
Credits	1
Version	1.0
Last Reviewed Date	30/04/2024
Next Review Date	30/04/2027
NSQC Clearance Date	30/04/2024

Qualification Pack

MSME/CSC/N0601: Demonstrate the Basic Machine Operation

Description

After completion of course Student should be able to: Explain applications and advantages of Tool Room machines

Scope

The scope covers the following :

- After completion of course Student should be able to:
- Explain applications and advantages of Tool Room machines

Elements and Performance Criteria

MSME/ADMMA/01Demonstrate the Basic Machine Operation

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

PC1. • Explain the types of Conventional & Non-Conventional Machines,
• Advantages & Limitations of CNC applications.

PC2. Discuss safety precautions.Demonstrate machines

PC3. Explain Co-ordinate systems & points mode.

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

PC5. Selection of standard tools/ cutters/Tool Holders as per requirement

PC6. Define Turning Insert Shapes

PC7. Describe Operating Conditions

PC8. Explain Work holding methods

PC9. Identify and Explain Tool holding Devices

PC10. Discuss the need of different oils & lubricants used

PC11. • Explain different conventional machine like lathe, milling, grinding
• machine etc.

PC12. • Describe different machine parts & accessories. Understand about the
• different types of operations.

PC13. Explain the methods of machining.

PC14. • Explain different cutting techniques like milling, turning, drilling, grinding
• etc.

PC15. • Describe different machine operations like: Plain & Step turning,
• Parting, Boring, Grooving, Facing, Threading, Profile, Drilling, Tapping,
• Reaming, Counter boring, Knurling, polishing etc.

PC16. • Describe standard mathematical formulae used in calculation required
• for machine tool operation

PC17. • Calculations of machining parameters like cutting speed, cutting feed,
• depth of cut etc.

PC18. • Explain CNC interpolation, open loop & close loop control systems with
• feedback devices

PC19. Explain Axis – Orientation

PC20. Define Work sketch and Calculation

PC21. • Use appropriate sources to obtain the required information e.g.
• Numerical control on CNC machine, types of CNC control

PC22. • Check that all the equipment is correctly connected and in a safe and
• usable working condition

PC23. Use codes and other references that follow the required conventions

PC24. Plan the machining activities before starting them.

PC25. • Set up and check that all peripheral devices are connected and correctly
• operating

PC26. • Confirm that the program is as per job specifications and contains all
• relevant information

PC27. • Make sure that programs are checked and approved by the appropriate
• person

PC28. Save the program in the appropriate file type and location

PC29. • Prepare programs, demonstrate, simulate and operate CNC lathe,
• machines for various machining operations.

PC30. Execute program and inspect simple geometrical forms / standard parts

PC31. Explain the type of maintenance and Maintenance checklist

PC32. Carry out Routine Maintenance activity as per standard / checklist

PC33. • Safe handling of tools, equipment & CNC Machines & Personal safety
• tool as per company product requirement.

PC34. Use protective clothing / equipment for specific tasks on CNC Machine

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
MSME/ADMMA/01Demonstrate the Basic Machine Operation	**100**	-	-	-
PC1. • Explain the types of Conventional & Non-Conventional Machines, • Advantages & Limitations of CNC applications.	-	-	-	-
PC2. Discuss safety precautions.Demonstrate machines	-	-	-	-
PC3. Explain Co-ordinate systems & points mode.	-	-	-	-
PC4. • Identify Cutting Tools and Tool Holders from the standard (ISO • Standard)	-	-	-	-
PC5. Selection of standard tools/ cutters/Tool Holders as per requirement	-	-	-	-
PC6. Define Turning Insert Shapes	-	-	-	-
PC7. Describe Operating Conditions	-	-	-	-
PC8. Explain Work holding methods	-	-	-	-
PC9. Identify and Explain Tool holding Devices	-	-	-	-
PC10. Discuss the need of different oils & lubricants used	-	-	-	-
PC11. • Explain different conventional machine like lathe, milling, grinding • machine etc.	-	-	-	-
PC12. • Describe different machine parts & accessories. Understand about the • different types of operations.	-	-	-	-
PC13. Explain the methods of machining.	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC14. • Explain different cutting techniques like milling, turning, drilling, grinding • etc.	-	-	-	-
PC15. • Describe different machine operations like: Plain & Step turning, • Parting, Boring, Grooving, Facing, Threading, Profile, Drilling, Tapping, • Reaming, Counter boring, Knurling, polishing etc.	-	-	-	-
PC16. • Describe standard mathematical formulae used in calculation required • for machine tool operation	-	-	-	-
PC17. • Calculations of machining parameters like cutting speed, cutting feed, • depth of cut etc.	-	-	-	-
PC18. • Explain CNC interpolation, open loop & close loop control systems with • feedback devices	-	-	-	-
PC19. Explain Axis – Orientation	-	-	-	-
PC20. Define Work sketch and Calculation	-	-	-	-
PC21. • Use appropriate sources to obtain the required information e.g. • Numerical control on CNC machine, types of CNC control	-	-	-	-
PC22. • Check that all the equipment is correctly connected and in a safe and • usable working condition	-	-	-	-
PC23. Use codes and other references that follow the required conventions	-	-	-	-
PC24. Plan the machining activities before starting them.	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC25. • Set up and check that all peripheral devices are connected and correctly • operating	-	-	-	-
PC26. • Confirm that the program is as per job specifications and contains all • relevant information	-	-	-	-
PC27. • Make sure that programs are checked and approved by the appropriate • person	-	-	-	-
PC28. Save the program in the appropriate file type and location	-	-	-	-
PC29. • Prepare programs, demonstrate, simulate and operate CNC lathe, • machines for various machining operations.	-	-	-	-
PC30. Execute program and inspect simple geometrical forms / standard parts	-	-	-	-
PC31. Explain the type of maintenance and Maintenance checklist	-	-	-	-
PC32. Carry out Routine Maintenance activity as per standard / checklist	-	-	-	-
PC33. • Safe handling of tools, equipment & CNC Machines & Personal safety • tool as per company product requirement.	-	-	-	-
PC34. Use protective clothing / equipment for specific tasks on CNC Machine	-	-	-	-
NOS Total	**100**	-	-	-

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N0601
NOS Name	Demonstrate the Basic Machine Operation
Sector	Capital Goods
Sub-Sector	
Occupation	Maintenance & Automation
NSQF Level	4.5
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/N0605: Maintenance of Hydraulics & Pneumatics Components.

Description

After completion of course Student should be able to: Understand about the Pneumatics system & Hydraulic System.

Scope

The scope covers the following :

- After completion of course Student should be able to:
- Understand about the Pneumatics system & Hydraulic System.

Elements and Performance Criteria

MSME/ADMMA/02 Maintenance of Hydraulics & Pneumatics Components.

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

PC1.   • Explain about pneumatic & hydraulic system, Advantages & Limitations
          • of pneumatic & hydraulic system applications.

PC2.   Explain about safety precaution in pneumatic operations.

PC3.   Demonstrate Pneumatics Basic controlling equipment and its use

PC4.   • Demonstrate the pressure Measurement by different pressure gauges
          • (Digital and Analog type).

PC5.   Calculate the gauge pressure, atmospheric pressure, absolute pressure

PC6.   Demonstrate different parts of air generation unit.

PC7.   Demonstrate different parts of air preparation unit.

PC8.   Demonstrate different parts of air consuming unit.

PC9.   Explain about pneumatic direction control valves.

PC10. Demonstration of DC-valves and their different actuation process.

PC11. Explain about pneumatic Flow control valves

PC12. Demonstration of different Flow control methods.

PC13. Explain about pneumatic pressure control valves & combination valve.

PC14. Demonstration of different pressure control valves and applications.

PC15. Explain about pneumatic linear actuators and Rotary actuators.

PC16. Demonstration of different pneumatic cylinders & motor actuation

PC17. • Explain about pneumatic components symbols and pneumatic
          • schematic control logic diagrams.

PC18. Explain about electro pneumatic system and electrical safety.

PC19. • Demonstration of different electro pneumatic components as switches,
          • relays, sensors, AC and DC supply.
          •

PC20. Explain about electro-pneumatic component symbols and electropneumatic schematic control logic diagrams.

PC21. • Demonstration of different electro pneumatic industrial control
• operations

PC22. Demonstration of OPC-Server communication with PC and electropneumatic system.

PC23. • Demonstration of PLC communication with PC and electro-pneumatic
• system

PC24. Explain about safety precaution in hydraulic operations.

PC25. Demonstrate hydraulics Basiccontrollingequipmentand its u se.

PC26. • Demonstrate the pressure Measurement by different manometers
• (Analog type). Calculate the hydraulic pressure.

PC27. Demonstrate different parts of hydraulic pressure generation unit

PC28. Explain about differentfilters and their application in hydraulic system.

PC29. Explain about Hydraulic direction control valves.

PC30. Demonstration of DC-valves and their different actuation process.

PC31. Explain about hydraulic Flow control valves.

PC32. Demonstration of different Flow control methods

PC33. Explain about hydraulic pressure control valves.

PC34. • Demonstration of different pressure control valves and pressure relief
• valves with applications.

PC35. Explain about hydrauliclinear actuators and Rotary actuators

PC36. Demonstration of different hydraulic cylinders& motor actuation.

PC37. • Explain about hydraulic components symbols and hydraulic schematic
• control logic diagrams.

PC38. • Explain about hydraulic components symbols and hydraulic schematic
• control logic diagrams.

PC39. Explain about electro-hydraulic system and electrical safety

PC40. • Demonstration of different electro -hydraulic components as switches,
• relays, sensors, AC and DC supply.

PC41. Explain about electro-hydraulic component symbols and electrohydraulic schematic control
logic diagrams.

PC42. • Demonstration of different electro-hydraulic industrial control
• operations.

PC43. Demonstration of OPC-Server communication with PC and electrohydraulic system.

PC44. • Demonstration of PLC communication with PC and electro-hydraulic
• system.

PC45. • Explain about maintenance of hydraulic& pneumatic system&
• demonstration

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
MSME/ADMMA/02 Maintenance of Hydraulics & Pneumatics Components.	**100**	-	-	-
PC1. • Explain about pneumatic & hydraulic system, Advantages & Limitations • of pneumatic & hydraulic system applications.	-	-	-	-
PC2. Explain about safety precaution in pneumatic operations.	-	-	-	-
PC3. Demonstrate Pneumatics Basic controlling equipment and its use	-	-	-	-
PC4. • Demonstrate the pressure Measurement by different pressure gauges • (Digital and Analog type).	-	-	-	-
PC5. Calculate the gauge pressure, atmospheric pressure, absolute pressure	-	-	-	-
PC6. Demonstrate different parts of air generation unit.	-	-	-	-
PC7. Demonstrate different parts of air preparation unit.	-	-	-	-
PC8. Demonstrate different parts of air consuming unit.	-	-	-	-
PC9. Explain about pneumatic direction control valves.	-	-	-	-
PC10. Demonstration of DC-valves and their different actuation process.	-	-	-	-
PC11. Explain about pneumatic Flow control valves	-	-	-	-
PC12. Demonstration of different Flow control methods.	-	-	-	-
PC13. Explain about pneumatic pressure control valves & combination valve.	-	-	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC14. Demonstration of different pressure control valves and applications.	-	-	-	-
PC15. Explain about pneumatic linear actuators and Rotary actuators.	-	-	-	-
PC16. Demonstration of different pneumatic cylinders & motor actuation	-	-	-	-
PC17. • Explain about pneumatic components symbols and pneumatic • schematic control logic diagrams.	-	-	-	-
PC18. Explain about electro pneumatic system and electrical safety.	-	-	-	-
PC19. • Demonstration of different electro pneumatic components as switches, • relays, sensors, AC and DC supply. •	-	-	-	-
PC20. Explain about electro-pneumatic component symbols and electropneumatic schematic control logic diagrams.	-	-	-	-
PC21. • Demonstration of different electro pneumatic industrial control • operations	-	-	-	-
PC22. Demonstration of OPC-Server communication with PC and electropneumatic system.	-	-	-	-
PC23. • Demonstration of PLC communication with PC and electro-pneumatic • system	-	-	-	-
PC24. Explain about safety precaution in hydraulic operations.	-	-	-	-
PC25. Demonstrate hydraulics Basiccontrollingequipmentand its u se.	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC26. • Demonstrate the pressure Measurement by different manometers • (Analog type). Calculate the hydraulic pressure.	-	-	-	-
PC27. Demonstrate different parts of hydraulic pressure generation unit	-	-	-	-
PC28. Explain about differentfilters and their application in hydraulic system.	-	-	-	-
PC29. Explain about Hydraulic direction control valves.	-	-	-	-
PC30. Demonstration of DC-valves and their different actuation process.	-	-	-	-
PC31. Explain about hydraulic Flow control valves.	-	-	-	-
PC32. Demonstration of different Flow control methods	-	-	-	-
PC33. Explain about hydraulic pressure control valves.	-	-	-	-
PC34. • Demonstration of different pressure control valves and pressure relief • valves with applications.	-	-	-	-
PC35. Explain about hydrauliclinear actuators and Rotary actuators	-	-	-	-
PC36. Demonstration of different hydraulic cylinders& motor actuation.	-	-	-	-
PC37. • Explain about hydraulic components symbols and hydraulic schematic • control logic diagrams.	-	-	-	-
PC38. • Explain about hydraulic components symbols and hydraulic schematic • control logic diagrams.	-	-	-	-
PC39. Explain about electro-hydraulic system and electrical safety	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC40. • Demonstration of different electro -hydraulic components as switches, • relays, sensors, AC and DC supply.	-	-	-	-
PC41. Explain about electro-hydraulic component symbols and electrohydraulic schematic control logic diagrams.	-	-	-	-
PC42. • Demonstration of different electro-hydraulic industrial control • operations.	-	-	-	-
PC43. Demonstration of OPC-Server communication with PC and electrohydraulic system.	-	-	-	-
PC44. • Demonstration of PLC communication with PC and electro-hydraulic • system.	-	-	-	-
PC45. • Explain about maintenance of hydraulic& pneumatic system& • demonstration	-	-	-	-
NOS Total	**100**	-	-	-

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N0605
NOS Name	Maintenance of Hydraulics & Pneumatics Components.
Sector	Capital Goods
Sub-Sector	
Occupation	Maintenance & Automation
NSQF Level	4.5
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/N0604: Maintenance of Hydraulics & Pneumatics Components.

Description

After completion of course Student should be able to: Understand about the Pneumatics system & Hydraulic System.

Scope

The scope covers the following :

- After completion of course Student should be able to:
- Understand about the Pneumatics system & Hydraulic System.

Elements and Performance Criteria

MSME/ADMMA/02 Maintenance of Hydraulics & Pneumatics Components.

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

PC1. • Explain about pneumatic & hydraulic system, Advantages & Limitations
• of pneumatic & hydraulic system applications.

PC2. Explain about safety precaution in pneumatic operations.

PC3. Demonstrate Pneumatics Basic controlling equipment and its use

PC4. • Demonstrate the pressure Measurement by different pressure gauges
• (Digital and Analog type).

PC5. Calculate the gauge pressure, atmospheric pressure, absolute pressure

PC6. Demonstrate different parts of air generation unit.

PC7. Demonstrate different parts of air preparation unit.

PC8. Demonstrate different parts of air consuming unit.

PC9. Explain about pneumatic direction control valves.

PC10. Demonstration of DC-valves and their different actuation process.

PC11. Explain about pneumatic Flow control valves

PC12. Demonstration of different Flow control methods.

PC13. Explain about pneumatic pressure control valves & combination valve.

PC14. Demonstration of different pressure control valves and applications.

PC15. Explain about pneumatic linear actuators and Rotary actuators.

PC16. Demonstration of different pneumatic cylinders & motor actuation

PC17. • Explain about pneumatic components symbols and pneumatic
• schematic control logic diagrams.

PC18. Explain about electro pneumatic system and electrical safety.

PC19. • Demonstration of different electro pneumatic components as switches,
• relays, sensors, AC and DC supply.
•

PC20. Explain about electro-pneumatic component symbols and electropneumatic schematic control logic diagrams.

PC21. • Demonstration of different electro pneumatic industrial control
• operations

PC22. Demonstration of OPC-Server communication with PC and electropneumatic system.

PC23. • Demonstration of PLC communication with PC and electro-pneumatic
• system

PC24. Explain about safety precaution in hydraulic operations.

PC25. Demonstrate hydraulics Basiccontrollingequipmentand its u se.

PC26. • Demonstrate the pressure Measurement by different manometers
• (Analog type). Calculate the hydraulic pressure.

PC27. Demonstrate different parts of hydraulic pressure generation unit

PC28. Explain about differentfilters and their application in hydraulic system.

PC29. Explain about Hydraulic direction control valves.

PC30. Demonstration of DC-valves and their different actuation process.

PC31. Explain about hydraulic Flow control valves.

PC32. Demonstration of different Flow control methods

PC33. Explain about hydraulic pressure control valves.

PC34. • Demonstration of different pressure control valves and pressure relief
• valves with applications.

PC35. Explain about hydrauliclinear actuators and Rotary actuators

PC36. Demonstration of different hydraulic cylinders& motor actuation.

PC37. • Explain about hydraulic components symbols and hydraulic schematic
• control logic diagrams.

PC38. • Explain about hydraulic components symbols and hydraulic schematic
• control logic diagrams.

PC39. Explain about electro-hydraulic system and electrical safety

PC40. • Demonstration of different electro -hydraulic components as switches,
• relays, sensors, AC and DC supply.

PC41. Explain about electro-hydraulic component symbols and electrohydraulic schematic control logic diagrams.

PC42. • Demonstration of different electro-hydraulic industrial control
• operations.

PC43. Demonstration of OPC-Server communication with PC and electrohydraulic system.

PC44. • Demonstration of PLC communication with PC and electro-hydraulic
• system.

PC45. • Explain about maintenance of hydraulic& pneumatic system&
• demonstration

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
MSME/ADMMA/02 Maintenance of Hydraulics & Pneumatics Components.	-	**100**	-	-
PC1. • Explain about pneumatic & hydraulic system, Advantages & Limitations • of pneumatic & hydraulic system applications.	-	-	-	-
PC2. Explain about safety precaution in pneumatic operations.	-	-	-	-
PC3. Demonstrate Pneumatics Basic controlling equipment and its use	-	-	-	-
PC4. • Demonstrate the pressure Measurement by different pressure gauges • (Digital and Analog type).	-	-	-	-
PC5. Calculate the gauge pressure, atmospheric pressure, absolute pressure	-	-	-	-
PC6. Demonstrate different parts of air generation unit.	-	-	-	-
PC7. Demonstrate different parts of air preparation unit.	-	-	-	-
PC8. Demonstrate different parts of air consuming unit.	-	-	-	-
PC9. Explain about pneumatic direction control valves.	-	-	-	-
PC10. Demonstration of DC-valves and their different actuation process.	-	-	-	-
PC11. Explain about pneumatic Flow control valves	-	-	-	-
PC12. Demonstration of different Flow control methods.	-	-	-	-
PC13. Explain about pneumatic pressure control valves & combination valve.	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC14. Demonstration of different pressure control valves and applications.	-	-	-	-
PC15. Explain about pneumatic linear actuators and Rotary actuators.	-	-	-	-
PC16. Demonstration of different pneumatic cylinders & motor actuation	-	-	-	-
PC17. • Explain about pneumatic components symbols and pneumatic • schematic control logic diagrams.	-	-	-	-
PC18. Explain about electro pneumatic system and electrical safety.	-	-	-	-
PC19. • Demonstration of different electro pneumatic components as switches, • relays, sensors, AC and DC supply. •	-	-	-	-
PC20. Explain about electro-pneumatic component symbols and electropneumatic schematic control logic diagrams.	-	-	-	-
PC21. • Demonstration of different electro pneumatic industrial control • operations	-	-	-	-
PC22. Demonstration of OPC-Server communication with PC and electropneumatic system.	-	-	-	-
PC23. • Demonstration of PLC communication with PC and electro-pneumatic • system	-	-	-	-
PC24. Explain about safety precaution in hydraulic operations.	-	-	-	-
PC25. Demonstrate hydraulics Basiccontrollingequipmentand its u se.	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC26. • Demonstrate the pressure Measurement by different manometers • (Analog type). Calculate the hydraulic pressure.	-	-	-	-
PC27. Demonstrate different parts of hydraulic pressure generation unit	-	-	-	-
PC28. Explain about differentfilters and their application in hydraulic system.	-	-	-	-
PC29. Explain about Hydraulic direction control valves.	-	-	-	-
PC30. Demonstration of DC-valves and their different actuation process.	-	-	-	-
PC31. Explain about hydraulic Flow control valves.	-	-	-	-
PC32. Demonstration of different Flow control methods	-	-	-	-
PC33. Explain about hydraulic pressure control valves.	-	-	-	-
PC34. • Demonstration of different pressure control valves and pressure relief • valves with applications.	-	-	-	-
PC35. Explain about hydrauliclinear actuators and Rotary actuators	-	-	-	-
PC36. Demonstration of different hydraulic cylinders& motor actuation.	-	-	-	-
PC37. • Explain about hydraulic components symbols and hydraulic schematic • control logic diagrams.	-	-	-	-
PC38. • Explain about hydraulic components symbols and hydraulic schematic • control logic diagrams.	-	-	-	-
PC39. Explain about electro-hydraulic system and electrical safety	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC40. • Demonstration of different electro -hydraulic components as switches, • relays, sensors, AC and DC supply.	-	-	-	-
PC41. Explain about electro-hydraulic component symbols and electrohydraulic schematic control logic diagrams.	-	-	-	-
PC42. • Demonstration of different electro-hydraulic industrial control • operations.	-	-	-	-
PC43. Demonstration of OPC-Server communication with PC and electrohydraulic system.	-	-	-	-
PC44. • Demonstration of PLC communication with PC and electro-hydraulic • system.	-	-	-	-
PC45. • Explain about maintenance of hydraulic& pneumatic system& • demonstration	-	-	-	-
NOS Total	-	100	-	-

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N0604
NOS Name	Maintenance of Hydraulics & Pneumatics Components.
Sector	Capital Goods
Sub-Sector	
Occupation	Maintenance & Automation
NSQF Level	4.5
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/N0606: Create & Modify the Electrical circuit diagram 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/ADMMA/03 Create & Modify the Electrical circuit diagram using CAD software

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

PC1. Explain the Importance of Engineering drawing,

PC2. Explanation the scope and objective of Engineering Drawing

PC3. • Demonstrate and explain drawing Standards: Size of drawing sheets –
• Layout of drawing sheet – Title Blocks – Types of lines – Folding of
• drawing sheets.

PC4. Use of dimensioning techniques according to Standard of dimensions

PC5. • Demonstrate orthographic & Isometric projection by using a viewing
• box and a model

PC6. Use of symbol in projections -Front view, top view and side view

PC7. Demonstrate the use of Auto CAD and Auto CAD interface

PC8. Apply coordinates systems in auto CAD

PC9. Demonstrate the use of tool bars.

PC10. Create solid field area (Hatching, Gradient)

PC11. Edit objects using the object property tool bar and various methods.

PC12. Use sketch settings and Style toolbar (text style, Multileader style etc.)

PC13. Edit object using object property toolbar & various method.

PC14. Create the replica of model using copy, array command

PC15. Work with models in the modify toolbar.

PC16. Identify the appropriate Tool to create and modify the model

PC17. Change the orientation of the object by aligns, offset, rotate command

PC18. Apply standard dimension in a mechanical component.

PC19. Use of dimensioning Methods: Linear, Align, ordinates, Radius,Diameter, Arc length, angular etc,

PC20. Use of leader with text, block reference

PC21. Edit or modify the CAD Drawings

PC22. Use of layers Management and its applications

PC23. Apply GD& T Symbols in drawings

PC24. Develop proper drawing layout

PC25. • Use of 3D, 3D environment & toolbars.Extrude, revolve, Boolean
• operation

PC26. • Use of Sweep, Loft, and Press pull.3d Move, 3d Rotate, 3d Array, 3d
• Align.

PC27. • Use of AutoCAD Electrical software Workspace Awareness, Tool Bars,
• Tool Pallets ,

PC28. • Insert component working with project manager. Overview about
• relay, contactor, timer and old

PC29. • Explain about drafting features-copy, move, delete, scoot, align, link
• component, attribute reverse/ flip component, retag and update
• component

PC30. • Create For/Rev Control circuit of 3ph induction motor using contactor
• and for/rev control circuit of 1ph dc motor using relay.

PC31. Create Star-Delta Control Circuit, Start-Delta With For-Rev Control Ckt.

PC32. • Create Multibus, wire number, wire color, wire size, wire labeling, and
• overview on timer power ckt of F-R .

PC33. Symbol builder, cuircuit builder, icon menu wizard, power ckt of StarDelta, Star-Delta with F-R.

PC34. • Panel design of F-R, A-D, panel design of F-R with S-D,schematic and
• panel report generation, export data to excel format.

PC35. • Use of EPLAN for power circuit, wire coloring, labeling with 2D&3D
• panel designing.

PC36. Develop PLC-I/O positioning, symbol macro, report generation.

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
MSME/ADMMA/03 Create & Modify the Electrical circuit diagram using CAD software	-	**100**	-	-
PC1. Explain the Importance of Engineering drawing,	-	-	-	-
PC2. Explanation the scope and objective of Engineering Drawing	-	-	-	-
PC3. • Demonstrate and explain drawing Standards: Size of drawing sheets – • Layout of drawing sheet – Title Blocks – Types of lines – Folding of • drawing sheets.	-	-	-	-
PC4. Use of dimensioning techniques according to Standard of dimensions	-	-	-	-
PC5. • Demonstrate orthographic & Isometric projection by using a viewing • box and a model	-	-	-	-
PC6. Use of symbol in projections -Front view, top view and side view	-	-	-	-
PC7. Demonstrate the use of Auto CAD and Auto CAD interface	-	-	-	-
PC8. Apply coordinates systems in auto CAD	-	-	-	-
PC9. Demonstrate the use of tool bars.	-	-	-	-
PC10. Create solid field area (Hatching, Gradient)	-	-	-	-
PC11. Edit objects using the object property tool bar and various methods.	-	-	-	-
PC12. Use sketch settings and Style toolbar (text style, Multileader style etc.)	-	-	-	-
PC13. Edit object using object property toolbar & various method.	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC14. Create the replica of model using copy, array command	-	-	-	-
PC15. Work with models in the modify toolbar.	-	-	-	-
PC16. Identify the appropriate Tool to create and modify the model	-	-	-	-
PC17. Change the orientation of the object by aligns, offset, rotate command	-	-	-	-
PC18. Apply standard dimension in a mechanical component.	-	-	-	-
PC19. Use of dimensioning Methods: Linear, Align, ordinates, Radius,Diameter, Arc length, angular etc,	-	-	-	-
PC20. Use of leader with text, block reference	-	-	-	-
PC21. Edit or modify the CAD Drawings	-	-	-	-
PC22. Use of layers Management and its applications	-	-	-	-
PC23. Apply GD& T Symbols in drawings	-	-	-	-
PC24. Develop proper drawing layout	-	-	-	-
PC25. • Use of 3D, 3D environment & toolbars.Extrude, revolve, Boolean • operation	-	-	-	-
PC26. • Use of Sweep, Loft, and Press pull.3d Move, 3d Rotate, 3d Array, 3d • Align.	-	-	-	-
PC27. • Use of AutoCAD Electrical software Workspace Awareness, Tool Bars, • Tool Pallets ,	-	-	-	-
PC28. • Insert component working with project manager. Overview about • relay, contactor, timer and old	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC29. • Explain about drafting features-copy, move, delete, scoot, align, link • component, attribute reverse/ flip component, retag and update • component	-	-	-	-
PC30. • Create For/Rev Control circuit of 3ph induction motor using contactor • and for/rev control circuit of 1ph dc motor using relay.	-	-	-	-
PC31. Create Star-Delta Control Circuit, Start-Delta With For-Rev Control Ckt.	-	-	-	-
PC32. • Create Multibus, wire number, wire color, wire size, wire labeling, and • overview on timer power ckt of F-R .	-	-	-	-
PC33. Symbol builder, cuircuit builder, icon menu wizard, power ckt of StarDelta, Star-Delta with F-R.	-	-	-	-
PC34. • Panel design of F-R, A-D, panel design of F-R with S-D,schematic and • panel report generation, export data to excel format.	-	-	-	-
PC35. • Use of EPLAN for power circuit, wire coloring, labeling with 2D&3D • panel designing.	-	-	-	-
PC36. Develop PLC-I/O positioning, symbol macro, report generation.	-	-	-	-
NOS Total	-	**100**	-	-

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N0606
NOS Name	Create & Modify the Electrical circuit diagram using CAD software
Sector	Capital Goods
Sub-Sector	
Occupation	Maintenance & Automation
NSQF Level	4.5
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/N0612: Carry out Machine Maintenance activities (Electrical)

Description

After completion of course Student should be able to Understand about electricity

Scope

The scope covers the following :

- After completion of course Student should be able to
- Understand about electricity

Elements and Performance Criteria

MSME/ADMMA/04 Carry out Machine Maintenance activities (Electrical)

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

PC1. Explain about basic fundamental of electricity.

PC2. • Explain about electrical safety rules, use of safety precaution kit and
• tools.

PC3. Explain the PPE in Industrial Safety. Common hand tools.

PC4. • Explain Basic injury prevention, Hazard identification and avoidance,
• safety signs for Danger, Warning, caution & personal safety.

PC5. • Discuss about Electrical shock and its effect, effect of electrical current
• on human being, method of avoiding electrical shock, first aid for victim
• of electric shock.

PC6. • Use of various appropriate fire extinguishers on different types of fires
• correctly.

PC7. • Explain Nature of electricity and fundamental laws. Single phase & three
• phase system

PC8. Explain Electrical measuring instrument construction & working.

PC9. • Demonstratemeasuringinstrumentforelectricalparameters as voltmeter,
• ammeter, frequency meter, power factor meter, watt meter, lux meter,
• tacho meter, clamp meter, anemometer, flux meter.

PC10. Explain about different types of earthings.

PC11. Demonstration of earthing test.

PC12. Demonstration of different types of electrical safety fuses.

PC13. Discuss about L.V circuit breakers.

PC14. • Demonstration of different types of electrical protective device as MCB,
• MCCB, RCCB, ELCB, OLR, MPCB.

PC15. • Explain about different types of electrical cables, specifications,
• selection procedure, uses, and advantages.

PC16. • Demonstration of underground cable laying methods. Socketing,
• Glanding, Fault measuring.

PC17. Demonstration of underground cable laying methods. Socketing, Glanding, Fault measuring

PC18. • Explain types of maintenance, Preventive Maintenance, Corrective
       • Maintenance, And Breakdown Maintenance.

PC19. Explain about domestic supply and appliances

PC20. Demonstrate maintenance of Iron, Geyser, Induction Heater, MicroOven, Celling Fan, Grinder etc.

PC21. Explain about industrial supply and different industrial electrical loads.

PC22. • Explain industrial machine maintenance, Preventive Maintenance,
       • Corrective Maintenance and Breakdown Maintenance.

PC23. Demonstrate machine panel wiring, electrical fault finding procedures

PC24. • Demonstrate MOTOR Preventive Maintenance, Corrective Maintenance
       • and Breakdown Maintenance. Motor meggering, overhauling.

PC25. • Demonstrate PUMP Preventive Maintenance, Corrective Maintenance
       • and Breakdown Maintenance.

PC26. Explain about different types of bearings & assembly methods.

PC27. Demonstrate bearing maintenance & assembly.

PC28. • Demonstrate Hydraulic power pack, pneumatic compressor, Diesel
       • generator maintenance.

PC29. • Explain about types and activities of plant maintenance
       • and Documentary report.

PC30. • Demonstrate about PlanningSystem, spare part
       • Inventory, qualityrequirementandawareness.

PC31. • Explain about different electrical & mechanical faults in different
       • machines

PC32. • Explain about fault finding methods, root cause analysis & troubleshoot
       • of breakdown machines.

PC33. • Demonstrate to find Source, partinventory repairing, purchasing
       • and cause and factor analysis for all machines.

PC34. • Demonstrate Maintenance of different machine as:
       • turning,milling,andgrinding,drilling,radialgrinding of different manufactures.

PC35. • Explain about ObjectiveofCNCmachine, machine codes,
       • panelboardandaxishoming.

PC36. Demonstrate about different cycle and their uses.

PC37. • Demonstrate about weekly, monthly CNC Preventive maintenance,
       • Break down Maintenance

PC38. • Demonstrate Magnetism and classification of magnets, care
       • and maintenance ,methods of magnetizing &magnetic materials.

PC39. • Demonstrate
       • electromagnetism,corkscrewrule,righthandrules.Faradays laws,
       • Lenz's law andPrincipleandApplicationofD.C.motorandgenerators.

PC40. Demonstrate Installation,testand runofanelectricDCmotors

PC41. • Demonstrate Installation,testand runof electricDCgenerator and
       • M.G.set.

PC42. • Demonstrate Principle of Single phaseand threephasemotorand
       • itsapplication.

PC43. • Install and test an electric single phase AC motors and
       • anelectric3phasemotor byaD.O.L.starter

PC44. Install and test an electric 3phasemotor byaStar-Delta starter.

PC45. • Explain about different types of transformers, working principle,
• specification and calculations.

PC46. Demonstration of Shortandopencircuit testof1phasetransformer.

PC47. Demonstrate about star and delta conversion of transformer.

PC48. • Demonstrate Power measurement by two wattmeter
• method of three phase resistive load& inductive load

PC49. • Explain about different electronic components, applications and
• advantages.

PC50. • Demonstration on different electronic component like resister,
• capacitor, diode, IC, transistor, SCR and its application.

PC51. Demonstrate op-amp and its application. Use op-amp to design various electronic circuits,identifythepins ofop-ampIC

PC52. • Demonstrate about Soldering technique, active,
• Passive electronic components, measuring instruments.

PC53. • Demonstrate the number system, logic gates and K-Map.
• Know the number system conversion and simplify expression using K-Map

PC54. Analog & digital IC testing by using IC tester.

PC55. • Function and working of oscilloscope and also measuring different
• quantities

PC56. • Demonstrate Function of frequency generator, counter & wave shaping
• etc

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
MSME/ADMMA/04 Carry out Machine Maintenance activities (Electrical)	-	**100**	-	-
PC1. Explain about basic fundamental of electricity.	-	-	-	-
PC2. • Explain about electrical safety rules, use of safety precaution kit and • tools.	-	-	-	-
PC3. Explain the PPE in Industrial Safety. Common hand tools.	-	-	-	-
PC4. • Explain Basic injury prevention, Hazard identification and avoidance, • safety signs for Danger, Warning, caution & personal safety.	-	-	-	-
PC5. • Discuss about Electrical shock and its effect, effect of electrical current • on human being, method of avoiding electrical shock, first aid for victim • of electric shock.	-	-	-	-
PC6. • Use of various appropriate fire extinguishers on different types of fires • correctly.	-	-	-	-
PC7. • Explain Nature of electricity and fundamental laws. Single phase & three • phase system	-	-	-	-
PC8. Explain Electrical measuring instrument construction & working.	-	-	-	-
PC9. • Demonstratemeasuringinstrumentforelectricalparameters as voltmeter, • ammeter, frequency meter, power factor meter, watt meter, lux meter, • tacho meter, clamp meter, anemometer, flux meter.	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. Explain about different types of earthings.	-	-	-	-
PC11. Demonstration of earthing test.	-	-	-	-
PC12. Demonstration of different types of electrical safety fuses.	-	-	-	-
PC13. Discuss about L.V circuit breakers.	-	-	-	-
PC14. • Demonstration of different types of electrical protective device as MCB, • MCCB, RCCB, ELCB, OLR, MPCB.	-	-	-	-
PC15. • Explain about different types of electrical cables, specifications, • selection procedure, uses, and advantages.	-	-	-	-
PC16. • Demonstration of underground cable laying methods. Socketing, • Glanding, Fault measuring.	-	-	-	-
PC17. Demonstration of underground cable laying methods. Socketing, Glanding, Fault measuring	-	-	-	-
PC18. • Explain types of maintenance, Preventive Maintenance, Corrective • Maintenance, And Breakdown Maintenance.	-	-	-	-
PC19. Explain about domestic supply and appliances	-	-	-	-
PC20. Demonstrate maintenance of Iron, Geyser, Induction Heater, MicroOven, Celling Fan, Grinder etc.	-	-	-	-
PC21. Explain about industrial supply and different industrial electrical loads.	-	-	-	-
PC22. • Explain industrial machine maintenance, Preventive Maintenance, • Corrective Maintenance and Breakdown Maintenance.	-	-	-	-
PC23. Demonstrate machine panel wiring, electrical fault finding procedures	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC24. • Demonstrate MOTOR Preventive Maintenance, Corrective Maintenance • and Breakdown Maintenance. Motor meggering, overhauling.	-	-	-	-
PC25. • Demonstrate PUMP Preventive Maintenance, Corrective Maintenance • and Breakdown Maintenance.	-	-	-	-
PC26. Explain about different types of bearings & assembly methods.	-	-	-	-
PC27. Demonstrate bearing maintenance & assembly.	-	-	-	-
PC28. • Demonstrate Hydraulic power pack, pneumatic compressor, Diesel • generator maintenance.	-	-	-	-
PC29. • Explain about types and activities of plant maintenance • and Documentary report.	-	-	-	-
PC30. • Demonstrate about PlanningSystem, spare part • Inventory, qualityrequirementandawareness.	-	-	-	-
PC31. • Explain about different electrical & mechanical faults in different • machines	-	-	-	-
PC32. • Explain about fault finding methods, root cause analysis & troubleshoot • of breakdown machines.	-	-	-	-
PC33. • Demonstrate to find Source, partinventory repairing, purchasing • and cause and factor analysis for all machines.	-	-	-	-
PC34. • Demonstrate Maintenance of different machine as: • turning,milling,andgrinding,drilling,radialgrinding of different manufactures.	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC35. • Explain about ObjectiveofCNCmachine, machine codes, • panelboardandaxishoming.	-	-	-	-
PC36. Demonstrate about different cycle and their uses.	-	-	-	-
PC37. • Demonstrate about weekly, monthly CNC Preventive maintenance, • Break down Maintenance	-	-	-	-
PC38. • Demonstrate Magnetism and classification of magnets, care • and maintenance ,methods of magnetizing &magnetic materials.	-	-	-	-
PC39. • Demonstrate • electromagnetism,corkscrewrule,righthandrules.Faradays laws, • Lenz's law andPrincipleandApplicationofD.C.motorandgenerators.	-	-	-	-
PC40. Demonstrate Installation,testand runofanelectricDCmotors	-	-	-	-
PC41. • Demonstrate Installation,testand runof electricDCgenerator and • M.G.set.	-	-	-	-
PC42. • Demonstrate Principle of Single phaseand threephasemotorand • itsapplication.	-	-	-	-
PC43. • Install and test an electric single phase AC motors and • anelectric3phasemotor byaD.O.L.starter	-	-	-	-
PC44. Install and test an electric 3phasemotor byaStar-Delta starter.	-	-	-	-
PC45. • Explain about different types of transformers, working principle, • specification and calculations.	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC46. Demonstration of Shortandopencircuit testof1phasetransformer.	-	-	-	-
PC47. Demonstrate about star and delta conversion of transformer.	-	-	-	-
PC48. • Demonstrate Power measurement by two wattmeter • method of three phase resistive load& inductive load	-	-	-	-
PC49. • Explain about different electronic components, applications and • advantages.	-	-	-	-
PC50. • Demonstration on different electronic component like resister, • capacitor, diode, IC, transistor, SCR and its application.	-	-	-	-
PC51. Demonstrate op-amp and its application. Use op-amp to design various electronic circuits,identifythepins ofop-ampIC	-	-	-	-
PC52. • Demonstrate about Soldering technique, active, • Passive electronic components, measuring instruments.	-	-	-	-
PC53. • Demonstrate the number system, logic gates and K-Map. • Know the number system conversion and simplify expression using K-Map	-	-	-	-
PC54. Analog & digital IC testing by using IC tester.	-	-	-	-
PC55. • Function and working of oscilloscope and also measuring different • quantities	-	-	-	-
PC56. • Demonstrate Function of frequency generator, counter & wave shaping • etc	-	-	-	-
NOS Total	-	100	-	-

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N0612
NOS Name	Carry out Machine Maintenance activities (Electrical)
Sector	Capital Goods
Sub-Sector	
Occupation	Maintenance & Automation
NSQF Level	4.5
Credits	8
Version	1.0
Last Reviewed Date	30/04/2024
Next Review Date	30/04/2027
NSQC Clearance Date	30/04/2024

MSME/CSC/N0607: Carry out Machine Maintenance activities (Electrical)

Description

After completion of course Student should be able to Understand about electricity

Scope

The scope covers the following :

- After completion of course Student should be able to
- Understand about electricity

Elements and Performance Criteria

MSME/ADMMA/04 Carry out Machine Maintenance activities (Electrical)

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

PC1. Explain about basic fundamental of electricity.

PC2. • Explain about electrical safety rules, use of safety precaution kit and
• tools.

PC3. Explain the PPE in Industrial Safety. Common hand tools.

PC4. • Explain Basic injury prevention, Hazard identification and avoidance,
• safety signs for Danger, Warning, caution & personal safety.

PC5. • Discuss about Electrical shock and its effect, effect of electrical current
• on human being, method of avoiding electrical shock, first aid for victim
• of electric shock.

PC6. • Use of various appropriate fire extinguishers on different types of fires
• correctly.

PC7. • Explain Nature of electricity and fundamental laws. Single phase & three
• phase system

PC8. Explain Electrical measuring instrument construction & working.

PC9. • Demonstratemeasuringinstrumentforelectricalparameters as voltmeter,
• ammeter, frequency meter, power factor meter, watt meter, lux meter,
• tacho meter, clamp meter, anemometer, flux meter.

PC10. Explain about different types of earthings.

PC11. Demonstration of earthing test.

PC12. Demonstration of different types of electrical safety fuses.

PC13. Discuss about L.V circuit breakers.

PC14. • Demonstration of different types of electrical protective device as MCB,
• MCCB, RCCB, ELCB, OLR, MPCB.

PC15. • Explain about different types of electrical cables, specifications,
• selection procedure, uses, and advantages.

PC16. • Demonstration of underground cable laying methods. Socketing,
• Glanding, Fault measuring.

PC17. Demonstration of underground cable laying methods. Socketing, Glanding, Fault measuring

PC18. • Explain types of maintenance, Preventive Maintenance, Corrective
• Maintenance, And Breakdown Maintenance.

PC19. Explain about domestic supply and appliances

PC20. Demonstrate maintenance of Iron, Geyser, Induction Heater, MicroOven, Celling Fan, Grinder etc.

PC21. Explain about industrial supply and different industrial electrical loads.

PC22. • Explain industrial machine maintenance, Preventive Maintenance,
• Corrective Maintenance and Breakdown Maintenance.

PC23. Demonstrate machine panel wiring, electrical fault finding procedures

PC24. • Demonstrate MOTOR Preventive Maintenance, Corrective Maintenance
• and Breakdown Maintenance. Motor meggering, overhauling.

PC25. • Demonstrate PUMP Preventive Maintenance, Corrective Maintenance
• and Breakdown Maintenance.

PC26. Explain about different types of bearings & assembly methods.

PC27. Demonstrate bearing maintenance & assembly.

PC28. • Demonstrate Hydraulic power pack, pneumatic compressor, Diesel
• generator maintenance.

PC29. • Explain about types and activities of plant maintenance
• and Documentary report.

PC30. • Demonstrate about PlanningSystem, spare part
• Inventory, qualityrequirementandawareness.

PC31. • Explain about different electrical & mechanical faults in different
• machines

PC32. • Explain about fault finding methods, root cause analysis & troubleshoot
• of breakdown machines.

PC33. • Demonstrate to find Source, partinventory repairing, purchasing
• and cause and factor analysis for all machines.

PC34. • Demonstrate Maintenance of different machine as:
• turning,milling,andgrinding,drilling,radialgrinding of different manufactures.

PC35. • Explain about ObjectiveofCNCmachine, machine codes,
• panelboardandaxishoming.

PC36. Demonstrate about different cycle and their uses.

PC37. • Demonstrate about weekly, monthly CNC Preventive maintenance,
• Break down Maintenance

PC38. • Demonstrate Magnetism and classification of magnets, care
• and maintenance ,methods of magnetizing &magnetic materials.

PC39. • Demonstrate
• electromagnetism,corkscrewrule,righthandrules.Faradays laws,
• Lenz's law andPrincipleandApplicationofD.C.motorandgenerators.

PC40. Demonstrate Installation,testand runofanelectricDCmotors

PC41. • Demonstrate Installation,testand runof electricDCgenerator and
• M.G.set.

PC42. • Demonstrate Principle of Single phaseand threephasemotorand
• itsapplication.

PC43. • Install and test an electric single phase AC motors and
• anelectric3phasemotor byaD.O.L.starter

PC44. Install and test an electric 3phasemotor byaStar-Delta starter.

PC45. • Explain about different types of transformers, working principle,
• specification and calculations.

PC46. Demonstration of Shortandopencircuit testof1phasetransformer.

PC47. Demonstrate about star and delta conversion of transformer.

PC48. • Demonstrate Power measurement by two wattmeter
• method of three phase resistive load& inductive load

PC49. • Explain about different electronic components, applications and
• advantages.

PC50. • Demonstration on different electronic component like resister,
• capacitor, diode, IC, transistor, SCR and its application.

PC51. Demonstrate op-amp and its application. Use op-amp to design various electronic circuits,identifythepins ofop-ampIC

PC52. • Demonstrate about Soldering technique, active,
• Passive electronic components, measuring instruments.

PC53. • Demonstrate the number system, logic gates and K-Map.
• Know the number system conversion and simplify expression using K-Map

PC54. Analog & digital IC testing by using IC tester.

PC55. • Function and working of oscilloscope and also measuring different
• quantities

PC56. • Demonstrate Function of frequency generator, counter & wave shaping
• etc

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
MSME/ADMMA/04 Carry out Machine Maintenance activities (Electrical)	**100**	-	-	-
PC1. Explain about basic fundamental of electricity.	-	-	-	-
PC2. • Explain about electrical safety rules, use of safety precaution kit and • tools.	-	-	-	-
PC3. Explain the PPE in Industrial Safety. Common hand tools.	-	-	-	-
PC4. • Explain Basic injury prevention, Hazard identification and avoidance, • safety signs for Danger, Warning, caution & personal safety.	-	-	-	-
PC5. • Discuss about Electrical shock and its effect, effect of electrical current • on human being, method of avoiding electrical shock, first aid for victim • of electric shock.	-	-	-	-
PC6. • Use of various appropriate fire extinguishers on different types of fires • correctly.	-	-	-	-
PC7. • Explain Nature of electricity and fundamental laws. Single phase & three • phase system	-	-	-	-
PC8. Explain Electrical measuring instrument construction & working.	-	-	-	-
PC9. • Demonstratemeasuringinstrumentforelectricalparameters as voltmeter, • ammeter, frequency meter, power factor meter, watt meter, lux meter, • tacho meter, clamp meter, anemometer, flux meter.	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. Explain about different types of earthings.	-	-	-	-
PC11. Demonstration of earthing test.	-	-	-	-
PC12. Demonstration of different types of electrical safety fuses.	-	-	-	-
PC13. Discuss about L.V circuit breakers.	-	-	-	-
PC14. • Demonstration of different types of electrical protective device as MCB, • MCCB, RCCB, ELCB, OLR, MPCB.	-	-	-	-
PC15. • Explain about different types of electrical cables, specifications, • selection procedure, uses, and advantages.	-	-	-	-
PC16. • Demonstration of underground cable laying methods. Socketing, • Glanding, Fault measuring.	-	-	-	-
PC17. Demonstration of underground cable laying methods. Socketing, Glanding, Fault measuring	-	-	-	-
PC18. • Explain types of maintenance, Preventive Maintenance, Corrective • Maintenance, And Breakdown Maintenance.	-	-	-	-
PC19. Explain about domestic supply and appliances	-	-	-	-
PC20. Demonstrate maintenance of Iron, Geyser, Induction Heater, MicroOven, Celling Fan, Grinder etc.	-	-	-	-
PC21. Explain about industrial supply and different industrial electrical loads.	-	-	-	-
PC22. • Explain industrial machine maintenance, Preventive Maintenance, • Corrective Maintenance and Breakdown Maintenance.	-	-	-	-
PC23. Demonstrate machine panel wiring, electrical fault finding procedures	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC24. • Demonstrate MOTOR Preventive Maintenance, Corrective Maintenance • and Breakdown Maintenance. Motor meggering, overhauling.	-	-	-	-
PC25. • Demonstrate PUMP Preventive Maintenance, Corrective Maintenance • and Breakdown Maintenance.	-	-	-	-
PC26. Explain about different types of bearings & assembly methods.	-	-	-	-
PC27. Demonstrate bearing maintenance & assembly.	-	-	-	-
PC28. • Demonstrate Hydraulic power pack, pneumatic compressor, Diesel • generator maintenance.	-	-	-	-
PC29. • Explain about types and activities of plant maintenance • and Documentary report.	-	-	-	-
PC30. • Demonstrate about PlanningSystem, spare part • Inventory, qualityrequirementandawareness.	-	-	-	-
PC31. • Explain about different electrical & mechanical faults in different • machines	-	-	-	-
PC32. • Explain about fault finding methods, root cause analysis & troubleshoot • of breakdown machines.	-	-	-	-
PC33. • Demonstrate to find Source, partinventory repairing, purchasing • and cause and factor analysis for all machines.	-	-	-	-
PC34. • Demonstrate Maintenance of different machine as: • turning,milling,andgrinding,drilling,radialgrinding of different manufactures.	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC35. • Explain about ObjectiveofCNCmachine, machine codes, • panelboardandaxishoming.	-	-	-	-
PC36. Demonstrate about different cycle and their uses.	-	-	-	-
PC37. • Demonstrate about weekly, monthly CNC Preventive maintenance, • Break down Maintenance	-	-	-	-
PC38. • Demonstrate Magnetism and classification of magnets, care • and maintenance ,methods of magnetizing &magnetic materials.	-	-	-	-
PC39. • Demonstrate • electromagnetism,corkscrewrule,righthandrules.Faradays laws, • Lenz's law andPrincipleandApplicationofD.C.motorandgenerators.	-	-	-	-
PC40. Demonstrate Installation,testand runofanelectricDCmotors	-	-	-	-
PC41. • Demonstrate Installation,testand runof electricDCgenerator and • M.G.set.	-	-	-	-
PC42. • Demonstrate Principle of Single phaseand threephasemotorand • itsapplication.	-	-	-	-
PC43. • Install and test an electric single phase AC motors and • anelectric3phasemotor byaD.O.L.starter	-	-	-	-
PC44. Install and test an electric 3phasemotor byaStar-Delta starter.	-	-	-	-
PC45. • Explain about different types of transformers, working principle, • specification and calculations.	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC46. Demonstration of Shortandopencircuit testof1phasetransformer.	-	-	-	-
PC47. Demonstrate about star and delta conversion of transformer.	-	-	-	-
PC48. • Demonstrate Power measurement by two wattmeter • method of three phase resistive load& inductive load	-	-	-	-
PC49. • Explain about different electronic components, applications and • advantages.	-	-	-	-
PC50. • Demonstration on different electronic component like resister, • capacitor, diode, IC, transistor, SCR and its application.	-	-	-	-
PC51. Demonstrate op-amp and its application. Use op-amp to design various electronic circuits,identifythepins ofop-ampIC	-	-	-	-
PC52. • Demonstrate about Soldering technique, active, • Passive electronic components, measuring instruments.	-	-	-	-
PC53. • Demonstrate the number system, logic gates and K-Map. • Know the number system conversion and simplify expression using K-Map	-	-	-	-
PC54. Analog & digital IC testing by using IC tester.	-	-	-	-
PC55. • Function and working of oscilloscope and also measuring different • quantities	-	-	-	-
PC56. • Demonstrate Function of frequency generator, counter & wave shaping • etc	-	-	-	-
NOS Total	**100**	-	-	-

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N0607
NOS Name	Carry out Machine Maintenance activities (Electrical)
Sector	Capital Goods
Sub-Sector	
Occupation	Maintenance & Automation
NSQF Level	4.5
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/N0610: Basics of Industrial Automation

Description

After completion of course Student should be able to Explain about electricity AC & DC.

Scope

The scope covers the following :

- After completion of course Student should be able to
- Explain about electricity AC & DC.

Elements and Performance Criteria

MSME/ADMMA/05 Basics of Industrial Automation

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

PC1. Explain about basic fundamental of electricity.

PC2. • Explain about electrical safety rules, use of safety precaution kit and
• tools.

PC3. Explain the PPE in Industrial Safety.

PC4. • Explain Basic injury prevention, Hazard identification and avoidance,
• safety signs for Danger, Warning, caution & personal safety.

PC5. Demonstrate measuring instrument for electrical parameters. Use multimeters for measurements of voltage, current& continuity.

PC6. • Explain briefly types of control based on application i.e. Manual Control,
• Feedback Control, Sequential Control, Motion Control, and Logical
• Control.

PC7. • Demonstrate symbols of the electrical components like M.C.B.,
• Starter ,Fuse ,and Bell etc. Use Series and parallel circuit and Prepares mall circuit.

PC8. • Identify types of wiring, draw one line diagram using standard symbols
• and do the wiring

PC9. Demonstrate Types of domestic and industrial wiring & JIC symbol, IEC symbol

PC10. • Discussion of different switches: push button, selector switch, limit
• switch.

PC11. • Explain briefly about types of contacts i.e. normally closed and normally
• closed contacts

PC12. Identify the types of switches and design control circuits for AC & DC loads

PC13. • Demonstrate different electro-mechanical switching componentsas:
• relay,contactor andtimer.

PC14. • Testing of Relay& contactor, identification of change over contacts as:
• NO- contacts, NC - contacts &common contacts.

PC15. • Do the connection Panel board wiring
• of relay and contactors for motor control logicas: start stop, forward reverse

PC16. • Demonstrate Panel wiring for Inching, Latching, Start, and Stop Control
• Circuits for motor.

PC17. • Demonstrate about different sensors as: proximity
• inductive, proximity capacitive, proximity optical.

PC18. • Identify and test the connecting terminals for input& output signal
• of the sensors.

PC19. Do the connection of sensors for different automation application logics.

PC20. Wiring and testing of control and power circuit: 3-ø star-delta starter.

PC21. • Explain about industrial Automation, different type of automation &
• control, advantages & dis -advantages, area of application, Levels of
• automation

PC22. Role of automation in various industrial process & future scopes.

PC23. Explain about Programmable Logic Controller (PLC), typesof PLC.

PC24. • Explain about Scan cycle, Work Memory, Data memory, PLChardware
• modules, communication protocols and gateway.

PC25. Demonstration of PLC Hardware installation and communication.

PC26. • Diagnosis of communication errors by indication and error-messages.
• Correction of error.

PC27. • Identify of PLC Hardware and do Practice to Communicate PLC with
• PC/LAPTOP system Installation of PLC software &simulation.

PC28. • Explain about PLC-programming software& features, IEC-programming
• languages as LAD, FBD, and STL

PC29. Create and test LAD, FBD, STL program using bit & block-Operands.

PC30. • Demonstration on LAD, FBD, STL programming language Logic Gates,
• AND, OR, NANAD, NOR, XOR.

PC31. • Demonstration on TIMER, COUNTER, and COMPARATOR blocks, in
• software.

PC32. • Explain about analog control in PLC, analog sensors and Voltage control
• method with 0-10v dc I/O signal /Current control method with 4-20 mA
• DC I/O signal.

PC33. • Demonstration analog signal I/O of PLCusingVoltage control method
• with 0-10 v DC I/O signal /Current control method with 4-20 mA DC I/O
• signal.

PC34. • Demonstration connection of I/O field devices in signal I/O of plc.
• Connection of different sensors & actuators with signal modules.

PC35. • Demonstration connection of remote I/O PLC with server PLC using
• profibus cable.

PC36. Fault analysis of Profibus / Ethernet network

PC37. Explain about supervisory control and data acquisition system (SCADA).

PC38. Functionalities and security features in SCADA architecture.

PC39. Demonstration on installation of SCADA software and driver tools.

PC40. Create different types of SCADA projects using software

PC41. • Demonstrate about graphic designer, tag management, and
• communication to PLC.

PC42. • Creating new projects, copy of project, activation & deactivation of
• project.

PC43. Use of Object Properties of Object Palette & Library.

PC44. • Editing Of Static Properties Style, Flashing, and Display. Use of Standard
• Color Palette.

PC45. Create process picture & simulate using mimic logic boards.

PC46. Demonstrate about Integrate & Configure Controls in Process Pictures.

PC47. • Demonstrate about Creating an Alarm Logging screen of a process.
• Archiving Messages. Display Message In Run Time

PC48. Creating an Online Trend, Table Trend report.

PC49. • Creating an Online Trend, Creating & Accessing Real-Time & Historical
• Trends.

PC50. • Design PC-Based HMI Interface different field devices with SCADA
• system & monitoring process values.

PC51. Configuration of HMI and PLC .Upload/ Transfer programs.

PC52. Demonstration with different HMI-models as KTP, TP.

PC53. • Demonstrate of connection between hard ware module & I/O field
• devices.

PC54. • Demonstrate the Connection of multiple users with multiple PLC using
• Ethernet communication network (LAN).

PC55. Fault finding with indication and system messages.

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
MSME/ADMMA/05 Basics of Industrial Automation	-	**100**	-	-
PC1. Explain about basic fundamental of electricity.	-	-	-	-
PC2. • Explain about electrical safety rules, use of safety precaution kit and • tools.	-	-	-	-
PC3. Explain the PPE in Industrial Safety.	-	-	-	-
PC4. • Explain Basic injury prevention, Hazard identification and avoidance, • safety signs for Danger, Warning, caution & personal safety.	-	-	-	-
PC5. Demonstrate measuring instrument for electrical parameters. Use multimeters for measurements of voltage, current& continuity.	-	-	-	-
PC6. • Explain briefly types of control based on application i.e. Manual Control, • Feedback Control, Sequential Control, Motion Control, and Logical • Control.	-	-	-	-
PC7. • Demonstrate symbols of the electrical components like M.C.B., • Starter ,Fuse ,and Bell etc. Use Series and parallel circuit and Prepares mall circuit.	-	-	-	-
PC8. • Identify types of wiring, draw one line diagram using standard symbols • and do the wiring	-	-	-	-
PC9. Demonstrate Types of domestic and industrial wiring & JIC symbol, IEC symbol	-	-	-	-
PC10. • Discussion of different switches: push button, selector switch, limit • switch.	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. • Explain briefly about types of contacts i.e. normally closed and normally • closed contacts	-	-	-	-
PC12. Identify the types of switches and design control circuits for AC & DC loads	-	-	-	-
PC13. • Demonstrate different electro-mechanical switching componentsas: • relay,contactor andtimer.	-	-	-	-
PC14. • Testing of Relay& contactor, identification of change over contacts as: • NO- contacts, NC - contacts &common contacts.	-	-	-	-
PC15. • Do the connection Panel board wiring • of relay and contactors for motor control logicas: start stop, forward reverse	-	-	-	-
PC16. • Demonstrate Panel wiring for Inching, Latching, Start, and Stop Control • Circuits for motor.	-	-	-	-
PC17. • Demonstrate about different sensors as: proximity • inductive, proximity capacitive, proximity optical.	-	-	-	-
PC18. • Identify and test the connecting terminals for input& output signal • of the sensors.	-	-	-	-
PC19. Do the connection of sensors for different automation application logics.	-	-	-	-
PC20. Wiring and testing of control and power circuit: 3-ø star-delta starter.	-	-	-	-
PC21. • Explain about industrial Automation, different type of automation & • control, advantages & dis -advantages, area of application, Levels of • automation	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC22. Role of automation in various industrial process & future scopes.	-	-	-	-
PC23. Explain about Programmable Logic Controller (PLC), typesof PLC.	-	-	-	-
PC24. • Explain about Scan cycle, Work Memory, Data memory, PLChardware • modules, communication protocols and gateway.	-	-	-	-
PC25. Demonstration of PLC Hardware installation and communication.	-	-	-	-
PC26. • Diagnosis of communication errors by indication and error-messages. • Correction of error.	-	-	-	-
PC27. • Identify of PLC Hardware and do Practice to Communicate PLC with • PC/LAPTOP system Installation of PLC software &simulation.	-	-	-	-
PC28. • Explain about PLC-programming software& features, IEC-programming • languages as LAD, FBD, and STL	-	-	-	-
PC29. Create and test LAD, FBD, STL program using bit & block-Operands.	-	-	-	-
PC30. • Demonstration on LAD, FBD, STL programming language Logic Gates, • AND, OR, NANAD, NOR, XOR.	-	-	-	-
PC31. • Demonstration on TIMER, COUNTER, and COMPARATOR blocks, in • software.	-	-	-	-
PC32. • Explain about analog control in PLC, analog sensors and Voltage control • method with 0-10v dc I/O signal /Current control method with 4-20 mA • DC I/O signal.	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC33. • Demonstration analog signal I/O of PLCusingVoltage control method • with 0-10 v DC I/O signal /Current control method with 4-20 mA DC I/O • signal.	-	-	-	-
PC34. • Demonstration connection of I/O field devices in signal I/O of plc. • Connection of different sensors & actuators with signal modules.	-	-	-	-
PC35. • Demonstration connection of remote I/O PLC with server PLC using • profibus cable.	-	-	-	-
PC36. Fault analysis of Profibus / Ethernet network	-	-	-	-
PC37. Explain about supervisory control and data acquisition system (SCADA).	-	-	-	-
PC38. Functionalities and security features in SCADA architecture.	-	-	-	-
PC39. Demonstration on installation of SCADA software and driver tools.	-	-	-	-
PC40. Create different types of SCADA projects using software	-	-	-	-
PC41. • Demonstrate about graphic designer, tag management, and • communication to PLC.	-	-	-	-
PC42. • Creating new projects, copy of project, activation & deactivation of • project.	-	-	-	-
PC43. Use of Object Properties of Object Palette & Library.	-	-	-	-
PC44. • Editing Of Static Properties Style, Flashing, and Display. Use of Standard • Color Palette.	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC45. Create process picture & simulate using mimic logic boards.	-	-	-	-
PC46. Demonstrate about Integrate & Configure Controls in Process Pictures.	-	-	-	-
PC47. • Demonstrate about Creating an Alarm Logging screen of a process. • Archiving Messages. Display Message In Run Time	-	-	-	-
PC48. Creating an Online Trend, Table Trend report.	-	-	-	-
PC49. • Creating an Online Trend, Creating & Accessing Real-Time & Historical • Trends.	-	-	-	-
PC50. • Design PC-Based HMI Interface different field devices with SCADA • system & monitoring process values.	-	-	-	-
PC51. Configuration of HMI and PLC .Upload/ Transfer programs.	-	-	-	-
PC52. Demonstration with different HMI-models as KTP, TP.	-	-	-	-
PC53. • Demonstrate of connection between hard ware module & I/O field • devices.	-	-	-	-
PC54. • Demonstrate the Connection of multiple users with multiple PLC using • Ethernet communication network (LAN).	-	-	-	-
PC55. Fault finding with indication and system messages.	-	-	-	-
NOS Total	**-**	**100**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N0610
NOS Name	Basics of Industrial Automation
Sector	Capital Goods
Sub-Sector	
Occupation	Maintenance & Automation
NSQF Level	4.5
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/N0609: Basics of Industrial Automation

Description

After completion of course Student should be able to Explain about electricity AC & DC.

Scope

The scope covers the following :

- After completion of course Student should be able to
- Explain about electricity AC & DC.

Elements and Performance Criteria

MSME/ADMMA/05 Basics of Industrial Automation

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

PC1. Explain about basic fundamental of electricity.

PC2. • Explain about electrical safety rules, use of safety precaution kit and
• tools.

PC3. Explain the PPE in Industrial Safety.

PC4. • Explain Basic injury prevention, Hazard identification and avoidance,
• safety signs for Danger, Warning, caution & personal safety.

PC5. Demonstrate measuring instrument for electrical parameters. Use multimeters for measurements of voltage, current& continuity.

PC6. • Explain briefly types of control based on application i.e. Manual Control,
• Feedback Control, Sequential Control, Motion Control, and Logical
• Control.

PC7. • Demonstrate symbols of the electrical components like M.C.B.,
• Starter ,Fuse ,and Bell etc. Use Series and parallel circuit and Prepares mall circuit.

PC8. • Identify types of wiring, draw one line diagram using standard symbols
• and do the wiring

PC9. Demonstrate Types of domestic and industrial wiring & JIC symbol, IEC symbol

PC10. • Discussion of different switches: push button, selector switch, limit
• switch.

PC11. • Explain briefly about types of contacts i.e. normally closed and normally
• closed contacts

PC12. Identify the types of switches and design control circuits for AC & DC loads

PC13. • Demonstrate different electro-mechanical switching componentsas:
• relay,contactor andtimer.

PC14. • Testing of Relay& contactor, identification of change over contacts as:
• NO- contacts, NC - contacts &common contacts.

PC15. • Do the connection Panel board wiring
• of relay and contactors for motor control logicas: start stop, forward reverse

PC16. • Demonstrate Panel wiring for Inching, Latching, Start, and Stop Control
• Circuits for motor.

PC17. • Demonstrate about different sensors as: proximity
• inductive, proximity capacitive, proximity optical.

PC18. • Identify and test the connecting terminals for input& output signal
• of the sensors.

PC19. Do the connection of sensors for different automation application logics.

PC20. Wiring and testing of control and power circuit: 3-ø star-delta starter.

PC21. • Explain about industrial Automation, different type of automation &
• control, advantages & dis -advantages, area of application, Levels of
• automation

PC22. Role of automation in various industrial process & future scopes.

PC23. Explain about Programmable Logic Controller (PLC), typesof PLC.

PC24. • Explain about Scan cycle, Work Memory, Data memory, PLChardware
• modules, communication protocols and gateway.

PC25. Demonstration of PLC Hardware installation and communication.

PC26. • Diagnosis of communication errors by indication and error-messages.
• Correction of error.

PC27. • Identify of PLC Hardware and do Practice to Communicate PLC with
• PC/LAPTOP system Installation of PLC software &simulation.

PC28. • Explain about PLC-programming software& features, IEC-programming
• languages as LAD, FBD, and STL

PC29. Create and test LAD, FBD, STL program using bit & block-Operands.

PC30. • Demonstration on LAD, FBD, STL programming language Logic Gates,
• AND, OR, NANAD, NOR, XOR.

PC31. • Demonstration on TIMER, COUNTER, and COMPARATOR blocks, in
• software.

PC32. • Explain about analog control in PLC, analog sensors and Voltage control
• method with 0-10v dc I/O signal /Current control method with 4-20 mA
• DC I/O signal.

PC33. • Demonstration analog signal I/O of PLCusingVoltage control method
• with 0-10 v DC I/O signal /Current control method with 4-20 mA DC I/O
• signal.

PC34. • Demonstration connection of I/O field devices in signal I/O of plc.
• Connection of different sensors & actuators with signal modules.

PC35. • Demonstration connection of remote I/O PLC with server PLC using
• profibus cable.

PC36. Fault analysis of Profibus / Ethernet network

PC37. Explain about supervisory control and data acquisition system (SCADA).

PC38. Functionalities and security features in SCADA architecture.

PC39. Demonstration on installation of SCADA software and driver tools.

PC40. Create different types of SCADA projects using software

PC41. • Demonstrate about graphic designer, tag management, and
• communication to PLC.

PC42. • Creating new projects, copy of project, activation & deactivation of
• project.

PC43. Use of Object Properties of Object Palette & Library.

PC44. • Editing Of Static Properties Style, Flashing, and Display. Use of Standard
• Color Palette.

PC45. Create process picture & simulate using mimic logic boards.

PC46. Demonstrate about Integrate & Configure Controls in Process Pictures.

PC47. • Demonstrate about Creating an Alarm Logging screen of a process.
• Archiving Messages. Display Message In Run Time

PC48. Creating an Online Trend, Table Trend report.

PC49. • Creating an Online Trend, Creating & Accessing Real-Time & Historical
• Trends.

PC50. • Design PC-Based HMI Interface different field devices with SCADA
• system & monitoring process values.

PC51. Configuration of HMI and PLC .Upload/ Transfer programs.

PC52. Demonstration with different HMI-models as KTP, TP.

PC53. • Demonstrate of connection between hard ware module & I/O field
• devices.

PC54. • Demonstrate the Connection of multiple users with multiple PLC using
• Ethernet communication network (LAN).

PC55. Fault finding with indication and system messages.

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
MSME/ADMMA/05 Basics of Industrial Automation	**100**	-	-	-
PC1. Explain about basic fundamental of electricity.	-	-	-	-
PC2. • Explain about electrical safety rules, use of safety precaution kit and • tools.	-	-	-	-
PC3. Explain the PPE in Industrial Safety.	-	-	-	-
PC4. • Explain Basic injury prevention, Hazard identification and avoidance, • safety signs for Danger, Warning, caution & personal safety.	-	-	-	-
PC5. Demonstrate measuring instrument for electrical parameters. Use multimeters for measurements of voltage, current& continuity.	-	-	-	-
PC6. • Explain briefly types of control based on application i.e. Manual Control, • Feedback Control, Sequential Control, Motion Control, and Logical • Control.	-	-	-	-
PC7. • Demonstrate symbols of the electrical components like M.C.B., • Starter ,Fuse ,and Bell etc. Use Series and parallel circuit and Prepares mall circuit.	-	-	-	-
PC8. • Identify types of wiring, draw one line diagram using standard symbols • and do the wiring	-	-	-	-
PC9. Demonstrate Types of domestic and industrial wiring & JIC symbol, IEC symbol	-	-	-	-
PC10. • Discussion of different switches: push button, selector switch, limit • switch.	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. • Explain briefly about types of contacts i.e. normally closed and normally • closed contacts	-	-	-	-
PC12. Identify the types of switches and design control circuits for AC & DC loads	-	-	-	-
PC13. • Demonstrate different electro-mechanical switching componentsas: • relay,contactor andtimer.	-	-	-	-
PC14. • Testing of Relay& contactor, identification of change over contacts as: • NO- contacts, NC - contacts &common contacts.	-	-	-	-
PC15. • Do the connection Panel board wiring • of relay and contactors for motor control logicas: start stop, forward reverse	-	-	-	-
PC16. • Demonstrate Panel wiring for Inching, Latching, Start, and Stop Control • Circuits for motor.	-	-	-	-
PC17. • Demonstrate about different sensors as: proximity • inductive, proximity capacitive, proximity optical.	-	-	-	-
PC18. • Identify and test the connecting terminals for input& output signal • of the sensors.	-	-	-	-
PC19. Do the connection of sensors for different automation application logics.	-	-	-	-
PC20. Wiring and testing of control and power circuit: 3-ø star-delta starter.	-	-	-	-
PC21. • Explain about industrial Automation, different type of automation & • control, advantages & dis -advantages, area of application, Levels of • automation	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC22. Role of automation in various industrial process & future scopes.	-	-	-	-
PC23. Explain about Programmable Logic Controller (PLC), typesof PLC.	-	-	-	-
PC24. • Explain about Scan cycle, Work Memory, Data memory, PLChardware • modules, communication protocols and gateway.	-	-	-	-
PC25. Demonstration of PLC Hardware installation and communication.	-	-	-	-
PC26. • Diagnosis of communication errors by indication and error-messages. • Correction of error.	-	-	-	-
PC27. • Identify of PLC Hardware and do Practice to Communicate PLC with • PC/LAPTOP system Installation of PLC software &simulation.	-	-	-	-
PC28. • Explain about PLC-programming software& features, IEC-programming • languages as LAD, FBD, and STL	-	-	-	-
PC29. Create and test LAD, FBD, STL program using bit & block-Operands.	-	-	-	-
PC30. • Demonstration on LAD, FBD, STL programming language Logic Gates, • AND, OR, NANAD, NOR, XOR.	-	-	-	-
PC31. • Demonstration on TIMER, COUNTER, and COMPARATOR blocks, in • software.	-	-	-	-
PC32. • Explain about analog control in PLC, analog sensors and Voltage control • method with 0-10v dc I/O signal /Current control method with 4-20 mA • DC I/O signal.	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC33. • Demonstration analog signal I/O of PLCusingVoltage control method • with 0-10 v DC I/O signal /Current control method with 4-20 mA DC I/O • signal.	-	-	-	-
PC34. • Demonstration connection of I/O field devices in signal I/O of plc. • Connection of different sensors & actuators with signal modules.	-	-	-	-
PC35. • Demonstration connection of remote I/O PLC with server PLC using • profibus cable.	-	-	-	-
PC36. Fault analysis of Profibus / Ethernet network	-	-	-	-
PC37. Explain about supervisory control and data acquisition system (SCADA).	-	-	-	-
PC38. Functionalities and security features in SCADA architecture.	-	-	-	-
PC39. Demonstration on installation of SCADA software and driver tools.	-	-	-	-
PC40. Create different types of SCADA projects using software	-	-	-	-
PC41. • Demonstrate about graphic designer, tag management, and • communication to PLC.	-	-	-	-
PC42. • Creating new projects, copy of project, activation & deactivation of • project.	-	-	-	-
PC43. Use of Object Properties of Object Palette & Library.	-	-	-	-
PC44. • Editing Of Static Properties Style, Flashing, and Display. Use of Standard • Color Palette.	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC45. Create process picture & simulate using mimic logic boards.	-	-	-	-
PC46. Demonstrate about Integrate & Configure Controls in Process Pictures.	-	-	-	-
PC47. • Demonstrate about Creating an Alarm Logging screen of a process. • Archiving Messages. Display Message In Run Time	-	-	-	-
PC48. Creating an Online Trend, Table Trend report.	-	-	-	-
PC49. • Creating an Online Trend, Creating & Accessing Real-Time & Historical • Trends.	-	-	-	-
PC50. • Design PC-Based HMI Interface different field devices with SCADA • system & monitoring process values.	-	-	-	-
PC51. Configuration of HMI and PLC .Upload/ Transfer programs.	-	-	-	-
PC52. Demonstration with different HMI-models as KTP, TP.	-	-	-	-
PC53. • Demonstrate of connection between hard ware module & I/O field • devices.	-	-	-	-
PC54. • Demonstrate the Connection of multiple users with multiple PLC using • Ethernet communication network (LAN).	-	-	-	-
PC55. Fault finding with indication and system messages.	-	-	-	-
NOS Total	**100**	-	-	-

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N0609
NOS Name	Basics of Industrial Automation
Sector	Capital Goods
Sub-Sector	
Occupation	Maintenance & Automation
NSQF Level	4.5
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/N0611: Employability skills

Description

After completing this programme, participants will be able to: 1. Discuss the Employability Skills required for jobs in various industries 2. List different learning and employability related GOI and private portals and their usage

Scope

The scope covers the following :

- After completing this programme, participants will be able to:
- 1. Discuss the Employability Skills required for jobs in various industries
- 2. List different learning and employability related GOI and private portals and their
- usage

Elements and Performance Criteria

MSME/ES/02 Employability skills

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

PC1.	• Explain the major applications of MS Office. •
PC2.	Explain the different types of e-commerce. List the benefits of ecommerce for retailers and customers.
PC3.	• Discuss how the Digital India campaign will help boost e-commerce in • India
PC4.	Write applications pertaining to various matters.
PC5.	Explain power of positive attitude and Importance of commitment.
PC6.	• Explain motivation and the Ways to motivate oneself and Personal goal • setting
PC7.	Explain the Effective & Level of Communication
PC8.	Explain communication and Significance of technical communication
PC9.	Explain the methods of listening Skills.
PC10.	Explain the differences between bio-data, CV and Resume.
PC11.	Explain verbal and non-verbal Communication
PC12.	Explain how to face an interview
PC13.	Explain team work, group work, team formation process
PC14.	How to Minimize the team conflicts
PC15.	Explain Ethics & values.
PC16.	• Explain the concept of entrepreneurship, and entrepreneurship v/s • Management.
PC17.	Explain entrepreneurial process and entrepreneurship frame work.
PC18.	Role of information in opportunity recognition.

PC19. • Discuss how to identify opportunities for potential business, sources of
• funding and associated financial and legal risks with its mitigation plan.

PC20. • Describe the 4Ps of Marketing-Product, Price, Place and Promotion and
• apply them as per requirement

PC21. • Describe environment scanning, SWOT (Strengths, Weaknesses,
• Opportunities and Threats).

PC22. Explain entrepreneurial personality&traits. Barriers in entrepreneurship

PC23. Explain importance of business model, business model analysis & the life cycle of the business model.

PC24. Meaning and importance of startup factors of entrepreneurship.

PC25. Explain organizational structure and forms of ownership

PC26. • Explain the process of project report preparation for setting up a new
• business.

PC27. • Explain meaning and importance of manpower planning, financial
• planning, working capital, perfoma income statement, perfoma balance
• sheet, breakeven point.

PC28. • Explain the role of various schemes and institute for self- employment
• i.e MSME, DIC, NSIC, SIDBI etc,

PC29. Role of financial institution to support startup.

PC30. Discuss the importance of saving money.

PC31. Discuss the main types of bank accounts.

PC32. Differentiate between fixed and variable costs.

PC33. Describe the different types of insurance products.

PC34. Discuss the main types of electronic funds transfers.

PC35. Describe concept of intellectual property rights.

PC36. Explain types of intellectual properties

PC37. Role perspective of intellectual property concept in entrepreneurship

PC38. Explain advantage of intellectual property rights and economic benefits.

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
MSME/ES/02 Employability skills	**100**	**-**	**-**	**-**
PC1. • Explain the major applications of MS Office. •	-	-	-	-
PC2. Explain the different types of e-commerce. List the benefits of ecommerce for retailers and customers.	-	-	-	-
PC3. • Discuss how the Digital India campaign will help boost e-commerce in • India	-	-	-	-
PC4. Write applications pertaining to various matters.	-	-	-	-
PC5. Explain power of positive attitude and Importance of commitment.	-	-	-	-
PC6. • Explain motivation and the Ways to motivate oneself and Personal goal • setting	-	-	-	-
PC7. Explain the Effective & Level of Communication	-	-	-	-
PC8. Explain communication and Significance of technical communication	-	-	-	-
PC9. Explain the methods of listening Skills.	-	-	-	-
PC10. Explain the differences between bio-data, CV and Resume.	-	-	-	-
PC11. Explain verbal and non-verbal Communication	-	-	-	-
PC12. Explain how to face an interview	-	-	-	-
PC13. Explain team work, group work, team formation process	-	-	-	-
PC14. How to Minimize the team conflicts	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC15. Explain Ethics & values.	-	-	-	-
PC16. • Explain the concept of entrepreneurship, and entrepreneurship v/s • Management.	-	-	-	-
PC17. Explain entrepreneurial process and entrepreneurship frame work.	-	-	-	-
PC18. Role of information in opportunity recognition.	-	-	-	-
PC19. • Discuss how to identify opportunities for potential business, sources of • funding and associated financial and legal risks with its mitigation plan.	-	-	-	-
PC20. • Describe the 4Ps of Marketing-Product, Price, Place and Promotion and • apply them as per requirement	-	-	-	-
PC21. • Describe environment scanning, SWOT (Strengths, Weaknesses, • Opportunities and Threats).	-	-	-	-
PC22. Explain entrepreneurial personality&traits. Barriers in entrepreneurship	-	-	-	-
PC23. Explain importance of business model, business model analysis & the life cycle of the business model.	-	-	-	-
PC24. Meaning and importance of startup factors of entrepreneurship.	-	-	-	-
PC25. Explain organizational structure and forms of ownership	-	-	-	-
PC26. • Explain the process of project report preparation for setting up a new • business.	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC27. • Explain meaning and importance of manpower planning, financial • planning, working capital, perfoma income statement, perfoma balance • sheet, breakeven point.	-	-	-	-
PC28. • Explain the role of various schemes and institute for self- employment • i.e MSME, DIC, NSIC, SIDBI etc,	-	-	-	-
PC29. Role of financial institution to support startup.	-	-	-	-
PC30. Discuss the importance of saving money.	-	-	-	-
PC31. Discuss the main types of bank accounts.	-	-	-	-
PC32. Differentiate between fixed and variable costs.	-	-	-	-
PC33. Describe the different types of insurance products.	-	-	-	-
PC34. Discuss the main types of electronic funds transfers.	-	-	-	-
PC35. Describe concept of intellectual property rights.	-	-	-	-
PC36. Explain types of intellectual properties	-	-	-	-
PC37. Role perspective of intellectual property concept in entrepreneurship	-	-	-	-
PC38. Explain advantage of intellectual property rights and economic benefits.	-	-	-	-
NOS Total	**100**	**-**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	MSME/CSC/N0611
NOS Name	Employability skills
Sector	Capital Goods
Sub-Sector	
Occupation	Maintenance & Automation
NSQF Level	4.5
Credits	2
Version	1.0
Last Reviewed Date	30/04/2024
Next Review Date	30/04/2027
NSQC Clearance Date	30/04/2024

Assessment Guidelines and Assessment Weightage

Assessment Guidelines

As per QP

Minimum Aggregate Passing % at QP Level : 40

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

Minimum Passing % at NOS Level: 40

(**Please note**: A Trainee must score the minimum percentage for each NOS separately as well as on the QP as a whole.)

Assessment Weightage

Compulsory NOS

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
MSME/CSC/N0602.Demonstrate the Basic Machine Operation	-	100	-	-	100	10
MSME/CSC/N0601.Demonstrate the Basic Machine Operation	100	-	-	-	100	10
MSME/CSC/N0605.Maintenance of Hydraulics & Pneumatics Components.	100	-	-	-	100	10
MSME/CSC/N0604.Maintenance of Hydraulics & Pneumatics Components.	-	100	-	-	100	10
MSME/CSC/N0606.Create & Modify the Electrical circuit diagram using CAD software	-	100	-	-	100	10
MSME/CSC/N0612.Carry out Machine Maintenance activities (Electrical)	-	100	-	-	100	10
MSME/CSC/N0607.Carry out Machine Maintenance activities (Electrical)	100	-	-	-	100	10
MSME/CSC/N0610.Basics of Industrial Automation	-	100	-	-	100	10
MSME/CSC/N0609.Basics of Industrial Automation	100	-	-	-	100	10
MSME/CSC/N0611.Employability skills	100	-	-	-	100	10
Total	**500**	**500**	**-**	**-**	**1000**	**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.