सूक्ष्म, लघु एवं मध्यम उद्यम मंत्रालय
DEVELOPMENT COMMISSIONER
MINISTRY OF MICRO, SMALL & MEDIUM ENTERPRISES
MSME TECHNOLOGY CENTRE

MODEL CURRICULUM

Qualification Name:

SR. TECHNICIAN -MACHINE MAINTENANCE AND AUTOMATION

Qualification Code:

Version: 2.0

NSQF Level: 4.5

Model Curriculum Version: 2.0

Submitted by:

MSME TECHNOLOGY CENTRE

O/o DC MSME, Ministry of Micro, Small and Medium Enterprises

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NOS / MODULE TEMPLATE

NOS /Module: Demonstrate the Basic Machine Operation

NOS /Module Code: MSME/ADMMA/01

Outcomes:

After completion of course Student should be able to:

1. Explain applications and advantages of Tool Room machines
2. Understand about the basic norms of an organization
3. Understand an implement various activities involved in 5S
4. Understand about the safety rules
5. Explain the use of first aid and safety equipment/PPE
6. Explain various operations performed on conventional and Non-Conventional machines.
7. Calculate various parameters like Feed, RPM, Cycle time and other related parameters to perform machine operations.
8. Demonstrate and explain various conventional machines (CNC machine).
9. Prepare and understand different programs for various operations related to CNC machines.
10. Prepare programs, demonstrate, simulate and operate CNC machines for various machining operations.
11. Perform basic routine maintenance and prepare record of Machine break down.
12. Maintain & prepare reports as per standard / check sheet.

Theory Hours: 30 **Practical Hours: 30** **Theory Marks: NA** **Practical Marks: 100**

Unit No.	**Unit Name**	**Unit level outcomes**	**Contents (chapters/topics)**	**PR hours**	**PR Marks**
UNIT-I	Introduction Occupational health and safety	After completion of unit Student should be able to • Understand about Organizational rules & regulation • Understand about the various activities involved in 5S. • Implement 5S in the work area. • use of first aid and safety equipment/PPE	Introduction to Organization/ Institute (MSME Technology Centre) Rules & Regulation, mandate, mission and policies. Introduction & purpose of 5S, Creates a Visual Factory, The 5S Cycle, and 5S Activities, 5S Program Steps: Sort, Straighten, Shine, Standardize and Sustain. Health & Safety: Introduction to safety equipment's and their uses, Introduction of first aid, operation of Electrical mains, Occupational Safety & Health, Importance of housekeeping & good shop floor practices, Disposal procedure, Disposal of waste materials like cotton waste, metal chips/burrs etc, personal protective equipment's (PPE), Basic injury prevention, Hazard identification and avoidance, safety signs for Danger, Warning, caution & personal safety	3	10

			message.		
UNIT-II	Conventional/Non-conventional machines Operation and cutting tools	After completion of unit Student should be able to • Understand and explain single point cutting tool • Tool terminologies • Explain different conventional machine like lathe, milling, grinding machine etc. • Describe different machine parts & accessories • Understand about the different types of operations • Explain the methods of machining • Explain different cutting techniques like milling, turning, drilling, grinding etc.	Bench & pedestal grinders, features. Wheel dressers, Safety. Construction, Cutting Tool shape & Geometry, Work Holding Devices, Cutting Speed feed and depth of cut. Conventional/Non-conventional machines and its parts, Specification of a different conventional/Non-conventional Machines and its parts, work and tool holding devices, different machine operations like: Plain & Step turning, Parting, Boring, Grooving, Facing, Threading, Profile, Drilling, Tapping, Reaming, Counter boring, Knurling, polishing etc.	10	20
UNIT-III	CNC Machining-Turning and milling Operation and Setup)	After completion of unit Student should be able to • Optimize parameters for turning and milling operations • Analyze the parameters of lathe and milling operations • Explain operation sequence for the lathe and milling operations	CNC programming basics, Introduction to manual NC programming, NC programming, Introduction and demonstration of line programs, NC programming for lathe machine using ISO codes into the CNC simulator. CNC programming for lathe machines using different machining cycles into the CNC simulator, Adoptive Control System and practical exercises Plan and optimize programs for CNC turning operations. Calculate parameters like speed feed etc. and set a references for the various operations	15	40

		• Prepare operation sequence for test run • Set, Simulate, and perform various operations like turning facing, grooving etc. • Set , Simulate, and perform various operations like milling, profile cutting , drilling etc.	Prepare operation and operation sequence for the lathe operations like turning, grooving etc. Prepare & set CNC lathe operations and run program Execute program and inspect simple geometrical forms / standard part Procedures Associated with part programming, Cutting process parameter selection, Process planning issues and path planning, G & M Codes		
UNIT-IV	Preventive measures and Maintenance	After completion of unit At the end of this Unit the student should be able to: • Understand the routine Maintenance concept of the CNC machines • Understand concept of preventive measures. • Understand different types of maintenance as per the industrial requirements like CBM, TPM, and RCM etc.	• Preventive measures, Routine maintenance, Electrical maintenance & steps to be taken to implement the CBM, TPM, and RCM etc. .	5	30

COURSES / MODULE TEMPLATE

NOS /Module: Maintenance of Hydraulics & Pneumatics Components.

NOS /Module Code: MSME/ADMMA/02

Outcomes:

After completion of course Student should be able to:

1. Understand about the Pneumatics system & Hydraulic System.
2. Explain about the basic Pneumatics & Hydraulic controlling equipment and its use.
3. Understand Electro-Pneumatics & Electro-Hydraulics controlling equipment and its use.
4. Explain about the Purpose of fluids and Basic controlling equipment used in hydraulics.
5. Explain the use of different valves & actuation method's.
6. Explain about different types of Pneumatics and Hydraulics Actuators.
7. Understand the actuation techniques of cylinders.
8. Demonstration on Hydraulics and check the quality requirements of oil.
9. Demonstrate and mark internal parts of a Power pack/Compressor and its related equipment.
10. Explain various operations performed on pneumatic & Hydraulic in industrial controls/machines.
11. Design various circuits by using different valves, for industrial control.
12. Explain about hydraulics &pneumatics maintenance.

Theory Hours: 30 **Practical Hours: - 60** **Theory Marks: 100** **Practical Marks: -100**

Unit No.	**Unit Name**	**Unit level outcomes**	**Contents (chapters/topics)**	**TH Hours**	**PR hours**	**PR Marks**
UNIT -I	Introduction of Pneumatics system.	At the end of this Unit the student should be able to: • Understand about Pneumatics system. • Understand about the different symbolic representation of pneumatic equipment's. • Understand about the pressure Measurement by different pressure gauges. • Understand about the various different parts of air generation & preparation unit. • Understand about the various different parts of air consuming unit. • Understand about the various different valves and their different actuation process • Understand about the	Introduction of Pneumatic system, Advantages & Limitations of pneumatic system applications. Safety precaution in pneumatic operations. Pneumatics Basic controlling equipment, ISO symbols, air generation & preparation unit compressor& dryer. Gauge pressure, atmospheric pressure, absolute pressure. Different pressure gauges (Digital and Analog type), FRL.Tubes & fittings, Pneumatic converters, reducers, DC-valves as 3/2 and 5/2, Flow control valve, throttle valve ,suttle valve, two pressure valve, logic valve Pressure Control Valves ,Combination Valve, Pressure Control Valves. Pressure relief valve, quick exhaust valve. Pneumatic linear actuators and Rotary actuators SAC,	9	18	25

		pneumatic linear actuators and Rotary actuators • General maintenance of compressor.	DAC. Pneumatic Industrial Control Logic & Operations. General maintenance of compressor.			
UNIT -II	Introduction of Electro-Pneumatics system.	At the end of this Unit the student should be able to: • Understand about electro-Pneumatics system. • Understand about the different symbolic representation of electro -pneumatic equipment's & electrical control. • Understand about the AC & DC supply. • Understand about the various different parts of electro -pneumatic system. • Understand about push button, selector, limit switch, sensors, reed switches application. • Understand about the RELAY & solenoid actuation. • Understand about the solenoid actuated pneumatic valves. • Understand about the pc based communication through OPC SERVER. • Understand about the pc based communication through PLC with electro-pneumatic system.	Introduction of Electro Pneumatic system, Advantages & Limitations of Electro -pneumatic system applications. Safety precaution in electro- pneumatic operations. Electro-Pneumatics Basic controlling equipment, electrical switches, push button, selector switch, limit switch, pressure sensor,Idcutive,Capacitive,Optical Sensor, Reed switch, timer, Solenoid actuated DC-valves as 3/2 and 5/2, pneumatic linear actuators and Rotary actuators SAC, DAC. Pneumatic Industrial Control Logic & Operations.PLC-Communication & application in electro-pneumatic system. Opc –server communication with pc based control.	6	12	25
UNIT -III	Introduction of hydraulics system.	At the end of this Unit the student should be able to: • Understand about hydraulic system.	Introduction of hydraulics system, Advantages & Limitations of hydraulics system applications. Safety precaution in hydraulics	9	18	25

		• Understand about the different symbolic representation of hydraulic equipment's. • Understand about the hy draulic pressure Measurement by different manometers. • Understand about the various different parts of power pack unit. Selection of hydraulic oil. • Understand about the various different parts of air consuming unit. • Understand about the various different hydraulic valves and their different actuation process • Understand about the hydraulic linear actuators and Rotary actuators. • General maintenance of hydraulic system.	operations. Hydraulics Basic controlling equipment, oil pressure generation, power pack unit, Hose pipes & fittings, types of seals, leakage. Pump, Oil pressure, ISO symbols of valves, filters and their application, check valves, DC-valves as 2/2, 4/3, 4/2 and 5/2. Flow control valve, throttle valve, Pressure Control Valves, and Pressure Control Valves. Pressure relief valve, hydraulics linear actuators and Rotary actuators SAC, DAC. Hydraulics Industrial Control Logic & Operations. General maintenance of power pack, seals, filters & hose pipes, oil check.			

UNIT -IV	Introduction of Electro-hydraulic system.	At the end of this Unit the student should be able to: • Understand about electro-Hydraulics system. • Understand about the different symbolic representation of electro - Hydraulics equipment's & electrical control. • Understand about the various different parts of electro - Hydraulics system. • Understand about the solenoid actuated Hydraulics valves. • Understand about the pc based communication through OPC SERVER. • Understand about the pc based communication through PLC with electro-Hydraulics system.	Introduction of electro - Hydraulics system, Advantages & Limitations of electro - Hydraulics system applications. Safety precaution in electro- Hydraulics operations. Electro- Hydraulics controlling equipment, electrical switches, push button, selector switch, limit switch, pressure sensor,Idcutive,Capacitive,Optical Sensor, Reed switch, Timer, Solenoid actuated DC-valves as 2/2,4/3, 4/2 and 5/2, electro - Hydraulics linear actuators and Rotary actuators SAC, DAC. Electro - Hydraulics Industrial Control Logic & Operations.PLC-Communication & application in electro - Hydraulics system. Opc –server communication with pc based control.	6	12	25

COURSES / MODULE TEMPLATE

NOS /Module: Create & Modify the Electrical circuit diagram using CAD software

NOS /Module Code: MSME/ADMMA/03

Outcomes:

After completion of course Student should be able to

1. Explain the application of engineering drawing.
2. Construct orthographic Projections giving proper dimensioning with title block using appropriate line type and scale for any geometrical figure in Auto CAD
3. Explain various drawing Equipment's.
4. Understand of Engineering Dimensioning method and their application
5. Distinguish between Isometric view and Isometric projections.
6. Explain about GD&T
7. Create 2D geometric sketches by using Auto CAD Software
8. Develop 3D modeling by using advanced command
9. Understand design generative & interactive drafting
10. Understand Electrical SLD design.
11. Develop various type of motor-stator control design.
12. Explain about HT& LT power lines with design.
13. Understand & development of electrical wiring for industrial machines.
14. Develop various type of industrial Electrical panels wiring design.

THEORY HOURS: -NA PRACTICAL HOURS: 60 THEORY MARKS: - NA PRACTICAL MARKS: 100

Unit No.	**Unit Name**	**Unit level outcomes**	**Contents (chapters/topics)**	**PR hours**	**PR Marks**
Unit-I	Introduction to auto cad	At the end of this Unit the student should be able to: • Understand CAD software. • Capability of Auto CAD • Use of various Visualization command • Documentation Quick tour • Create and Access documentation • Layout and plotting	Capability of Auto Cad, Starting AUTOCAD ,Various Visualization commands, Documentation Quick tour, Creating and Accessing documentation, Layout and plotting, Concept of software, Design criteria, Geometric modeling, entities, 2D & 3D Primitives. Different Types of cad software. Also comparison of various CAD Software. CAD software features..	6	5

Unit-II	Editing methods and controlling drawing display	At the end of this Unit the student should be able to: • AUTOCAD & interface • Setting new drawing. • Accessing command • Opening & saving existing file & function keys etc. • Work with Co-ordinates system and their type • Drawing Line, curve objects (Circle, Arc, Ellipse, elliptical arcs,) • Create solid filled areas-Regions, Hatch, Dot-nut, DD type	Create the replica of model using copy, array, Work with models in the modify toolbar, Work with Erase, Trim, Break, Break at point, Create mirror, fillet & chamfer, Execute dimensions through dimension style option Understand of design intent & edit the design intent, Identify Sketch Entities line arc, rectangle, circle etc., Use sketch settings, Use of Style toolbar (text style, Multilayer style etc.),Concept of creating single entity object, Perform Revision cloud and wipe out command	9	15
Unit-III	Layer management	At the end of this Unit the student should be able to: • Edit objects using the object property tool bar and various method • Adjusting snap & Grid alignment using Ortho mode • Use object snap and object tracking methods. • Understand the concept and use of layers • Work with Layer	Edit objects using the object property tool bar and various method, Concepts of layers, Create the layers by various line property., Extract the layers from the saved file by design Centre option, Application of layers on/off, Use of layers for block, text, dimension, freeze, lock. Work with snap & Grid alignment using Ortho modes, Define Attributes for variable text of block, Use of purge to eliminate the unused layers, blocks, Create title block using table option.	6	5

Unit-IV	Basic Dimensioning , Geometric dimensioning & Tolerance.	At the end of this Unit the student should be able to: • Need for Dimension • Detailed discussion on Dimensioning and tolerance method in AUTOCAD • Edit method • Add text with various engineering symbols • Concept of block, formation of block, Attribute definition • DD attribute and edit block • Insert, Modify, renaming block	Use of linear dimensioning (Linear, Align, Ordinates), Use of circular dimensioning (Radius, Diameter, Arc length), Create Baseline dimension & continuous dimensions for linear & angular dimension. Identify the appropriate Tool to create and modify the model, Add text with various engineering symbols, Deform the object by scale, lengthen, stretching, extend, Change the orientation of the object by align, offset, rotate, Concept of standard dimension, Use of angular dimension, Use of leader with text, block reference, concepts of Block, create the Block, Write block & extract the block from saved block.	6	10
Unit V	Getting started with 3d & Working in 3d space"	At the end of this Unit the student should be able to: • Concept of Isometric Drawing, axes and planes • Defining the paper setting • View ports • Overview of 3D model • Solid modeling in AutoCAD • Surface modeling in AutoCAD	Concept of Isometric Drawing, axes and planes, so-circle, Defining the paper setting ,Overview of 3D model, Solid modeling in AutoCAD(creating technique),Solid modeling in AutoCAD(editing and modification technique),Solid modeling in AutoCAD(editing and modification technique), Surface modeling in AutoCAD(creating, editing and modification technique),Converting wire frame models in to surface mode , Use of Sweep, Loft, and Press pull. 3d Move, 3d Rotate, 3d Array, 3d Align.	6	10

Unit VI	Electrcal CAD	After completion of unit Student should be able to • Explain applications and advantages electrical CAD. • Understand and explain difference between Drawing and Engineering Drawing. • Demonstrate and explain various Drawing options in software. • Understand and demonstrate method of dimensioning. • Understand electrical control ckt & power ckt design. • Understand about HT & LT lines representation in SLD using multicolor, multi buses.	AutoCAD Electrical software Workspace Awareness, Tool Bars, Tool Pallets, Insert component working with project manager. Overview about relay, contactor, timer and old. Drafting features- copy, move, delete, scoot, align, link component, attribute reverse/ flip component, retag and update component. Create For/Rev Control circuit ,power circuit diagrams,SLD Presentation, various electrical motor stator design, Multibus, wire number, wire color, wire size, wire labeling, and overview on HT & LT Lines, grids. Develop PLC- I/O positioning, symbol macro, report generation.	18	40
Unit VII	E PLAN	After completion of unit Student should be able to • Understand to design the various types of electrical panel. • Understand the wiring standard of industrial panels. • Understand to design various electrical HT & LT Panels as per power ratings.	Introduction to EPLAN Software, 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. Representation of all dimensions and specifications of panel in drawing.	9	15-

COURSES / MODULE TEMPLATE

NOS /Module: Carry out Machine Maintenance activities (Electrical)

NOS /Module Code: MSME/ADMMA/04

Outcomes:

After completion of course Student should be able to

1. Understand about electricity.
2. Explain about electrical safety & safety precautions.
3. Describe about different electrical parameters.
4. Describe about different electrical safety devices.
5. Demonstrate different electrical measuring instruments as voltmeter, ammeter, frequency meter, power factor meter, watt meter etc.
6. Describe electrical equipment's like motor, pump, transformer, etc.
7. Explain about different types of bearings & assembly methods.
8. Develop electrical wiring for different electrical machines.
9. Explain about different types of earthing methods.
10. Understand about various electrical domestic appliances & industrial machines maintenance.
11. Understand about different types of conventional machines & non –conventional machine maintenance.
12. Understand about preventive & breakdown maintenance.
13. Explain about types and activities of plant maintenance and Documentary report.
14. Explain about different electronic components, applications and advantages.
15. Demonstrate to find Source, part inventory repairing, purchasing and cause and factor analysis for all machines.
16. Demonstrate Hydraulic power pack, pneumatic compressor, Diesel generator maintenance.

THEORY HOURS: 30 PRACTICAL HOURS: - 120 THEORY MARKS: 100 PRACTICAL MARKS: -100

Unit No.	**Unit Name**	**Unit level outcomes**	**Contents (chapters/topics)**	**TH hours**	**PR / hours**	**TH Marks**	**PR Marks**
Unit I	**Basic electrical fundamentals & safety.**	After completion of unit Student should be able to • Understand fundamental concept of electricity. • Work safely while doing electrical work. • Explain about different types of electrical safety equipment's and devices. • Understand about Single phase & three	Basic fundamental of electricity. Electrical safety rules, safety precaution kit and tools. PPE in Industrial Safety. Common hand tools. Basic injury prevention, Hazard identification and avoidance, safety signs for Danger, Warning, caution & personal safety. Electrical shock and its effect, effect of electrical current on human being, method of avoiding electrical shock, first aid for victim of	5	12	10	15

		phase system.	electric shock. Use of various appropriate fire extinguishers on different types of fires correctly. Nature of electricity and fundamental laws. Single phase & three phase system. Different types of electrical safety fuses. Earthing methods. Electrical protective devices as MCB, MCCB, RCCB, ELCB, OLR, MPCB etc.				
Unit II	**Measuring instruments for electrical parameters**	After completion of unit Student should be able to • Understand the Use of measuring instruments for measurement of electrical parameters •Perform electrical wiring • Fault measuring • Demonstrate about Soldering technique, • Explain active, passive electronic components, measuring instruments.	Measuring instrument for electrical parameters as voltmeter, ammeter, frequency meter, power factor meter, watt meter, lux meter, tacho meter, clamp meter, anemometer, flux meter. Meggering methods, earthing test.cable test. Insulation testing, body short circuit testing. Active, Passive electronic components, measuring instruments.	3	12	15	10
Unit III	**Introduction of maintenance.**	After completion of unit Student should be able to • Understand the concept of maintenance. • Understand preventive maintenance. • Understand corrective maintenance. • Troubleshoot in different electrical machines.	Introduction of maintenance. Types of maintenance, Preventive Maintenance, Corrective Maintenance, And Breakdown Maintenance. Process of maintenance in various electrical equipment's. Description, specification & general care of maintenance common tools that is involved in maintenance work.	3	9	10	10
Unit IV	**Planning of plant maintenance and Documentary.**	After completion of unit Student should be able to • Understand the industrial supply as 1-phase & 3 phase.	Industrial supply and different industrial electrical loads. Single phase and three phase power sytem. Industrial machine maintenance, Preventive Maintenance,	3	15	15	10

		• Understand preventive maintenance of different plant machines. • Explain maintenance planning and schedule. • Keep records of different electrical machines and machine parts.	Corrective Maintenance and Breakdown Maintenance. Types of electrical cables, specifications, selection procedure, uses, and advantages. Underground cable laying methods. Socketing, Glanding, Fault measuring. Fault finding methods, root cause analysis & troubleshoot of breakdown machines. Planning System, spare part Inventory, quality requirement and awareness. Types and activities of plant maintenance and Documentary report.				
Unit V	**Maintenance of domestic appliance.**	After completion of unit Student should be able to • Understand about different types of domestic wiring. • Acquire confidence about electrical wiring. • Understand about different types of fault condition in domestic supply. • Understand about different types of fault condition in domestic appliance. • Able to troubleshoot & repair.	Domestic supply and appliances. Domestic wiring. Types of wire according to material, size & core. General safety & safety devices, different wiring methods. Close circuit & its diagram using inductive, capacitive & resistive elements. Resister, capacitor, transformer, IC, transistor ,Switches, relay, sensors working, specifications, selection and wiring according to different control operation. Fault finding methods. Checking methods. Assemble and disassemble technique of different machines, bearing assemble & disassemble technique, maintenance of Iron, Geyser, Induction Heater, Micro-Oven, Celling Fan, Grinder, Pump ,motor etc. Earthing methods, earth fault test & corrective actions.	3	18	10	15

Unit VI	**Maintenance of CNC machines**	After completion of unit Student should be able to • Understand the CNC operation & maintenance. • Describe CNC milling, lathe machines etc. • Perform maintenance activities on CNC machines.	Objective of CNC machine, machine codes, panel board and axis homing. General safety instruction, Symbol & Information, Preventive maintenance. Fluid plans, lubrications through hydraulic/Pneumatic, Schedule maintenance plan & its record, Level indicators, Guidelines of dismantling & reassembling of sin-s cylinder, Checking machine parameters ,Top up & filling lubricant, coolant as per specification of instruction manual for maintaining level. Check pressure supply in hydraulic unit, Check leakage for hydraulic & pneumatic system, Hydraulic system layout for tail stock & spindle locking. Pick of unit Replacement of contactor, starter, solenoid coil & valve, silencer, relay, pressure meter, pressure gauge, PCB replacement, Flusher, cooling systems, Cleaning of filterisation system ,Regular check of Filling level Trouble shooting for oil pump & motors. Fault finding & troubleshooting.	5	21	15	15
Unit VII	**Maintenance of conventional machines.**	After completion of this unit trainees will be able to • Operate Lathe machines • Carryout maintenance on lathe machines • Operate milling machines	Conventional machine like lathe, milling, grinding machine, drilling, radial grinding. Preventive & Break down Maintenance of different machine (turning, milling, and grinding, drilling, radial grinding of different manufacturer. Trouble shooting for oil pump & motors. Fault finding &	**5**	**18**	**15**	**15**

		• Carryout maintenance on milling machines • Operate Grinding machines • Carryout maintenance on grinding machines • Carryout maintenance on drilling machines • Carryout maintenance on radial grinding machines	troubleshooting for all machines. Electrical panel wiring switches, sensors and hydraulic & pneumatic signal. Introduction to lathe machine Preventive & Breakdown maintenance of lathe machines. Common problems & its remedies. Introduction to milling machines, Preventive & Breakdown maintenance in milling machine. Common problems & its remedies. Introduction to grinding machines. Preventive & Breakdown maintenance of grinding machines. Common problems & its remedies. Introduction to Radial grinding machines. Preventive & Breakdown maintenance of Radial grinding machines. Common problems & its remedies. Introduction to drilling machines. Preventive & Breakdown maintenance of drilling machines. Common problems & its remedies.				

Unit VIII	**Utility Maintenance.**	After completion of this unit trainees will be able to • Carry out maintenance of Centrifugal Pump • Carry out maintenance of Air compressor • Carry out maintenance of DG set • Carry out maintenance of Motor. • Carry out General maintenance of Hydraulic power pack.	MOTOR Preventive Maintenance, Corrective Maintenance and Breakdown Maintenance. Motor meggering, overhauling. Details & maintenance of pump Hydraulic power pack, seals, filters, hose pipe replacement, pneumatic compressor, Diesel generator maintenance. Types of transformers, working principle, specification and calculations. Oil level check.	**3**	**15**	**10**	**10**

COURSES / MODULE TEMPLATE

NOS /Module: Basics of Industrial Automation

NOS /Module Code: MSME/ADMMA/05

Outcomes:

After completion of course Student should be able to

1. Explain about electricity AC & DC.
2. Identify the types of switches and design control circuitsfor AC &DC loads
3. Develop various control and power circuit for different industrial control logic.
4. Understand about different types of control & controlling elements.
5. Understand about SLD designs and rules.
6. Identify electrical faults in control & power circuit both in three phase &single phase.
7. Design relay control logic, different stator for motor control, automation using sensors.
8. Install PLC hardware modules & configure communication with programming device.
9. Develop PLC program and diagnose different errors.
10. Create different automation program using PLC software.
11. Connect different sensors or field I/O devices with PLC.
12. Explain about SCADA system.
13. Configure the communication console parameter between Controller (PLC), with MTU.
14. Create a single user and multi user SCADA Project.
15. Configure communication between PLC & HMI.

THEORY HOURS: 30 PRACTICAL HOURS: - 30 THEORY MARKS: NA PRACTICAL MARKS: -100

Unit No.	**Unit Name**	**Unit level outcomes**	**Contents (chapters/topics)**	**TH hours**	**PR hours**	**PR Marks**
Unit I	**Electrical hardware logic control.**	After completion of unit Student should be able to • Explain about SLD design & rules. • Understand about different types of control. • Understand about different electrical, mechanical, electro-mechanical switches. • Design various industrial control wirings using relay logic. • Design automation using sensors & timers.	Types of control based on application i.e. Manual Control, Feedback Control, Sequential Control, Motion Control, and Logical Control. Industrial wiring & JIC symbol, IEC symbol. Types of switches and design control circuits for AC &DC loads. Different electro-mechanical switching components as: relay, contactor and timer, NO & NC contacts terminology and operation, SLD design. DOL Starter, Panel board wiring of relay and contactors for	**10**	**10**	**40**

			motor control logic as: start stop, forward reverse. Control and power circuit: 3-ø star-delta starter. Electrical fault monitoring.			
Unit II	**Introduction to Programmable Logic Controller (PLC) SCADA & HMI**	After completion of unit Student should be able to • Understand the process of automation • Install PLC hardware modules & configure communication with programming device. • Develop PLC program and diagnose different errors. • Create different automation program using PLC software. • Connect different sensors or field I/O devices with PLC. • Diagnose different fault and communication error in PLC.	Industrial Automation, different type of automation & control, advantages & dis -advantages, area of application, Levels of automation. Automation in various industrial process & future scopes. Programmable Logic Controller (PLC), types of PLC. Scan cycle, Work Memory, Data memory, PLC hardware modules, communication protocols and gateway. PLC Hardware installation and communication. Diagnosis of communication errors by indication and error-messages. Correction of error. Identify of PLC Hardware and Communicate PLC with PC/LAPTOP system, Installation of PLC software & simulation.PLC-programming software& features. Introduction to SCADA Introduction to HMI	**20**	**20**	**60**

COURSES / MODULE TEMPLATE

NOS /Module: Employability Skills

NOS /Module Code: MSME/ES/02

THEORY HOURS: 60 PRACTICAL HOURS: - THEORY MARKS: 100 PRACTICAL MARKS: -

Refer Standard Curriculum developed by NCVET. (60-hours-MC-Employability-Skills_v4-DGT (1).pdf)