MODEL CURRICULUM

Qualification Name:

MASTER TECHNECIAN - MACHINE MAINTENANCE

Qualification Code: QG-4.5-PW-04169-2025-V1-MSMETC

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Submitted By:

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COURSE NAME: Single Line diagram with E-CAD

COURSE CODE: MSME/ACCMM/01

COURSE OUTCOMES:

After completion of course Student should be able to

- Understanding the basic software of E-CAD.
- Develop Single line diagram in E- CAD software.
- Designing and development of electrical single line diagram in E-CAD.
- Demonstrate Appling GD& T Symbols in drawings and Develop proper drawing layout
- Understood the E –CAD software to development of For/rev electrical ckt diagram.
- Understands Panel design of F-R, A-D, panel design of F-R with S-D, schematic and panel report generation.

THEORY HOURS:00hrs
PRATICAL HOURS : 60 HRS

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH hours	Require equipment
1	Single Line diagram with E-CAD:	❖ Understand the Importance, scope and objective of Engineering Drawing ❖ Demonstrate and explain drawing Standards: Size of drawing sheets – Layout of drawing sheet – Title Blocks – Types of lines – Folding of drawing sheets. ❖ Use of dimensioning techniques according to Standard of dimensions. ❖ Demonstrate orthographic & Isometric projection by using a viewing box and a model, Use of symbol in projections -Front view, top view and side view. ❖ Demonstrate the use of Auto CAD and Auto CAD interface, Apply coordinates systems in auto CAD. ❖ Demonstrate the use of tool bars, Create solid field area (Hatching, Gradient) and Edit objects using the object property tool bar and various methods. ❖ Understand sketch settings and Style toolbar (text style, Multileader	❖ Understand the Importance, scope and objective of Engineering Drawing. ❖ Demonstrate orthographic & Isometric projection by using a viewing box and a model, Use of symbol in projections -Front view, top view and side view. ❖ Demonstrate the use of Auto CAD and Auto CAD interface, Apply coordinates systems in auto CAD. ❖ Understand sketch settings and Style toolbar (text style, Multileader style etc.) and Edit object using object property toolbar & various method. ❖ Understand about single line diagram used for electrical wiring diagram. ❖ Understand Use of AutoCAD Electrical software Workspace Awareness, Tool Bars, Tool Pallets , ❖ Demonstrate Creation of for/Rev Control circuit of 3ph induction motor using contactor and for/rev	00 hrs	Computer, E –CAD software.

		style etc.) and Edit object using object property toolbar & various method. ❖ Demonstrate Creating the replica of model using copy, array command and Work with models in the modify toolbar. ❖ Identify the appropriate Tool to create and modify the model and Change the orientation of the object by aligns, offset, rotate command. ❖ Demonstrate Appling of standard dimension in a mechanical component. ❖ Understand about Use of dimensioning Methods: Linear, Align, ordinates, Radius, Diameter, Arc length, angular etc. and Use of leader with text, block reference. ❖ Demonstrate Appling GD& T Symbols in drawings and Develop proper drawing layout. ❖ Understand about single line diagram used for electrical wiring diagram. ❖ Understand about procedures for drawing the single line diagram. ❖ Understand Use of AutoCAD Electrical software Workspace Awareness, Tool Bars, Tool Pallets , ❖ Demonstrate Inserting component working with project manager. Overview about relay, contactor, timer and old. ❖ Understand about drafting features-copy, move, delete, scoot, align, link component, attribute reverse/ flip component, retag and update component.	control circuit of 1ph dc motor using re ❖ Demonstrate Inserting component working with project manager. Overview about relay, contactor, timer and old. ❖ Understand Symbol builder, circuit builder, icon menu wizard, power ckt of Star-Delta, Star-Delta with F-R.		

		❖ Demonstrate Creation of for/Rev Control circuit of 3ph induction motor using contactor and for/rev control circuit of 1ph dc motor using relay. ❖ Demonstrate creation of Star-Delta Control Circuit, Start-Delta with For-Rev Control Ckt. ❖ Demonstrate creation of Multibus, wire number, wire colour, wire size, wire labelling, and overview on timer power ckt of F-R. ❖ Understand Symbol builder, circuit builder, icon menu wizard, power ckt of Star-Delta, Star-Delta with F-R. ❖ Understands 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.			

COURSE NAME: Transmission & Control

COURSE CODE: MSME/ACCMM/02

COURSE OUTCOMES:

After completion of course Student should be able to

- Understand about basic concept of Transmission and control.
- Get knowledge about Use of Voltmeter, Ammeter, Wattmeter, Energy meter, frequency meter, Power factor meter, multi-meters, Etc.
- Understand how to utilize different components of electrical like motor , transformer, measuring instruments, etc.
- Understand circuit connection in electrical.

THEORY HOURS:30 hrs
PRATICAL HOURS 90

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH hours	Require equipment

01	Transmission & Control	❖ Understand about electrical safety rules, use of safety precaution kit and tools. ❖ Understood about PPE in transmission and distribution system. ❖ Explain Basic injury prevention, Hazard identification and avoidance, safety signs for Danger, Warning, caution & personal safety. ❖ Demonstrate measuring instrument for electrical parameter, Use of Voltmeter, Ammeter, Wattmeter, Energy meter, frequency meter, Power factor meter, multi-meters, Clamp meters, Megger, Earth tester etc. ❖ Understand about Non-conventional & Conventional Methods of power generation. ❖ Understand about LT and HT substations. ❖ Demonstrate single line diagram of electrical substation with symbols. ❖ Understand the power transmission and distribution by overhead line. ❖ Understands the difference between AC and DC transmission lines.	❖ Understand about electrical safety rules, use of safety precaution kit and tools. ❖ Understood about PPE in transmission and distribution system. ❖ Demonstrate measuring instrument for electrical parameter, Use of Voltmeter, Ammeter, Wattmeter, Energy meter, frequency meter, Power factor meter, multi-meters, Clamp meters, Megger, Earth tester etc. ❖ Understand about LT and HT substations. ❖ Understand the power transmission and distribution by overhead line. ❖ Understands the difference between AC and DC transmission lines. ❖ Understand about LT and HT substations ❖ Understands the difference between AC and DC transmission lines. ❖ Understand about the main components of overhead transmission line like, conductor, insulator, pole and tower. ❖ Demonstrate different types of switch gear mechanism used in transmission and distribution system. ❖ Understand about about corona effect, sag and skin	30 hours	Demo lab and books or electrical measuring equipment's like a ammeter , wattmeter, energy meter, frequency meter ,power factor meter ,multimeter ETC.

		❖ Understand about the main components of overhead transmission line like, conductor, insulator, pole and tower. ❖ Understand about the line support used in transmission line. ❖ Understand about the types of power lines with respect to classification of voltage. ❖ Understand about about corona effect, sag and skin effect on overhead transmission line. ❖ Understand about the types of measuring instruments used in transmission line. ❖ Understand about the single phase and three phase three wire system in transmission system. ❖ Demonstrate different types of switch gear mechanism used in transmission and distribution system. ❖ Demonstrate different types protecting devices used in transmission system. ❖ Understand about the steps followed for testing of overhead line.	effect on overhead transmission line. ❖ Understand about the single phase and three phase three wire system in transmission system. ❖ Understand about the steps followed for testing of overhead line.		

COURSE NAME: PLC Programming

COURSE CODE: MSME/ACCMM/03

COURSE OUTCOMES:

After completion of course Student should be able to

- Understand about basic PLC programming
- understand about the plc software and logic gate programming
- Developing new different logic plc programming And basic logic gate programming.
- Understand and design full electrical programming.

THEORY HOURS:
00hrs
PRATICAL HOURS : 90

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH hours	Require equipment
1	PLC Programming	❖ Understand about industrial Automation, different type of automation & control, advantages & disadvantages, area of application, Levels of automation. ❖ Understand Role of automation in various industrial process & future scopes. ❖ Understand about Programmable Logic Controller (PLC), types of PLC. ❖ Understand about Scan cycle, Work Memory, Data memory, PLC hardware modules, communication protocols and gateway. ❖ Demonstration of PLC Hardware installation and communication.	❖ Understand about industrial Automation, different type of automation & control, advantages & disadvantages, area of application, Levels of automation. ❖ Understand about Programmable Logic Controller (PLC), types of PLC. ❖ Understand about Scan cycle, Work Memory, Data memory, PLC hardware modules, communication protocols and gateway. ❖ Demonstration of PLC Hardware installation and communication. ❖ Understand about PLC-programming software& features, IEC-programming languages as LAD, FBD, and STL and Create and test LAD, FBD, STL program using bit & block-Operands. ❖ Demonstrate LAD, FBD, STL programming language Logic Gates, AND, OR, NANAD, NOR, XOR. ❖ Demonstrate analog signal I/O of Pulsing Voltage control method with 0-10 v DC I/O signal /Current control method with 4-20 mA DC I/O signal.	00hrs	Computer and plc software

		❖ Understand Diagnosis of communication errors by indication and error-messages. Correction of error. ❖ Understand about of PLC Hardware and do Practice to Communicate PLC with PC/LAPTOP system Installation of PLC software & simulation. ❖ Understand about PLC-programming software& features, IEC-programming languages as LAD, FBD, and STL and Create and test LAD, FBD, STL program using bit & block-Operands. ❖ Demonstrate LAD, FBD, STL programming language Logic Gates, AND, OR, NANAD, NOR, XOR. ❖ Demonstrate on TIMER, COUNTER, and COMPARATOR blocks, in software. ❖ Understand about analog control in PLC, analog sensors and Voltage control method with 0-10v dc I/O signal /Current	❖ Demonstrate connection of remote I/O PLC with server PLC using profibus cable and Fault analysis of Profibus / Ethernet network		

		control method with 4-20 mA DC I/O signal. ❖ Demonstrate analog signal I/O of PLCusing Voltage control method with 0-10 v DC I/O signal /Current control method with 4-20 mA DC I/O signal. ❖ Demonstrate connection of I/O field devices in signal I/O of plc. Connection of different sensors & actuators with signal modules. ❖ Demonstrate connection of remote I/O PLC with server PLC using profibus cable and Fault analysis of Profibus / Ethernet network. ❖ Demonstrate of connection between hard ware module & I/O field devices. ❖ Demonstrate the Connection of multiple users with multiple PLC using Ethernet communication network (LAN) and Fault finding with indication and system messages.			

COURSE NAME: Machine Maintenance (Electrical)

COURSE CODE: MSME/ACCMM/04

COURSE OUTCOMES:

After completion of course Student should be able to

- Understand different types of machines and its function.
- Understand different moving mechanism of machine parts.
- Understand different parts in machine.
- Get knowledge about machine tool accessories.

THEORY HOURS: 60 hrs
PRATICAL HOURS : 180

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH hours	Require equipment
1	Machine Maintenance (Electrical)	❖ Understand about basic fundamental of electricity. ❖ Demonstrate the PPE in Industrial Safety, Common hand tools used for electrical maintenance work. ❖ Understand Basic injury prevention, Hazard identification and avoidance, safety signs for Danger, Warning, caution & personal safety. ❖ Demonstrate 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. ❖ Understand about types of fires and fire extinguishers' and their appropriate using procedure. ❖ Understand Nature of electricity and fundamental laws. Single phase & three phase system.	❖ The PPE in Industrial Safety, Common hand tools used for electrical maintenance work. ❖ Understand about types of fires and fire extinguishers' and their appropriate using procedure. ❖ Demonstrate 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. ❖ Understand about the Different control and power circuits using relay, contactor and timers. ❖ Demonstrate about different sensors as: proximity inductive, proximity capacitive, proximity optical.	**60 hrs**	Demo lab, reference books,

		❖ Demonstrate different switches like push button, selector switch, limit switch etc. ❖ Demonstrate different electro-mechanical switching components as: relay, contactor and timer and testing of Relay, contactor and timer. ❖ Demonstrate different control and power circuits using relay, contactor and timers. ❖ Demonstrate about different sensors as: proximity inductive,proximity capacitive, proximity optical. ❖ Demonstrate different control and power circuits using Sensors and relay. ❖ Demonstrate the wiring and testing of control and power circuit of 3-ø star-delta starter and Electrical fault finding in both control and power circuit. ❖ Understand about different types of earthlings. ❖ Demonstrate the procedure of earth testing. ❖ Demonstration of different types of electrical protective device as fuse, MCB, MCCB, RCCB, ELCB, OLR, MPCB. ❖ Understand about different types of electrical cables, specifications, selection procedure, uses, and advantages. ❖ Demonstration of underground cable laying	❖ Demonstration of different types of electrical protective device as fuse, MCB, MCCB, RCCB, ELCB, OLR, MPCB. ❖ Demonstrate Principle of Single phase and three phase motor and its application. ❖ Demonstrate machine panel wiring, electrical fault finding procedures of different conventional machines. ❖ Demonstrate LT panel wiring using different electrical components and circuit breakers. ❖ Demonstrate different electronic component like resister, capacitor, diode, IC, transistor, SCR and its application. ❖ Demonstrate op-amp and its application. Use op-amp to design various electronic circuits,identify the pins of op-amp IC. ❖ Demonstrate Analog & Digital IC testing by using IC tester.		

		methods. Socketing, Gladding, Fault measuring. ❖ Understand about types of maintenance, Preventive Maintenance, Corrective Maintenance, And Breakdown Maintenance. ❖ Demonstrate Installation, test and run of an electric DC motors. ❖ Demonstrate Principle of Single phase and three phase motor and its application. ❖ Install and test an electric single phase AC motors and an electric 3 phase motor using different starters. ❖ Demonstrate MOTOR Preventive Maintenance, Corrective Maintenance and Breakdown Maintenance. Motor meggering, overhauling. ❖ Understand about different types of transformers, working principle, specification and calculations. ❖ Understand about different electronic components, applications and advantages. ❖ Demonstrate different electronic component like resister, capacitor, diode, IC, transistor, SCR and its application. ❖ Demonstrate op-amp and its application. Use op-amp to design various electronic circuits,identify the pins of op-amp IC.			

		❖ Demonstrate Analog & Digital IC testing by using IC tester. ❖ Demonstrate Function and working of oscilloscope and also measuring different quantities. ❖ Demonstrate Function of frequency generator, counter & wave shaping etc. ❖ Understood the procedures for preparing logic diagrams for different conventional machines. ❖ Demonstrate preparation of different machine logic circuit using different electrical components. ❖ Demonstrate machine panel wiring, electrical fault finding procedures of different conventional machines. ❖ Demonstrate LT panel wiring using different electrical components and circuit breakers. ❖ Understood the procedures for studying the wiring diagram of different CNC machines. ❖ Demonstrate CNC machine panel wiring, electrical fault finding procedures of different CNC machines.			

COURSE NAME: Basics of Machine Operation

COURSE CODE: MSME/ACCMM/05

COURSE OUTCOMES:

After completion of course Student should be able to

- understand about the type of Conventional & Non-Conventional Machines
- Understand about the cutting techniques like milling, turning, drilling, grinding
- understand about the simulate and operate CNC lathe and CNC milling. And others machine

THEORY HOURS: 30 hrs
Pratical HOURS : 90

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH hours	Require equipment
1	Basics of Machine Operation	❖ Understanding about the types of Conventional & Non-Conventional Machines. ❖ Understands safety precautions followed in workshop. ❖ Understand Co-ordinate systems & points mode. ❖ Identify Cutting Tools and Tool Holders from the standard (ISO Standard). ❖ Understand selection procedure of standard tools/ cutters/Tool Holders as per requirement. ❖ Define Turning Insert Shapes. ❖ Describe Operating Conditions. ❖ Understand in Work holding methods. ❖ Identify and understand Tool holding Devices. ❖ Understand the need of different oils & lubricants used. ❖ Understand about different conventional machine like	❖ Understanding about the types of Conventional & Non-Conventional Machines. ❖ Understands safety precautions followed in workshop. ❖ Understand the need of different oils & lubricants used. ❖ Understand about different conventional machine like lathe, milling, grinding machine etc. ❖ Understand about the different cutting techniques like milling, turning, drilling, grinding etc. ❖ Calculations of machining parameters like cutting speed, cutting feed, depth of cut etc. ❖ Understand about the different CNC machines like CNC milling and CNC turning machine. ❖ Prepare programs, demonstrate, simulate and operate CNC lathe and CNC milling. ❖ Execute program and inspect simple geometrical forms / standard parts.	**30hrs**	Demo lab and lathe machine and grinding machine, turning, Drilling, machines etc.

		lathe, milling, grinding machine etc. ❖ Describe different machine parts & accessories. Understand about the different types of operations. ❖ Understand the methods of machining. ❖ Understand about the different cutting techniques like milling, turning, drilling, grinding etc. ❖ Describe different machine operations like: Plain & Step turning, Parting, Facing, Profile, Drilling, Tapping, Reaming, polishing etc. ❖ Describe standard mathematical formula used in calculation required for machine tool operation. ❖ Calculations of machining parameters like cutting speed, cutting feed, depth of cut etc. ❖ Understand about the different CNC machines like CNC milling and CNC turning machine. ❖ Understand Axis – Orientation ❖ Define Work sketch and Calculation ❖ Prepare programs, demonstrate, simulate and operate CNC lathe and CNC milling.			

		❖ Prepare basic program and cut the material in auto/single auto mode. ❖ Execute program and inspect simple geometrical forms / standard parts. ❖ Understand about the handling of tools, equipment & CNC Machines & Personal safety tool as per company product requirement.			

COURSE NAME: Machine Maintenance (Mechanical)

COURSE CODE: MSME/ACCMM/06

COURSE OUTCOMES:

After completion of course Student should be able to

- Get practical knowledge about maintenance of machines.
- Understand different parts of machines.
- Get knowledge about find out problem from machines and understand problem.
- Understand how to solve the problem.

PRACTICAL HOURS: 210
THEORY HOURS : 60hrs

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	Practical hours	Require equipment
1	Machine Maintenance (Mechanical)	❖ Understand about the different types of maintenance, Preventive Maintenance, Corrective Maintenance, Breakdown Maintenance & CBM. ❖ Understand about different mechanical component	❖ Understand about the different types of maintenance, Preventive Maintenance, Corrective Maintenance, Breakdown Maintenance & CBM. ❖ Understand about mounting and dismounting the Gear and Bearing.	**60 hrs**	Workshop with different machines.

		used in machines like gear, bearing, belts etc. ❖ Demonstrate gear dismounting and mounting procedure. ❖ Demonstrate different dismounting and mounting procedure of Bearings. ❖ Demonstrate dismounting and mounting procedure of belts and other mechanical components. ❖ Demonstrate different mechanism used in different conventional machines. ❖ Understand about pneumatic & hydraulic system, Advantages & Limitations of pneumatic & hydraulic system applications. ❖ Understand about safety precaution in pneumatic and hydraulic operations. ❖ Demonstrate the pressure Measurement by different pressure gauges (Digital and Analog type). ❖ Demonstrate different valves used in Pneumatic system. ❖ Understand about pneumatic linear actuators and Rotary actuators. ❖ Demonstration of different pneumatic cylinders & motor actuation. ❖ Understand about pneumatic components	❖ Understand about pneumatic & hydraulic system, Advantages & Limitations of pneumatic & hydraulic system applications. ❖ Understand about safety precaution in pneumatic and hydraulic operations. ❖ Demonstration of different electro pneumatic components as switches, relays, sensors, AC and DC supply. ❖ Demonstration of different electro pneumatic industrial control operations. ❖ Demonstration of OPC-Server communication with PC and electro-pneumatic system. ❖ Demonstration of PLC communication with PC and electro-hydraulic system. ❖ Demonstrate maintenance of hydraulic & pneumatic system. ❖ Demonstrate preventive and breakdown maintenance of different types of air compressor. ❖ Understand about electro-hydraulic component symbols and electro- hydraulic schematic control logic diagrams.		

		symbols and pneumatic schematic control logic diagrams. ❖ Understand about electro pneumatic system and electrical safety. ❖ Demonstration of different electro pneumatic components as switches, relays, sensors, AC and DC supply. ❖ Understand about electro-pneumatic component symbols and electro-pneumatic schematic control logic diagrams. ❖ Demonstration of different electro pneumatic industrial control operations ❖ Demonstration of OPC-Server communication with PC and electro-pneumatic system. ❖ Demonstration of PLC communication with PC and electro-pneumatic system. ❖ Demonstrate hydraulics Basic controlling equipment and its use. ❖ Demonstrate different parts of hydraulic pressure generation unit. ❖ Explain about different filters and their application in hydraulic system. ❖ Demonstrate different valves used in Hydraulic system.	❖ Demonstrate different types of industrial pumps and its parts. ❖ Demonstrate installation procedure of different types of Industrial pump. ❖ Demonstrate preventive and breakdown maintenance of different type's industrial pump. ❖ Demonstrate preventive and breakdown Maintenance procedure of different machine like turning, milling, grinding and drilling. ❖ Demonstrate different mechanism used in CNC machines. ❖ Demonstrate different parts of CNC machines and its functions.		

		❖ Explain about hydraulic linear actuators and Rotary actuators. ❖ Demonstrate of different hydraulic cylinders & motor actuation. ❖ Explain about hydraulic components symbols and hydraulic schematic control logic diagrams. ❖ Explain about electro-hydraulic system and electrical safety. ❖ Demonstration of different electro -hydraulic components as switches, relays, sensors, AC and DC supply. ❖ Explain about electro-hydraulic component symbols and electro-hydraulic schematic control logic diagrams. ❖ Demonstration of different electro-hydraulic industrial control operations. ❖ Demonstration of OPC-Server communication with PC and electro-hydraulic system. ❖ Demonstration of PLC communication with PC and electro-hydraulic system. ❖ Demonstrate maintenance of hydraulic & pneumatic system. ❖ Demonstrate different types of air compressor and its parts.			

		❖ Demonstrate preventive and breakdown maintenance of different types of air compressor. ❖ Demonstrate different types of industrial pumps and its parts. ❖ Demonstrate installation procedure of different types of Industrial pump. ❖ Demonstrate preventive and breakdown maintenance of different type's industrial pump. ❖ Demonstrate preventive and breakdown Maintenance procedure of different machine like turning, milling, grinding and drilling. ❖ Demonstrate different mechanism used in CNC machines. ❖ Demonstrate different parts of CNC machines and its functions. ❖ Demonstrate Preventive and breakdown maintenance of different CNC machines			

NOS /Module: Employability Skills
NOS /Module Code: MSME/ES/04
THEORY HOURS: 120 PRACTICAL HOURS: - THEORY MARKS: 100 PRACTICAL MARKS: -
Refer Standard Curriculum developed by NCVET. (120-hours-MC-Employability-Skills_v4-DGT (1).pdf)