

**MAHARASHTRA STATE BOARD OF VOCATIONAL EDUCATION EXAMINATION, MUMBAI**

1	Name of Syllabus	C.C. in Fabrication of Instrumentation Panel and Installation of pipeline (308101)																																								
2	Max. Nos of Student	25 Students																																								
3	Duration	6 Month																																								
4	Type	Part Time																																								
5	Nos Of Days / Week	6 days																																								
6	Nos Of Hours /Days	4 hrs.																																								
7	Space Required	1) Workshop = 400 sqfeet 2) Class Room = 200 sqfeet TOTAL = 600 sqfeet																																								
8	Entry Qualification	8 <sup>th</sup> Passed																																								
9	Objective Of Syllabus/ introduction	On completion of this module, the trainee will be able to : <ul style="list-style-type: none"><li>• fabricate an Instrument panel and will be</li><li>• install the required pipe line</li></ul>																																								
10	Employment Opportunity	May get job in Establishment																																								
11	Teacher’s Qualification	DME OR BE (MECH)/ Relevent Diploma																																								
12	Training System	<table><tr><th colspan="7">Training System Per Week</th></tr><tr><th>Theory</th><th>Practical</th><th>Total</th><th colspan="4"></th></tr><tr><td>6 hrs</td><td>18 hrs</td><td>24 hrs</td><td colspan="4"></td></tr></table>						Training System Per Week							Theory	Practical	Total					6 hrs	18 hrs	24 hrs																		
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## **Theory - I Instrumentation Panel**

1. Safety and First Aid. Introduction to Electricity and Instrumentation. Basic units and measurements. Industries associated with Process Instrumentation. (Chemical, Paper, Fertilizer, Steel etc)
2. Use of Hand Tools (Screw Drivers, Pliers, Cutting and Drilling tools, Hammers, Spanners and Files) Use of power drill. Copper, MS, GI and Plastic pipes. Their sizes and use. Pipe Fittings (Bends, nipples, unions, elbows ) and jointing. Use of Pipe Threading tools and pipe Vises, Pipe bending machine and pipe cutters. Fabrication of Instrument panels. Installation of pipelines.
3. Introduction to Welding. Knowledge of Arc Welding, Spark Welding, Gas Welding etc Different types of Process parameters and their units and principles of process Indicators. (Temperature, Pressure, Level and Flow). Temperature, level and pressure switches and their maintenance.

Introduction to Electrical Machines (AC and DC Motors, Generators). Batteries, Cells and chargers, UPS. Electrical relays and starters Air Compressors (Pneumatic lines, air filters, air regulators and Installation of pneumatic lines) Pressure gauges and their calibration using Dead Weight pressure gauge testers

## **Practical - I - Installation of Accessories**

1. Exercises on AC and DC motors
2. Maintenance and Maintenance free batteries.
3. Study of different parts of Air Compressors
4. Dismantling and assembling of Pressure gauges, Temperature gauges , level and flow indicators
5. Repair and maintenance of hot air ovens, geyser, coolers
6. Calibration and maintenance of pressure, temperature, level and flow indicators
7. .Use and calibration of flow indicators
8. Installing solar panels on Solar water heater.

## **Practical – II - Fabrication of Instrumentation Panel**

1. Use of ruler, measuring tape. Use of Multimeter (Digital & Analog).
2. Material Handling and Safety precautions to be taken. Fire fighting. First aid practice. Do's and Don'ts.
3. Use of Screwdrivers, hammers, files and drilling machines.
4. Use of pipe threading tools . Use of cutters in cutting sheets. Drilling holes.
5. And fabrication of panels. Installation of pressure gauges, temp indicators and level indicators and switches
6. Exercises on panel fabrication
7. Exercises on pipe line fabrication
8. Installation of Temp/level /pressure switches Hot Air Ovens, Room Heaters, Geysers, Coolers (Thermal Switches, humidity sensors). Installation and Maintenance. Varieties of Temperature indicators and their calibration Level sensors, level indicators and Level Switches and level Controllers (on off) Installation of overhead tank level controllers and sump level Controllers
9. Simple Mechanical type Flow indicators
10. Solar Water Heater Installation.

### List of tools and equipments

Sl No.	Description	Quantity
1	Assorted screw drivers	4 sets
2	Assorted pliers	4 sets
3	Assorted files	4 sets
4	Assorted hammers and pipe wrenches	3 sets
5	Heck saws	3 sets
6	Pipe threading (die set) and tap set	2 sets
7	Pipe cutters	3 sets
8	Work benches with pipe and normal vises	2 sets
9	Temperature, pressure, level and flow indicators	2 sets
10	Temperature, pressure, level switches	
11	GI and MS pipes of assorted sizes and pipe fitting , MS and Aluminum sheets, Copper tubes.	
12	Single Phase AC motors	2
13	DC motors	2
14	Air Compressor	1
15	Geysers	1
16	Hot Air ovens	1
17	Bourden Tube Pressure gauges	3
18	Filled system them meters	3
19	Float Type level indicator	2
20	Rotameters	2
21	Venturi/Orifice type flow meter	2
22	Dead Weight Pressure gauge Tester with Master gauges	1
23	Different types of Thermocouples	1 set
24	Tools kits	4 sets

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