

MAHARASHTRA STATE BOARD OF VOCATIONAL EDUCATION EXAMINATION, MUMBAI

1	Name of Syllabus	C.C. in Basic Industrial Electronics (301130)												
2	Max. Nos of Student	25 Students												
3	Duration	6 Months												
4	Type	Part Time												
5	Nos Of Days / Week	6 Days												
6	Nos Of Hours /Days	4 Hrs												
7	Space Required	Workshop = 300 Sq feet Class Room = 200 Sq feet TOTAL = 500 Sq feet												
8	Entry Qualification	7 th pass												
9	Objective Of Syllabus introduction	Awareness of Safety precautions. Awareness of Industrial Electronics Awareness of Instrumentation. Awareness of Repair & Maintenance of Industrial Electronics & Instrumentation.												
10	Employment Opportunities	The trainee will either to be able to take up jobs with agencies which Deal with maintain and repair Industrial Electronics & Instrumentation related machines with working experience will be in a position to start his own independent Business.												
11	Teacher's Qualification	Diploma/Certificate in concern subject												
12	Training System	Training System Per Week <table><tr><td>Theory</td><td>Practical</td><td>Total</td></tr><tr><td>06 Hours</td><td>18 Hours</td><td>24 Hours</td></tr></table>							Theory	Practical	Total	06 Hours	18 Hours	24 Hours
Theory	Practical	Total												
06 Hours	18 Hours	24 Hours												
13	Exam. System	Sr No	Paper Code	Name of Subject	TH/PR	Hours	Max. Marks	Min. Marks						
		1	30113011	Industrial Electronics & Instrumentation	TH - I	3 hrs	100	35						
		2	30113021	Basic Electronics & Electronics Instrumentation	PR - I	3 hrs	100	50						
		3	30113022	Industrial Electronics & Instrumentation	PR - II	6 hrs	200	100						
				TOTAL			400	185						

INDUSTRIAL ELECTRONICS & INSTRUMENTATION

<i>Practical - II</i> <i>Industrial Electronics & Instrumentation</i>	<i>Theory - I</i> <i>Industrial Electronics & Instrumentation</i>
segment display. Display a binary number on a 7 segment display.	EPROM and EAPROM concept of cache SIMM, SDRAM, SGRAM, VRAM, etc.
Construction working of various digital instruments their principal block and Schmitt diagram, fabrication, operational, service maintenance and repair content development in progress. Observe the output of various transducers like strain gauge, load cell, LVDT, taco generator, flow sensors, capacitance probe, DP cell etc. Construct and observe output of P amplifiers. Integrator and differentiator, familiarize with motorized control valve and solenoid relay speed. Construct a stepper motor control circuit using discrete digital design	Feed back systems, transducers, various type of transducers used for the process, variable temperature, flow pressure level and speed, their types, functions and working principle, control amplifiers, their necessity, differentiating amplifier, actuators and final control element control valve, solenoid relays, stepper motors and servo motor, their constructional, working principle and applications.
Familiarization with IR LEDS, Photo diodes, photo transistors, optical sensor, opto couplers, LASER diodes & its applications. Introduction of Fiber optics, its application. Display the contents of a RAM/ROM location on a display. Load a byte of data into a specific RAM location.	IR LEDS, Photo diode for photo transistor, its characteristics and application, optical sensor, opto-computers, circuits with opto isolation, characteristics of LASER diodes Fiber optics applications.
Familiarization with 8085 Microprocessor Kit sub systems, its input output connectors for the hardware function and operation. Programme to perform integer division 8 bit by 8 bit & 16 bit by 8 bit. Programme to perform conversion BCD to ASCII, BCD to Hexadecimal. Experiment interfacing Microprocessor with DAC/ADC, Traffic light & stepper motor	Microprocessor it introduction, Block diagram & Architecture of 8085 Microprocessor, its internal data operation and registers accumulator, ALU, flags, program counter, control unit, micro instruction and macro instruction, memory interfacing, I/O ports, keyboard interfacing, interrupts interfacing, concept about monitor, Pin configuration, Principle device application and its interrupts and memory organization, classification, format and timing. Brief idea about instruction set, interfacing with 8259, 8357, 8255, 8251, 8279, 8155, 8253, etc. Application such as DAC/ADC stepper motor, traffic light controllers.
Familiarization of 8051 micro controller based kit and study the hardware, function, memory structure and operation of 8051 micro controller kit. Write and execute program for Multiplication of unsigned / signed numbers, division of unsigned / signed numbers, sorting strings in ascending and descending order, modular programming using subroutines. Interfacing using chips, Use of 8279 for communication, use of 8155 (for serial comm..) Traffic light controller by using 8253.	Introduction to basic 8051 Micro controller its memory management, counters, interrupts, pin configuration, interfacing and applications, I/O Ports, Basic Assembly Language, Programming process, tools and techniques. Programming the 8051 for moving the data in addressing mode, external data mode, push and pop op-codes & data exchange. Logical operation, rotate and swap operations, arithmetic operations like additions, subtractions, multiplications, division, decimal arithmetic, flags, incrementing decrementing, jumping of call operation, returns. Various SFRs and description. Interrupt programming, serial communication in 8051.

<p>Measure and monitor test points/way forms at different stages of SMPS. Measure and monitor test points/way forms at different stages of different types of Inverters.</p> <p>Generation of PWM wave forms using discrete ICs</p> <p>Measure and monitor test points/way forms at different stages of UPS. (On line/Off line/Line interactive, etc.) Measure and monitor test points/way forms at different stages of Analog (Conventional) DC drives. Measure and monitor test points/way forms at different stages of Digital DC drives.</p> <p>Configure different parameters and control AC drive.</p>	<p>Switch mode power supplies and their working principles. Principles of Inversion and Inverter circuits using different techniques. Pulse width modulation and their applications. UPS principles and various types. (On line/Off line/Line interactive, etc.) AC Motor fundamentals, speed control techniques.</p> <p>DC Motor fundamentals and speed control techniques.</p> <p>Discrete control of AC motor using conventional techniques.</p> <p>Discrete control of DC motor using conventional techniques.</p> <p>DC drive, block diagram and different stages. AC drive, block diagram and different stages. Tachometers and their principles of operation. Micro controller based DC motor drive and parameter settings using necessary software. V/F controlled AC drive and parameters setting using necessary software</p>
<p>Operation of Stroposcope and related measurements. Tachometers and measurements. Identify stages of RF heating control</p>	<p>Industrial Instruments used for Non destructive testing . Principles of RF heating. Ultrasonic equipment used in industrial</p>
<p>equipment and measure wave forms / test points. Perform metal testing using ultrasonic testers.</p>	<p>metal testing. Principles of working of Flaw detector.</p>
<p>Wire field devices to I/O modules Find out the address of field devices and identify them on the program on line</p> <p>Make simple programs and run them to control devices such as relays, solenoid valves etc</p> <p>Edit and make simple modifications and run the programs</p> <p>Troubleshoot the most widely occurring faults using the diagnostic facilities available in the software</p> <p>Interface PLC with AC DRIVE and DC drive and control vital parameters</p>	<p>Principles of working and Programming of PLCs, Addressing concepts, I/O modules, Wiring practices, Interfacing of digital and analog I/O field devices to PLCs, different type of signal modules (special purpose modules such as high speed counter, thermocouple/RTD modules etc), control of PID loops using PLCS, Applications of PLCS in CNC MACHINES, speed control of motor, Bottle filling, Batch processing, SCADA & Introduction to DCS</p>

Practical – I : - BASIC ELECTRONIC & ELECTRONICS INSTRUMENTATION

Practical - I
<p>Identification of hand tools, Safety Precautions while working in Electronics Lab & Electric Shock Firs Aid, and various measuring instruments, soldering- de- soldering Practice on wire, chassis and on PCB.</p> <ul style="list-style-type: none"> • Identification specification & testing of various kind of resistances, & capacitors, Measurement by colour code • Familiarize with various types of switches. • Construct circuit with SPST, SPDT, and DPDT switches. • Familiarize miniature and micro switches, reed switches & latches, sockets –connectors & plugs, fuses, terminals, tags, legs & thimbles, Relays and their contacts, • Familiarization with various types of variable resistors, the mister, LDR, VDR. • RC time. Constant

<p>Forward and reverse characteristics of P N junction diode & Zener Diode.</p> <ul style="list-style-type: none"> • Plotting of various characteristics of Transistor • Biasing method of Transistors • Identification, Specification testing of Junction Diode & Transistors, LED, Zener Diode • Fabrication and assembly of Full wave rectifier Ckt using Diodes, Adding to Pie Filter, • Adding to Series Regulated Ckt using Zener & Series Transistor, • Build of voltage Divider , Doublers
<p>Assemble and observe the outputs of mono stable, bi stable and A-stable multi vibrators using transistors and 1C555.</p> <ul style="list-style-type: none"> • Assembles and observe the output of two input, two output bi stable multi-vibrator, . • Assemble Astable multi-vibrator as a VCO. • Construct and measure the output of simple inverter, SMPS.& UPS • Characteristics of transistor As switch identification and Testing of FET, • Common Source and common drain Configuration, • Study of switching action of JFET CMOS BMOS & MOSFET. • Construct and measure the output of MOSFET based inverter, SMPS.& UPS
<p>Testing of SCR by multi meter plot the forward characteristics of a SCR</p> <ul style="list-style-type: none"> • Find the latching current and holding current of SCR, • AC switching circuit by UJT, plot the Characteristics of UJT, Construct and observe outputs of UJT firing circuit, light dimmer circuit, • Characteristics of DIAC, DIAC as a DC pulse generator, characteristics of TRIAC fan regulated • DC motor speed control method and armature current control method, SCR trainer kit.
<p>Integrated Circuits: - Formation of diode, transistor, Resistor and constructional details-Different types of ICs.</p> <p>Assemble and verify truth table of OR, AND, NOT gate using discrete components.</p> <p>Verify truth table of NAND, NOR, XOR and XNOR gates.</p> <p>Study the inter conversion of gates by combination of another logic ckts</p> <p>Making of Min and Max Combination ckt using logic gate</p> <p>Study of Digital Logic Lab and perform various experiments of Flip Flops, Registers, and Counters.</p>
<p>Familiarization with common anode, cathode and seven segments, LED display, LCD display and display drivers,</p> <ul style="list-style-type: none"> • Construct and observe output of resistive network and binary ladder. • D/A converter, observe the output of comparator with different inputs, • Familiarize with A/D converter • Familiarize with memory ICs, parallel expansion of memory ICs, EPROM ICs, EPROM programmer
<p>Measurement of LC & R, using LCR Bridge, Digital LC & R meter</p>
<p>Measurement of AC, DC voltage, current using all types of Analog and digital meters, ramp type, Integrating type, Continuous Balance type.</p> <p>Study complete method of use of digital millimeter for its complete measurement provision like V,I,R, db, Temperature, capacitance, feature of testing of semiconductors, Frequency, feature of hold and memory provision</p>
<p>Use of Analog and Digital Frequency meter/Counter , Various Type of Timer, Timers and controllers</p> <p>Familiarization with operation, use & application of CRO in detail .Measurement of Freq., Voltage, Phase & Phase Difference using Single, Dual Trace, Storage Type Oscilloscope.</p> <p>Seeing and comparative analysis of wave shape using Oscilloscope.</p> <p>Plotting of Lissagous Pattern</p> <p>Familiarization with operation and use of various kind of signal generator, function generator, pulse generator</p>

S.No.	Name of the Equipment	Quantity
1.	Soldering iron	10 Nos.
2.	Desoldering pumps	10 Nos.
3.	Soldering station	5 Nos.
4.	IC voltage regulator trainer	5 Nos.
5.	Different regulated power supply PCBs	10 Nos.
6.	Inverter (Transistor, SCR & MOSFET based)	As Required
7.	Battery Charger	1 No.
8.	UPS (On line & Off line)	1 No. Each
9.	SMPS (different make)	5 Nos.
10.	Trigger Module for SCR	5 Nos.
11.	Trigger Module for TRIAC	5 Nos.
12.	Digital IC Trainer	5 Nos.
13.	Logic Probe / Logic Pulsar	5 Nos.
14.	Function generators	5 Nos.
15.	Frequency counters	5 Nos.
16.	Pulse generators	5 Nos.
17.	Oscilloscopes	10 Nos.
18.	Analog multimeters	10 Nos.
19.	Digital multimeters	2 Nos.
20.	IC Tester	5 Nos.
21.	Analog Trainer kits	2 Nos.
22.	LCR meter with display	5 Nos.
23.	FET voltmeters	As Required
24.	Relay & contactors of various types	1 No.
25.	PA System	2 Nos.
26.	LIC trainer kits	5 Nos.
27.	Power supplies of various types	5 Nos.
28.	Tachometers	2 Nos.
29.	Microprocessor Trainer Kit (8085 & 8086)	5 Each (8085, 8086)
30.	Microcontroller Trainer Kits	5 Nos.
31.	Interfacing Modules such as Stepper Motor, Traffic Light, DAC/ADC, Logic Controller	2 Sets
32.	PLC (Allen Bradley)	
	TOOLS:	
1.	Tweeter	10 Nos.
2.	Screw driver set	10 Nos.
3.	Pliers set	10 Nos.
	FURNITURE:	
1.	Table (Work benches)	5 Nos.
2.	Chairs	20 Nos.
3.	Elmira	4 Nos.
4.	Book shelf	4 Nos.
5.	White Board	1 No.
