

1	Name of Course	C.C. in Embedded System & PLC (301125)																																								
2	Max.Nos. of Student	25 Students																																								
3	Duration	6 Months																																								
4	Type	Full Time																																								
5	Nos Of Days / Week	6 Days																																								
6	Nos Of Hours /Days	7 Hrs																																								
7	Space Required	Laboratory = 1000 Sq feet Class Room = 200 Sq feet TOTAL = 1200 Sq feet																																								
8	Entry Qualification	S.S.C. + Any Course of Electronics Group of MSBVE																																								
9	Objective Of Syllabus/ introduction	Awareness of Safety precautions. Knowledge of soldering techniques, Testing, use of tools in assembly. Application of Various Microprocessor/ Microcontroller Computer Hardware & Networking. PIC Microcontrollers, PLC & SCADA Ability to read schematic layouts wrings diagrams. Repair & Maintenance of various Embedded system Equipments used in various control System. PLC wiring diagram & Programs & Maintenance.																																								
10	Employment Opportunity	The trainee will either to be able to take up jobs with agencies which maintain and repair such equipments or with working experience will be in a position to start his own independent Business.																																								
11	Teacher’s Qualification	Diploma in Electronics Engineering. With 3 year Teaching experience in Electronic Field.																																								
12	Training System	Training System Per Week <table><tr><td>Theory</td><td>Practical</td><td>Total</td></tr><tr><td>12 Hours</td><td>30 Hours</td><td>42 Hours</td></tr></table>						Theory	Practical	Total	12 Hours	30 Hours	42 Hours																													
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13	Exam. System	<table><tr><th>Sr. No.</th><th>Paper Code</th><th>Name of Subject</th><th>TH/PR</th><th>Hours</th><th>Max. Marks</th><th>Min. Marks</th></tr><tr><td>1</td><td>30112511</td><td>Embedded System & PLC</td><td>TH-I</td><td>3 hrs</td><td>100</td><td>35</td></tr><tr><td>2</td><td>30112521</td><td>Basic Electronics & Assembly Technique</td><td>PR-I</td><td>3 hrs</td><td>100</td><td>50</td></tr><tr><td>3</td><td>30112522</td><td>Embedded System & PLC</td><td>PR-II</td><td>6 hrs</td><td>200</td><td>100</td></tr><tr><td></td><td></td><td>TOTAL</td><td></td><td></td><td>400</td><td>185</td></tr></table>						Sr. No.	Paper Code	Name of Subject	TH/PR	Hours	Max. Marks	Min. Marks	1	30112511	Embedded System & PLC	TH-I	3 hrs	100	35	2	30112521	Basic Electronics & Assembly Technique	PR-I	3 hrs	100	50	3	30112522	Embedded System & PLC	PR-II	6 hrs	200	100			TOTAL			400	185
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SYLLABUS

Embedded System & PLC

Practical – II	Theory - I
Familiarization of MP kit Program Execution using - Data Transfer Group, Logic Group, Arithmetic Group Branch Group Interface microprocessor kit with different application boards and run the applications	Introduction to basic Computer architecture ,CPU & its spcification. Accumulator & Register based processors Microprocessor an overview of 8 bit (8085) Processor, architecture , Interrupt system, Mapping & DMA, Basic programing concept-Assembler, flowchart, debugging. Addressing modes , types of instructions, Instruction set Comparison with other 8 bit processors.
Familiarization of MC kit Program Execution using -Data Transfer Group, Logic Group, Arithmetic Group, Branch Group Study of interfacing techniques	Microprocessor and Microcontroller- a comparison Mocrecontroller an over view of 8051 & its Architecture, Instruction set, Addressing modes, Programming-Data Transfer, Arithmetic, Logic, Boolean Variable manipulation & branching Instruction
Hard ware and software Exercises in ports & Read the status of a switch using MC port pin Drive a relay using MC port pin Develop & run programs using Timer, Counter & Interrupt applications	I/O ports pins and their functions, I/O Programming, Bit manipulation ,Timers, modes of Timers, application of Timer to generate Time Delays. Interrupts and polling, various interrupt SFR's related to Interrupt Programming Edge Triggered and level triggered interrupts Priority of interrupts
Transmit & Receive Data with PC using serial link, Connection of Microcontroller kit to PC	Difference between serial and parallel Communication ,serial communication protocal, synchronous and Asynchronous communication, Data Framing, RS232 Standard, max 232 chips Baud Rates, programming Techniques.
Interfacing of MC using 8255 and study the working of: Traffic light controller ,DAC, ADC, Stepper motor ,Elevator, LCD KEYBOARD	Various methods of A to D & D to A conversion-counter type ADC, Successive type, Integrating Type ADC's Specification of DAC & ADC, 8255-programmable peripheral device, Concepts of Traffic light control, Fundamentals of Stepper motor-
	types, driving methods, Elevator ,Key board and LCD
Basic structure of c program Execution & compiling c program Program with -various data types ,using mathematical operators Program with input & output operations Program with simple loops & using 2D array, multidimensional arrays, character string& user defined functions	Introduction to C Language, Constants, variables and Data Types, Operators, Expessions, Input & Output operators, Decision Making and Branching, Looping, Array, Chracter Strings, User Defined Functions, Structures & Unions, Pointers, Classes in C++ & Stack operationsrrtrt
Exercise on PIC MC	Introduction to PIC MC, Architecture, Instruction set, Additional Features

<p>Identify physical topology of a network and members of the network ,identify the protocols installed and check resource sharing</p> <p>Identify the cables and components in the network</p> <p>Identify controls and ports on servers</p> <p>Identify the hardware of servers and configuration</p> <p>Starting and shutting down servers</p> <p>Identifying and using basic features Using Win 2000</p> <p>Prof/Linux/Unix/Novell features</p> <p>Making UTP cross cables and testing ,Making straight cables and testing ,Making cable layout drawing</p> <p>Installing information outlet points.</p> <p>Install different common protocols one by one and test communication and features</p> <p>Install and check TCP/IP utilities and services</p>	<p>Network features-Network topologies,protocols-TCP/IP,UDP/FTP,models, types, components,network medias,-specification and standards,types of cables</p> <p>Difference between PC & Server, Server-Usages of Server ,Types ,Server hardware, Operating system-OS ,NOS-features,types</p>
<p>Program Execution using Kit and PC Study of interfacing techniques</p>	<p>Architecture of 16 bit (8086)processor, Basic programing concept-Assembler, flowchart, debugging .Addressing modes , types of instructions, Instruction set , Comparison with other 16 bit processors.</p>
<p>Identification of different digital input and output field devices used in process/ mechanical industries categorized w.r.t voltage levels, single end and differential end etc. Operate and test the above mentioned field devices</p> <p>Identify different type of cables used to connect field devices to closed loop single/multi loop controllers and programmable controllers. Identify different cables and connectors used to connect programming terminals such as HHT, PC etc to the programmable controllers.</p>	<p>Evolution of different control techniques like manual, hardwired, electronic gate control and programmable control. Advantages and disadvantages of different techniques mentioned above. Different type of analog and digital input and output field devices used in process industries. Types of voltage and current formats used in field devices. Types of connections of field devices to controllers.Type of cables used for connecting field devices to controllers.</p>
<p>Identify the CPU type and the memory inside.</p> <p>Identify typical modules of the given PLC systems (such as power supply, Digital and Analog I/O(signal modules), basic module, high speed module, special function modules, RTD/Thermocouple etc) Identify the type of connectivity between the CPU and different. Modules of PLC. Identify the type of communication between different modules with PLC.</p>	<p>Block diagram of a basic PLC system and the Architecture, PLC components principles of working of PLCs, Specifications of PLCs.</p> <p>Different type of modules like Digital and Analog input and output modules and their working</p> <p>Hardware description of I/O, power supply Modules I/O addressing concepts. Types of memory used in PLCs. Memory and its impact on performance of PLC Memory map and Data files used in PLCs</p> <p>Different functional blocks/files and their uses</p>
<p>Install the PLC Software on the PC. Configure the software to communicate with a PLC.</p> <p>Familiarization with the software and use of different Data files/ function blocks etc. Develop simple programs and Download them for execution for simple digital I/O</p> <p>Develop programs using timers and counters and execute. Develop programs to cover different instructions and execute.</p>	<p>Different industry Bus communication standards like RS232, RS 422, DH, DH+, 485 etc and their charac-teristics. Different type protocols used in the field of PLCs. Programming of PLCs using different techni-ques such as Ladder, Instruction list, Control system flow chart etc.</p> <p>Instruction set covering basic I/O operations, timer, counter, data copy, arithmetic Logical, compare type, program control, shift instructions etc., PLC interrupts, PLC subroutines, PLC sequencers.</p> <p>Wiring, entering, documenting and testing program.</p>

Develop and run simple tasks such as control of a relay, contactor, lamp & motor etc for different input conditions. Monitor the status of the application ONLINE. Perform some Force operations. Develop programs to acquire analog data using Analog input card. Develop programs to display/control data using Analog output card. Make a closed loop control system using analog I/Os and control a process. PID Control using PLC. Interrupts using PLCs. Sub-routine development in PLCs. Repeat all the above for any two popular commercial PLCs.	Types of special function modules such as memory module, high speed counter, Communication processor module and its importance. Introduction to SCADA and DCS system
Familiarization and interpretation of the screens and its contents provided for diagnostic purpose in the software. Interpretation of the error codes. Clearing the minor errors and major errors. Troubleshooting screens.	Common faults in a typical PLC- based system with respect to hardware i.e power supply, digital/analog I/Os, special function modules, communication modules etc. Diagnostic capabilities of the PLC Software and the typical codes generated by the system for the effective troubleshooting of different modules of PLCs
Exercise on wireless	Wireless communication standards & various types of networks

Practical - I - Basic Electronics & Assembly Technique
Tool Identification, safety precautions, Familiarization with Electronic Components. Different Type of Soldering Iron. Use of Soldering Iron. Color Code of Fixed Resistors.
Use of various Meters for Measuring Voltage, Current , Resistance etc. Safe Handling of Instruments . Use of Digital & Analog Multimeter. Familiarization with CRO. Measurement of L, C and R using LCR bridge.
Identification & Testing of various types of Diodes. Familiarization with CRO, Operating knobs. Construction of Half Wave & Full Wave Rectifiers. Calculation of Ripple using Filters to improve DC Output
Transistor Testing, study the transistor characteristics. Construction of single stage amplifier. Construction of a transistor- switch and to drive a relay.
Construction of RC Phase Shift Oscillator. Construction of Astable and Bistable multivibrator.
Plotting of V-I Characteristics of SCR/Triac, study of light Dimmer.
Lab Demonstration of all types of Digital Logic Gates. Verification of all truth table. Familiarization with various IC and their Packages.

Tools & Equipment List

Sl No	Description of Item	Qty
1	8085 based Microprocessor Kit	4
2	8051 Based Microcontroller kit	4
3	Interfacing Modules such as DAC,ADC, TRAFFIC LIGHT ,STEPPER MOTOR,LCD Display & Key board	4 each
4	8086 based 16 bit Trainer Kit	4
5	Pic Microcontroller Kit	4
6	P IV Computer Server configuration	1
7	P IV Computers	4
8	Compiler on C language	1
9	Window 2000 software	1
10	8 Port Hub	1
11	NIC cards,cables and peripherals	4
12	Bread Boards	2
13	Microcontroller Programmer	1
14	Components (MC, Memories,Resistors, cap, wires ETC)	As required
15	Soldering Iron (Temperature Controlled)	6
16	PIC programmer	1
17	In-circuit emulator	1
18	Oscilloscope (100MHZ)	1
19	Digital Multimeter	6
20	PLC Trainer Systems (SIEMENS & ALLENBRADLEY)	1 each
21	PLC development software for Siemens & Allenbradley PLC systems.	1 each
22	Working models for PLCs	
23	a) Bottle fill trainer	1
24	b) Speed control module	1
25	c) Batch process reactor	1
26	d) Start delta starter	1
27	e) Discrete application trainer	1
28	SCADA software	1
29	Hand held programming terminal for PLC	1
