

COURSE TITLE : MICROCONTROLLER & PROGRAMMABLE LOGIC CONTROLLERS
COURSE CODE : 6032
COURSE CATEGORY : A
PERIODS/WEEK : 5
PERIODS/SEMESTER : 75
CREDITS : 5

TIME SCHEDULE

MODULE	TOPICS	PERIODS
1	Architecture of Microcontrollers	18
2	Programming and Application of Microcontroller	19
3	Advanced Microcontroller and Interfacing.	19
4	Programmable Logic Controllers	19
Total		75

Course Outcome:

Sl.No	Sub	On completion of this course the student will be able:
1	1	To understand the architecture of microcontroller 8051
	2	To understand the counter & timers
2	1	To understand the programming of microcontroller 8051
3	1	To comprehend the application of MC 8051
	2	To understand the features of PIC and AVR
4	1	To understand the architecture of PLC
	2	To apply the interfacing of PLC

Specific Outcome:

MODULE I Architecture of Microcontrollers

- 1.1.1 To introduce 8051 micro controller.
- 1.1.2 To describe feature of 8051.
- 1.1.3 To describe block diagram of 8051.
- 1.1.4 To describe 8051 architecture.
- 1.1.5 To explain register structure of 8051.
- 1.1.6 To explain special function register of 8051.
- 1.1.7 To describe internal & external memory of 8051.
- 1.1.8 To describe pin details of 8051.
- 1.1.9 To describe ports of 8051.

- 1.2.1 To explain counters& timers in 8051 and associated registers-TMOD,TCON.
- 1.2.2 To describe modes of operation of timers / counters.
- 1.2.3 To explain serial input/output of 8051 and associated registers-SCON,SBUF.
- 1.2.4 To Explain interrupts in 8051 and associated registers-IP,IE.

MODULE II Programming and Application of Microcontroller

- 2.1.1 To explain addressing modes of 8051.
- 2.1.2 To describe instruction set of 8051.
- 2.1.3 To describe logical operations.
- 2.1.4 To describe arithmetic operations.
- 2.1.5 To describe jump and call instructions.
- 2.1.6 To describe timing & delay subroutines

MODULE III Advanced Microcontroller and Interfacing.

- 3.1.0 To describe the basics of serial communication.
- 3.1.1 To describe the asynchronous serial communication and data framing.
- 3.1.2 To explain serial communication between PC and 8051.
- 3.1.3 To describe 8255 programmable peripheral interface
- 3.1.4 To demonstrate controlling of a stepper motor with μC 8051.
- 3.1.5 To describe how to interface a relay with μC 8051.

- 3.2.0 To explain the features of PIC 18.
- 1.2.1 To explain the block diagrams of ;
 - a) PIC18.
 - b) PIC 16.

To describe PIC architecture.

- 3.2.0 To explain the features of AVR.
- 3.2.1 To explain the block diagram of AT tiny 25.
- 3.2.2 To explain the block diagram of AT mega 32.
- 3.2.3 To describe AVR architecture.

MODULE IV Programmable Logic Controllers

- 4.1.0 To explain the Applications & Importance of PLC.
- 4.1.1 To compare PLC and a relay panel.
- 4.1.2 To classify PLC.
- 4.1.3 To describe the block diagram and operation of a micro PLC.
- 4.1.4 To classify PLC programming.
- 4.1.5 To give an idea of ladder programming.
- 4.1.6 To describe timer / counter instruction sets.

- 4.2.0 To describe math and logical instructions.
- 4.2.0 To study the Ladder programming.
- 4.2.1 To list the types of Instructions.
- 4.2.2 To explain how to select a PLC for a typical application.
- 4.2.3 To explain how to interface an induction motor using PLC.
- 4.2.4 To explain how to interface a traffic control with PLC.

CONTENTS

MODULE - I

Introduction. Architecture of microcontroller - microcontroller-evolution of microprocessor-microcontroller-microcontroller family. The 8051 microcontroller- features – architecture of 8051 – block diagram. Memory organization – Program memory – data memory – internal and external memory-Internal DATA memory structure –register banks – bit addressable area – scratch pad area-stock area- memory addresses- special function registers – accumulator-B register-DPTR-SP-Program Status Word – Flags –other SFRs-selection of register bank - Internal programme memory - capacity-address range - provision for external data memory - address range - provision for external programme memory-address range - external memory access-use of address latch. Pin configuration of 8051-description of eh pins-Ports in 8051 – port addresses - making ports as input and output ports -timers and counters in 8051 - timer registers - TMOD register-TCON register - different modes. Frequency of internal clock signal - machine cycle - calculation of time delay. Interrupts in 8051-need - IE register - IP register - interrupt vector table.

MODULE - II

Programming and application of microcontroller - the 8051 instruction set-classification-data transfer instructions-arithmetic instructions-logical instructions-branching and control transfer instructions-use of each instruction. Arithmetic and logical operations - Subroutines – interrupt service routine-need of subprograms-calling a subprogram-ACALL-LCALL- examples. Data transfer in 8051-addressing modes. Simple Programmes - arithmetic operations-block transfer of data - array sorting-time delay using sub routines.

MODULE - III

Advanced microcontrollers & interfacing.

Serial communication –basic principles-baud rate-asynchronous and synchronous communication- data framing-8051 registers related to serial communication-SBUF-SCON-serial communication ports. Microcontroller based system-peripherals-interfacing peripherals - 8255 programmable peripheral interface –need-block diagram-control word Register - Interfacing of stepper motor and relays. Features of PIC 18 - block diagram - block diagram of PIC 16 - architecture. Features of AVR- 25 block diagram of AT tiny 25 - block diagram of AT mega 32.- AVR architecture.

MODULE – IV

Programmable Logic Controllers.

PLC- Applications, Importance, classification, Comparison of PLC with Relay panel, block diagram and Operation of PLC. Classification of PLC programming- Ladder programming.Types of Instructions bit instructions- timer/counter instructions , Logical, compare instructions, move instructions - math instructions, programme control instructions - simple ladder programs connecting the above Instructions – motor control using PLC.

REFERANCES:

1. V Udayashankara & M S Mallikarjunaswamy. 8051 Microcontroller : Hardware , Software and Applications: Tata Mc Graw-hill Publishing company.
2. Kenneth J. Ayala. The 8051 Microcontroller: Thomson Delmer Learning.
3. Mazidi Muhammad Ali. The 8051 Microcontroller and Embedded Systems: Using Assembly and C: Pearson Education.
4. N. Senthil Kumar. Microprocessors and Microcontrollers: OUP India.
5. Muhammed Ali Mazeedi, Rolin D McKinlay & Danny Causey. PIC Microcontroller and Embedded Systems: Using Assembly and C Pearson Prentice Hall.
6. Muhammed Ali Mazeedi . AVR Microcontroller and Embedded Systems: Pearson Education Ltd.