Marwadi University
Faculty of Diploma studies
Information and Communication Technology

Subject Code : 09CT0505
Subject Name: Microcontroller and Interfacing

Diploma Year – III (Semester V)

Objective: The objective of the subject is to give an exposure to the microcontroller architecture, programming and various applications based on it.

Credits Earned: 4

Course Outcomes: After learning this course, students should be able to,

1. Understand various features of Microcontroller

2. Develop assembly language programs

3. Apply programming skill to interface necessary hardware with microcontroller

4. Develop microcontroller based systems

Pre-requisite of course: Digital Electronics, Microprocessor

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	IA (M)	CSE (I)	Viva (V)	Term work (TW)	
3	0	2	4	50	30	20	25	25	150

Contents:

Unit No	Course content	Total Hrs.
1	**Introduction to Microcontroller** Block diagram of microcontroller, Features of microcontroller, Evolution of microcontroller, Difference between microprocessor and microcontroller, Microcontroller architecture- Von neuman and Harward architecture, RISC and CISC	**05**
2	**8051 Microcontroller Architecture** Block diagram of 8051, Pin Diagram of 8051, General purpose registers, Special Function Registers, Oscillator and clock circuit, circuit, Memory Organization, Internal Program and Data Memory	**05**

3	**8051 Assembly Language Programming** Introduction to Program Development Tools(IDE),Concept of IDE,Editor,Assembler,Compiler,Linker,Simulator,Debugger,Assembler Directives, Programming model of 8051, Addressing modes, data transfer instructions, I/O Port programming, Arithmetic and Logical instructions, Bit level instructions, Branching instructions (Jump and loop Jump and call), Concept of stack, subroutine and related instructions, writing programs	**08**
4	**8051 Timer/Counter and Programming:** Use of counter as timer, Timer/Counters and associated registers, Various modes of timer/counter operations, Time delay programs in Assembly language	**04**
5	**8051 Serial Port and Programming:** Basics of serial communication, RS232 standards, 8051 connection to RS232, Serial data input/output and associated registers, Various modes of serial data communication, serial data communication programs in Assembly language	**04**
6	**8051 Interrupts:** Concept of Interrupt, interrupt versus polling, Types of interrupts in 8051, Reset, interrupt control and associated registers, interrupt vectors, Interrupt execution, RETI instruction, software generated interrupt, interrupt handler subroutine for timer/counter and serial data transmission/reception in Assembly language	**04**
7	**Interfacing with 8051 Microcontroller** Interfacing of LEDs, 7 Segment display device, LCD display, DIP Switches, Push Button switches, Key denounce techniques, Keyboard connections load per key and matrix form, Interfacing A/D converter, D/A converter, Relay, opto isolator stepper motor and DC motor.	**08**
8	**Applications of 8051 Microcontroller** Temperature measurement using LM 35 temperature sensor, Battery voltage monitoring system, Developing Data Acquisition System for multiple channel inputs, GSM based application, Measurement of speed	**04**
	Total	**42 hrs.**

Suggested List of Experiments:

1. Introduction to simulation tool for 8051 microcontroller programming.

2. Introduction to 8051 Trainer board and its features.

3. Develop Assembly Language Programs with Data Transfer Instructions.

4. Develop Assembly Language Programs with Arithmetic Instructions (8 bit Addition, Subtractions, Multiplication and Division)

5. Develop Assembly Language Programs using Logical Instructions (AND, OR, NOT)

6. Develop Assembly Language Programs using Branching instructions.

7. Develop Assembly Language Programs for Looping, Counting & Indexing concept.

8. Introduce delay using Timer & Counter by Assembly Language Programming.

9. Develop Assembly Language Programs using Interrupts.

10. Serial Communication and UART programming using Assembly language.

11. Interfacing of LED & 7 Segment display with 8051 Controller.

12. Interface LCD Module with 8051 microcontroller.

13. Interface DAC & ADC with 8051 microcontroller.

14. Interface DC motor and stepper motor with 8051 microcontroller.

References:

1. The 8051 Microcontroller and Embedded Systems using Assembly and C by Muhammad Ali Mazidi, Janice Gillispie Mazidi and Rolin McKinlay (Second Edition , Pearson Education)
2. The 8051 Microcontroller & Embedded Systems using Assembly and C By K. J. Ayala, D. V. Gadre (Cengage Learning , India Edition).
3. Microcontrollers: Principles and Applications by Pal Ajit, EEE, PHI New Delhi(Latest Edition)
4. The 8051 Microcontrollers: Architecture, Programming and Applications
Rao Dr. K Uma Pearson Education India, New Delhi,(Latest edition)

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

R Level	U Level	A Level	N Level	E Level	C Level
30	**30**	**20**	**10**	**10**	**0**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)