4ᵗʰ SEMESTER
DISCIPLINE SPECIFIC COURSE (CORE-4)

ELT416C: ELECTRONICS: MICROPROCESSOR AND MICROCONTROLLER
CREDITS: THEORY-04, PRACTICAL-02
MAX. MARKS: THEORY: 60; PRACTICAL: 30
MIN. MARKS: THEORY: 24; PRACTICAL: 12

THEORY: 60 LECTURES

Unit-I: Microcomputer Organization and 8085 Architecture:

Input / Output Devices. Data storage (idea of RAM and ROM). Computer memory. Memory organization
& addressing. Memory Interfacing. Memory Map. Main features of 8085. Block diagram. Pin-out diagram of
8085. Data and address buses. Registers. ALU. Stack memory. Program counter. (**13 Lectures**)

Unit-II: 8085 Programming:

Instruction classification, Instructions set (Data transfer including stacks. Arithmetic, logical, branch, and control instructions). Subroutines, delay loops. Timing & Control circuitry. Timing states. Instruction cycle, Timing diagram of MOV and MVI. Hardware and software interrupts. (**17 Lectures**)

Unit- III: 8051 Microcontroller Architecture:

Introduction and block diagram of 8051 microcontroller, architecture of 8051, overview of 8051 family, 8051 assembly language programming, Program Counter and ROM memory map, Data types and directives, Flag bits and Program Status Word (PSW) register, Jump, loop and call instructions. (**15 Lectures**)

Unit- IV: 8051 Programming and Introduction to Embedded system:

8051 I/O port programming: Introduction of I/O port programming, pin out diagram of 8051 microcontroller, I/O port pins description & their functions, I/O port programming in 8051 (using assembly language), I/O programming: Bit manipulation, Embedded systems and general purpose computer systems. Architecture of embedded system. Classifications, applications and purpose of embedded systems. (**15 Lectures**)

REFERENCE BOOKS:

1. Microprocessor Architecture Programming & applications with 8085, 2002, R.S. Goankar, Prentice Hall.
2. Embedded Systems: Architecture, Programming & Design, Raj Kamal, 2008, Tata McGraw Hill
3. The 8051 Microcontroller and Embedded Systems Using Assembly and C, M.A. Mazidi, J.G. Mazidi, and R.D. McKinlay, 2nd Ed., 2007, Pearson Education India.
4. Microprocessor and Microcontrollers, N. Senthil Kumar, 2010, Oxford University Press
5. 8051 microcontrollers, Satish Shah, 2010, Oxford University Press.
6. Embedded Systems: Design & applications, S.F. Barrett, 2008, Pearson Education India
7. Introduction to embedded system, K.V. Shibu, 1st edition, 2009, McGraw Hill

PRACTICAL: 2 CREDITS (60 HOURS) – 30 MARKS

At least 06 experiments each from Section-A and Section-B

Section-A: Programs using 8085 Microprocessor

1. Addition and subtraction of numbers using direct addressing mode
2. Addition and subtraction of numbers using indirect addressing mode
3. Multiplication by repeated addition.
4. Division by repeated subtraction.
5. Handling of 16-bit Numbers.
6. Use of CALL and RETURN Instruction.
7. Block data handling.
8. Other programs (e.g. Parity Check, using interrupts, etc.).

Section-B: Experiments using 8051 microcontroller:

1. To find that the given numbers is prime or not.
2. To find the factorial of a number.
3. Write a program to make the two numbers equal by increasing the smallest number and decreasing the largest number.
4. Use one of the four ports of 8051 for O/P interfaced to eight LED's. Simulate binary counter (8 bit) on LED's
5. Program to glow the first four LEDs then next four using TIMER application.
6. Program to rotate the contents of the accumulator first right and then left.
7. Program to run a countdown from 9-0 in the seven segment LED display.
8. Program to interface seven segment LED display with 8051 microcontroller and display 'HELP' in the seven segment LED display.
9. Program to toggle '1234' as '1324' in the seven segment LED display.
10. Interface stepper motor with 8051 and write a program to move the motor through a given angle in clock wise or counter clockwise direction.
11. Application of embedded systems: Temperature measurement & display on LCD

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1. Microprocessor Architecture Programming & applications with 8085, 2002, R.S. Goankar, Prentice Hall.

2. Embedded Systems: Architecture, Programming & Design, Raj Kamal, 2008, Tata McGraw Hill

3. The 8051 Microcontroller and Embedded Systems Using Assembly and C, M.A. Mazidi, J.G. Mazidi, and R.D. McKinlay, 2nd Ed., 2007, Pearson Education India.

4. 8051 microcontrollers, Satish Shah, 2010, Oxford University Press.

5. Embedded Microcomputer systems: Real time interfacing, J.W. Valcano 2011, Cengage Learning.