Microprocessor

Course Objective:
To familiarize students with architecture, programming, hardware and application of microprocessor.

1. Introduction(4 hours)
    a. Introduction and History of Microprocessors
    b. Basic Block Diagram of a Computer
    c. Organization of Microprocessor Based System
    d. Bus Organization
    e. Stored program Concept and Von Neumann Machine
    f. Processing Cycle of a Stored Program Computer
    g. Microinstructions and Hardwired/Microprogrammed Control Unit
    h. Introduction to Register Transfer Language

2. Programming with 8085 Microprocessor(10 hours)
    a. Internal Architecture and Features of 8085 microprocessor
    b. Instruction Format and Data Format
    c. Addressing Modes of 8085
    d. Intel 8085 Instruction Set
    e. Various Programs in 8085
        i. Simple Programs with Arithmetic and Logical Operations
        ii. Conditions and Loops
        iii. Array and Table Processing
        iv. Decimal BCD Conversion
        v. Multiplication and Division

3. Programming with 8086 Microprocessor(12 hours)
    a. Internal Architecture and Features of 8086 Microprocessor
        i. BIU and Components
        ii. EU and Components
        iii. EU and BIU Operations
        iv. Segment and Offset Address
    b. Addressing Modes of 8086
    c. Assembly Language Programming
    d. High Level versus Low Level Programming
    e. Assembly Language Syntax
        i. Comments
        ii. Reserved words
        iii. Identifiers
        iv. Statements
        v. Directives
        vi. Operators
        vii. Instructions
    f. EXE and COM programs
    g. Assembling, Linking and Executing
    h. One Pass and Two Pass Assemblers
    i. Keyboard and Video Services

j. Various Programs in 8086
    i. Simple Programs for Arithmetic, Logical, String Input/Output
    ii. Conditions and Loops
    iii. Array and String Processing
    iv. Read and Display ASCII and Decimal Numbers
    v. Displaying Numbers in Binary and Hexadecimal Formats

4. Microprocessor System(10 hours)
    a. Pin Configuration of 8085 and 8086 Microprocessors
    b. Bus Structure
        i. Synchronous Bus
        ii. Asynchronous Bus
        iii. Read and Write Bus Timing of 8085 and 8086 Microprocessors
    c. Memory Device Classification and Hierarchy
    d. Interfacing I/O and Memory
        i. Address Decoding
        ii. Unique and Non Unique Address Decoding
        iii. I/O Mapped I/O and Memory Mapped I/O
        iv. Serial and Parallel Interfaces
        v. I/O Address Decoding with NAND and Block Decoders (8085, 8086)
        vi. Memory Address Decoding with NAND, Block and PROM Decoders (8085, 8086)
    e. Parallel Interface
        i. Modes: Simple, Wait, Single Handshaking and Double Handshaking
        ii. Introduction to Programmable Peripheral Interface (PPI)
    f. Serial Interface
        i. Synchronous and Asynchronous Transmission
        ii. Serial Interface Standards: RS232, RS423, RS422, USB
        iii. Introduction to USART
    g. Introduction to Direct Memory Access (DMA) and DMA Controllers

5. Interrupt Operations(5 hours)
    a. Polling versus Interrupt
    b. Interrupt Processing Sequence
    c. Interrupt Service Routine
    d. Interrupt Processing in 8085
        i. Interrupt Pins and Priorities
        ii. Using Programmable Interrupt Controllers (PIC)
        iii. Interrupt Instructions
    e. Interrupt Processing in 8086
        i. Interrupt Pins
        ii. Interrupt Vector Table and its Organization
        iii. Software and Hardware Interrupts
        iv. Interrupt Priorities

6. Advanced Topics(4 hours)
    a. Multiprocessing Systems
        i. Real and Pseudo-Parallelism
        ii. Flynn's Classification
        iii. Instruction Level, Thread Level and Process Level Parallelism
        iv. Interprocess Communication, Resource Allocation and Deadlock
        v. Features of Typical Operating System
    b. Different Microprocessor Architectures
        i. Register Based and Accumulator Based Architecture
        ii. RISC and CISC Architectures
        iii. Digital Signal Processors

Practical:
There will be about 12 lab exercises to program 8085 and 8086 microprocessors.

References:

1. Ramesh S. Gaonkar, "Microprocessor Architecture, Programming and Application with 8085", 5th Edition 2002, Prentice Hall
2. Peter Abel, "IBM PC Assembly Language and Programming", 5th Edition 2001, Pearson Education Inc.
3. D. V. Hall, "Microprocessor and Interfacing, Programming and Hardware", 2nd Edition 1999, Tata McGraw Hill
4. John Uffenbeck, "Microcomputers and Microprocessors, The 8080, 8085 and Z-80 Programming, Interfacing and Troubleshooting" 3rd Edition 1999, Prentice Hall
5. Walter A. Triebel and Avtar Singh, "The 8088 and 8086 Microprocessors, Programming, Interfacing, Software, Hardware and Applications", 4th Edition 2003, Prentice Hall
6. William Stalling, "Computer Organization and Architecture", 8th Edition 2009, Prentice Hall

Evaluation Scheme:

The questions will cover all the chapters of the syllabus. The evaluation scheme will be as indicated in the table below:

Chapters	Hours	Marks distribution*
1	4	8
2	10	16
3	12	16
4	10	16
5	5	8
6	4	8
1,2,3,4,5,6	-	8
Total	45	80

***Note: There may be a minor deviation in Marks distribution**