**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

## 19AEC61- MICROPROCESSORS & MICROCONTROLLERS

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**Course Objectives:** The objectives of the course are to make the students learn about

- To develop an in-depth understanding of the operation of microprocessors.
- To learn about the architecture of the microprocessor and interfacing DMA controller.
- To understand the parallel and serial data transfer, basic peripherals devices their programming and interfacing techniques.
- To gain knowledge of the concepts of Interrupt of 8086.
- To impart the basic concepts of microcontrollers, programming and interfacing.

**UNIT – I:**

**Introduction:** Microprocessor based personal computer system, 8085 Micro Processors: Architecture, Register Organizing, Addressing modes, interrupts, Instruction set, Bus Timings, T state Calculations.

8086 Micro Processors: Programmer's model for 8086, memory organization of 8086, Addressing modes, Instruction set of 8086, Assembly language programming.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Gain knowledge on architecture, internal organization, addressing modes and instruction sets of 8085 processors. **L1**
- Understand the architecture, usage of different addressing modes and instruction set of 8086 microprocessor. **L2**

**UNIT – II:**

**Interfacing with 8086 –Part 1:** Pin diagram detail of 8086, Minimum and Maximum mode of operations, Bus timing, Memory interface to 8086, DMA Controller: 8257 and 8237 their interfacing to 8086.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the pin diagram of 8086 and interfacing of memory to 8086. **L2**
- Learn the operation of DMA controller and interfacing to 8086. **L1**

**UNIT – III:**

**Interfacing with 8086 – Part 2:** Parallel and serial data transfer methods, I/O interface method, 8255 PPI chip, Interfacing with 7 segment LEDs, Interfacing with keyboards, Interfacing with ADCs, Interfacing with DACs, Interfacing with Stepper Motor.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Perform parallel and serial data transfer using 8086 microprocessor. **L3**
- Interface input – output modules and convert analog data to digital data and vice versa. **L4**

**UNIT – IV:**

**Interfacing with 8086 – Part 3:** Interrupts of 8086, Programming with DOS and BIOS function calls, 8259 interrupt controller and its interfacing with 8086, cascade mode of operation of 8259.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Appreciate the importance and usage of Interrupts of 8086. **L1**
- Gain knowledge on interfacing 8259-interrupt controller and cascade mode of operation of 8259. **L1**

**UNIT – V:**

**Introduction to Microcontrollers :** 8051 Micro Controllers: Architecture, Registers Organization, Memory Organization, Pin Description, Connections, I/O Ports, Timers and their modes of operations, Serial Communication - Basics of Serial communication, UART, RS 232 Protocol, 8051 interface to RS 232, 8051 UART Programming, SPI and $I^2C$ implementation on 8051, Addressing Modes, Instruction Set, Assembly directives, Simple assembly software programs with 8051, Interfacing: LEDs, LCDs and switches.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand 8051 microcontroller architecture, internal organization and different modes of operations. **L2**
- Identify the usage of Serial Communication and write assembly software programs with 8051. **L1**

**Text Books:**

1. Ramesh Gaonkar, "Microprocessor Architecture, Programming and Applications with the 8085", 6th Edition, Penram International Publishing, 2013
2. Douglas V Hall and S. S. SP Rao, "Microprocessors and Interfacing",3rd Edition, Tata McGraw Hill, 2012.
3. M.A. Mazidiand J.C. Mazidi,"Microcontroller and Embedded systems using Assembly & C", 2nd Edition, Pearson Education, 2007.

**Reference Books:**

1. A.K.Ray andK.M.Bhurchandi, "Advanced Microprocessors and Peripherals",3rd Edition, Tata McGraw Hill, 2006.
2. Kenneth J Ayala, "The 8051 Microcontroller", 3rd Edition, Thomson Delmar Learning, 2004.

**Course Outcomes:**

At the end of this Course the student will be able to

- Define the basic concepts of microprocessors operation. **L1**
- Describe the architecture of the microprocessor and how to interface DMA controller. **L1**
- Analyze parallel and serial data transfer, and interface basic peripherals devices. **L4**
- Describe the concepts of Interrupts of 8086. **L1**
- Describe the basic concepts of microcontrollers, programming and interfacing. **L1**