B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA
19AEC65a-INTRODUCTION TO MICROCONTROLLER AND APPLICATIONS
(Open Elective-II)

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Course Objectives: The objectives of the course are to make the students learn about
- To understand the basic concepts and architecture of 8051.
- To learn various instructions and addressing modes used in 8051
- To be able to write programs in assembly language for 8051
- To be able to program 8051 Timers and implement serial communication for a given application.
- To learn interfacing of memory, I/O devices and the usage of Interrupts.

UNIT – I:

Architecture of 8051: Introduction, Block diagram of 8051 Microcontroller, Functions of each block, Pin details of 8051, ALU,ROM, RAM, Memory Organization of 8051, Special function registers, Program Counter, PSW register, Stack, I/O Ports, Timer, Interrupt, Serial Port, Oscillator and Clock, Clock Cycle, Machine Cycle, Instruction cycle, Reset, Power on Reset.

Learning Outcomes:

At the end of this unit, the student will be able to
- Understand the architecture of 8051 microcontroller.   **L2**
- Learn the functions of each block of 8051 microcontroller.   **L1**

UNIT – II:

Instruction Set of 8051: Instruction set of 8051, Classification of 8051 Instructions, Data transfer instructions, Arithmetic Instructions, Logical instructions, Branching instructions, Bit Manipulation Instructions

Assembler and Addressing Modes: Assembling and running an 8051 program, Structure of Assembly Language, Assembler directives, Different addressing modes of 8051.

Learning Outcomes:

At the end of this unit, the student will be able to
- Know different instructions available in the Instruction set of 8051.   **L1**
- Learn and use different types of addressing modes of 8051 microcontroller.   **L1**

UNIT – III:

Programs: Arithmetic operations, Biggest Number / Smallest Number, Ascending order / Descending order, BCD to HEX Conversion, HEX to BCD Conversion, Odd Parity Generator Even Parity Generator, Time delay routines

I/O: Bit addresses for I/O and RAM, I/O programming, I/O bit manipulation programming.

Learning Outcomes:

At the end of this unit, the student will be able to
- Write assembly language program in 8051 for simple operations.   **L6**
- Gain knowledge about different mappings used in 8051 microcontroller.   **L1**

UNIT – IV:

Timer: Programming 8051 Timers, Timer registers, Different modes of Timer, Programming timer in different modes, Counter programming, Different modes of Counter, Sample programs.

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.

Learning Outcomes:

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

- Write programs to use the 8051 Timers for a given application.   L6
- Use different types of serial communication devices based on the application.   L3

UNIT – V:

Interrupt: 8051 Interrupts, Programming Timer Interrupts, Programming external hardware interrupts, Programming the serial communication interrupt, Interrupt priority in 8051.**IC 8255:** IC 8255, Block Diagram, Modes of 8255, Interfacing with 8051.

Interfacing Techniques: Interfacing external memory to 8051, Sensor interfacing, ADC interfacing, DAC interfacing, Keyboard interfacing, Seven segment LED Display Interfacing, Stepper Motor interfacing.

Learning Outcomes:

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

- Interface memory and I/O devices for specific applications.   L4

- Learn and apply Interrupts based on the application and usage.   L3

Text Books:

1. Muhammed Ali Mazidi, Janice Gillispie Mazidi and Rolin D McKinlay, "The 8051 Microcontroller and Embedded Systems Using Assembly and C", 2nd Edition, Pearson Education, 2008.
2. Ajit pal, "Microcontrollers, Principles and Applications", – PHI Ltd., - 2011.

Reference Books:

1. Ajay V Deshmukh, "Microcontrollers: Theory and Applications", TATA McGraw Hill publications, 2007.
2. Krishna Kanth, "Microprocessors and Microcontrollers", PHI Publications, 2010

Course Outcomes:

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

- Understand the basic concepts and architecture of 8051.   L2
- Know the usage of various instructions and addressing modes in 8051   L1
- Write programs in assembly language for 8051   L6
- Program 8051 Timers and implement serial communication for a given application. L6
- Interface memory, I/O devices and use Interrupts.   L4