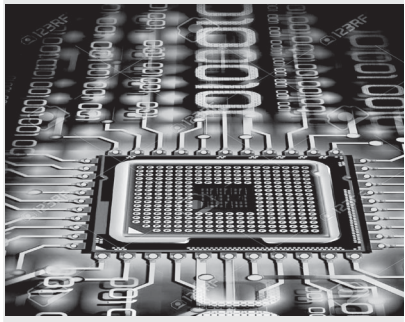
# 16BM304 FUNDAMENTALS OF MICROCONTROLLERS



Hours Per Week :

| L | T | P | C |
|---|---|---|---|
| 3 | - | 2 | 4 |

Total Hours :

| L | T | P |
|---|---|---|
| 45 | - | 30 |

| WA/RA | SSH/HSH | CS | SA | S | BS |
|---|---|---|---|---|---|
| 20 | 46 | 6 | 12 | 3 | 5 |

## Course Description and Objectives:

This course offers basic architecture and operation of a microprocessor and a microcontroller to the student. The course objective is to study the architecture and addressing modes of 8086/8051 and to know the importance of different peripheral devices and their interfacing to 8086/8051.

## Course Outcomes:

The student will be able to:

- architect a microprocessor or microcontroller system and estimate the required hardware and software resources.
- select a microprocessor or microcontroller suitable to the application.
- write assembly language program in 8086 for various applications.
- impart knowledge ontheconceptsofadvanced microprocessors.
- create the memory and IO interfacing techniques with 8086 and 805.
- write assembly language program in microcontroller 8051 for various applications.

## SKILLS:

- ✓ *Identify a Microcontroller for a specific application.*
- ✓ *Design a Micro Processor based system.*
- ✓ *Design a Micro Controller based system.*
- ✓ *Do programming in assembly language.*

**ACTIVITIES:**

- *Interface a 16x2 LCD with 8051.*
- *Interface a 4X4 Hex key pad with 8051.*
- *Interface a Stepper motor.*
- *Interface DAC: to generate Square, Triangular waves.*
- *Interface ADC: to convert analog signal to digital and to display it in 7-Segment LED display.*
- *Count external pulses arriving on port pins with the help oftimer units in 8051.*
- *Design any micro controller based system with more than seven peripherals.*

**UNIT - 1** **L-9**

**INTRODUCTION TO MICROPROCESSORS:** Evolution of Microprocessors, 8086 Microprocessor Architecture, Registerorganization, Instruction queue, and Physical address calculation, Addressing Modes, Pin description of 8086.

**UNIT - 2** **L-9**

**INSTRUCTION SET:** Assembly Language Programs for arithmetic operations, Logical operations, CALL-RET operations, Intra and inter segment calls, Sorting and string Operations, Interrupts of 8086.

**UNIT - 3** **L-9**

**INTRODUCTION TO MICROCONTROLLER:** Differences between microprocessor and microcontrollers, Architecture, Internal and External memory organization, Pin diagram, Addressing modes, On board RAM, Special Function Register area, Addressing modes of 8051, Interrupts of 8051, Interfacing external memory to 8051.

**UNIT - 4** **L-9**

**PROGRAMMING:**8051 Instruction set and assembly language programming, Example Programs.

**UNIT - 5** **L-9**

**INTERFACING:**Microprocessor interfacing- Key board and Display Interfacing, A/D and D/Aconverter interfacing, Traffic light,Micro controller interfacing-7-seg LED interfacing, Key board interfacing, LCDinterfacing, Stepper motor interfacing.

## LABORATORY EXPERIMENTS

**LIST OF EXPERIMENTS**: Total hours: 30

8086 Programs using kits and MASM

1. Basic arithmetic and Logical operations.
2. Move a data block without overlap.
3. Code conversion, decimal arithmetic and Matrix operations.
4. Floating point operations, string manipulations, sorting and searching.
5. Password checking, Print RAM size and system date.
6. Counters and Time Delay Peripherals and Interfacing Experiments.
7. Traffic light control.
8. Stepper motor control.
9. Digital clock.
10. Key board and Display.
11. Printer status.
12. Serial interface and Parallel interface.
13. A/D and D/A interface and Waveform Generation 8051 Experiments using kits and MASM 14. Basic arithmetic and Logical operations.
15. Square and Cube program, Find 2's complement of a number.
16. Unpacked BCD to ASCII.

**LAB EQUIPMENT FOR A BATCH OF 30 STUDENTS**:

**HARDWARE:**

8086 development kits - 30 nos.

Interfacing Units - Each 10 nos.

Microcontroller - 30 nos.

**SOFTWARE**:

Intel Desktop Systems with MASM - 30 nos.

8086 Assembler.

8051 Cross Assembler.

**TEXT BOOK:**

1. Douglas V.Hall, “Microprocessors and Interfacing”, 2nd edition, TMH, 2003.
2. Mazidi “The 8051 Microcontroller and Embedded Systems Using Assembly and C”, 2nd edition, Pearson education.

**REFERENCE BOOKS:**

1. A K Ray and K M Bhurchandi, “Advanced Microprocessors &Peripherals”, 2nd edition, TMH, 2006.
2. Raj Kamal, “Microcontroller architecture, programming, Interfacingand System Design”, 1st edition, Pearson Education, 2005.
3. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D.McKinlay, “The 8051 Microcontroller and Embedded Systems using Assemblyand C”, 2nd Edition, Pearson Education, 2008.
4. Barry B.Brey, “Intel Microprocessor Architecture, Programming and Interfacing- 8086/8088, 80186, 80286, 80386 and 80486", 1st edition, PHI,1995.