

MICROPROCESSORS AND MICROCONTROLLERS LAB

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|---------------------------------|--------------|--------------------------|-------|---------------|--|
| Course Code | 19EC3651 | Year | III | Semester | II |
| Course Category | Program Core | Branch | ECE | Course Type | Lab |
| Credits | 1.5 | L-T-P | 0-0-3 | Prerequisites | Computer Architecture and Organization |
| Continuous Internal Evaluation: | 25 | Semester End Evaluation: | 50 | Total Marks: | 75 |

| Course Outcomes | | BT Level |
|---|--|----------|
| Upon successful completion of the course, the student will be able to | | |
| CO1 | Develop programs using different class of instructions for 8086 microprocessor and ARM processor. | L3 |
| CO2 | Analyse assembly language programs; select appropriate IDE and assemble into machine of a microprocessor and microcontroller. | L4 |
| CO3 | Build electrical circuitry to the Microcontroller I/O ports in order to interface with the external devices. | L3 |
| CO4 | Make an effective lab report. | L4 |

| Mapping of course outcomes with Program outcomes (CO/ PO/PSO Matrix) | | | | | | | | | | | | | | |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| Note: 1- Weak correlation 2-Medium correlation 3-Strong correlation | | | | | | | | | | | | | | |
| * - Average value indicates course correlation strength with mapped PO | | | | | | | | | | | | | | |
| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| CO1 | 3 | 2 | 2 | 2 | 2 | | | | 2 | 2 | | | 2 | 2 |
| CO2 | 2 | 2 | 3 | 2 | 2 | | | | 2 | 2 | | | 2 | 3 |
| CO3 | 2 | 3 | 3 | 3 | 3 | | | | 3 | 2 | | | 3 | 3 |
| CO4 | 3 | 3 | 2 | 2 | 2 | | | | 2 | 3 | | | 2 | 2 |
| Average* (Rounded to nearest integer) | 3 | 3 | 3 | 2 | 2 | | | | 2 | 2 | | | 2 | 3 |

| Syllabus | | |
|----------|---|---------------|
| Unit No. | Contents | Mapped CO |
| | Experiments with microprocessor 8086 using Assembler: | |
| 1 | Arithmetic operations on 8 bit and 16 bit operands | CO1, CO2, CO4 |
| 2 | Transfer block of data from one memory location to another memory location. | CO1, CO2, CO4 |
| 3 | Programs using monitor routines. | CO1, CO2, CO4 |
| 4 | Compute maximum, minimum and sorting (ascending and descending). | CO1, CO2, CO4 |
| 5 | Generate Fibonacci series, average of N numbers, factorial of N. | CO1, CO2, CO4 |
| | Experiments with ARM CORTEX M3 Processor using KEIL MDK ARM | |

| | | |
|----|---|--------------------|
| 6 | A program to toggle LED every second using timer interrupt | CO1, CO2, CO3, CO4 |
| 7 | A program to interface stepper motor and rotate it in clockwise and anti-clockwise direction. | CO1, CO2, CO3, CO4 |
| 8 | Display the Hex digits 0 to F on a 7-segment LED interface with an appropriate delay in between | CO1, CO2, CO3, CO4 |
| 9 | Interface a 4x4 keyboard and display the key code on an LCD | CO1, CO2, CO3, CO4 |
| 10 | Write a program to utilize internal PWM module and generate PWM and vary its duty cycle | CO1, CO2, CO3, CO4 |

Learning Resources

Text Books

1. Microprocessors and Interfacing – Programming and Hardware by Douglas V Hall, SSSP Rao, Tata McGraw Hill Education Private Limited, 3rd Edition.
2. ARM Microprocessor Systems – Cortex – M Architecture, Programming, and Interfacing by Muhammad Tahir and Kashif Javed, CRC Press.
3. The Definitive Guide to ARM Cortex-M3 and Cortex-M4 Processors by Joseph You

Reference Books

1. Embedded Systems Fundamentals with ARM Cortex-M based Microcontrollers: A Practical Approach in English, by Dr. Alexander G. Dean, Published by Arm Education Media
2. Cortex -M3 Technical Reference Manual