

ARM MICROCONTROLLER SYSTEMS

| | | | | | |
|--|--------------------------|---------------------------------|-------|----------------------|--------|
| Course Code | 20EC4601B | Year | III | Semester | II |
| Course Category | Professional Elective-II | Branch | ECE | Course Type | Theory |
| Credits | 3 | L-T-P | 3-0-0 | Prerequisites | Nil |
| Continuous Internal Evaluation: | 30 | Semester End Evaluation: | 70 | Total Marks: | 100 |

| Course Outcomes | |
|---|--|
| Upon successful completion of the course, the student will be able to | |
| CO1 | Interpret the evolution of ARM processors, architectural advances and classification of ARM processors. (L2) |
| CO2 | Demonstrate programming proficiency using the addressing modes and instructions of the arm microcontroller. (L2) |
| CO3 | Develop programs to interface various peripherals with microcontrollers.(L3) |
| CO4 | Analyse real time communication modules using ARM microcontroller (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 | PO 10 | PO 11 | PO 12 | PSO1 | PSO2 |
| CO1 | 2 | | | | | | | | | | | | 1 | |
| CO2 | 2 | | | | | | | | | | | | 1 | 2 |
| CO3 | 2 | | | | | | | | 2 | 2 | | | 2 | 2 |
| CO4 | | 3 | | | | | | | 3 | 3 | | | 2 | 2 |
| Average* (Rounded to nearest integer) | 2 | 3 | | | | | | | 3 | 3 | | | 2 | 2 |

| Syllabus | | |
|-----------------|---|-------------|
| Unit No. | Contents | Mapped CO |
| I | ARM Architecture: Introduction to Cortex M microcontroller, ARM instruction set architecture, register set, processor operating modes, interrupts and processor reset sequence, pipelined architecture and data path. | CO1, CO2 |
| II | ARM Assembly language programming: Addressing modes, Data processing instructions, data transfer instructions, control flow instructions, multiple register transfer instructions, co-processor instructions, break point instructions, memory faults. | CO2, CO3 |

| | | |
|-----|--|-------------|
| III | fundamentals of I/O configuration: Configuring ARM pins as GPIO's, clock and bus configuration, mode control configuration, pad control configuration, data control configuration, configure keil tools for hardware design | CO2, CO4 |
| IV | I/O Interfacing: LED and switch, interfacing seven-segment display, keypad interfacing, interfacing LCD module, methods for Input and output synchronization | CO1, CO3 |
| V | Serial Communication Interfaces: UART interface, UART details on TM4C123 microcontroller, I2C interface, SPI & CAN | CO3, CO4 |

Learning Resources

Text Books

1. Muhammad Tahir and Kashif Javed - ARM Microprocessor Systems – Cortex – M Architecture, Programming, and Interfacing by, CRC Press.
2. Steve Furber - ARM System-on-chip Architecture by, 2nd Ed., Pearson

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
3. Joseph You- The Definitive Guide to ARM Cortex-M3 and Cortex-M4 Processors

Web Resources:

1. <https://nptel.ac.in/courses/117/106/117106111/>
2. https://onlinecourses.nptel.ac.in/noc20_cs15/preview