



National Institute of Technology Meghalaya

An Institute of National Importance

CURRICULUM

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|-----------|---|--------------------|----------------|
| Programme | Bachelor of Technology in Electrical and Electronics Engineering | Year of Regulation | 2019-20 |
|-----------|---|--------------------|----------------|

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|------------|-------------------------------|----------|-----------|
| Department | Electrical Engineering | Semester | VI |
|------------|-------------------------------|----------|-----------|

| Course Code | Course Name | Credit Structure | | | | Marks Distribution | | | |
|--------------|--|------------------|----------|----------|----------|--------------------|-----------|------------|------------|
| | | L | T | P | C | INT | MID | END | Total |
| EE312 | Microcontroller and Embedded System | 3 | 0 | 0 | 3 | 50 | 50 | 100 | 200 |

After the completion of the course, the student should be able to:

| Course Objectives | To introduce 8051 microcontroller architecture | | Course Outcomes | CO1 | acquire knowledge about the features and architecture of 8051 microcontroller. |
|-------------------|--|--|-----------------|-----|---|
| | To teach instruction sets, addressing mode, and programming for 8051 | | | CO2 | understand the programming and interfacing of 8051 microcontroller. |
| | To introduce PIC family microcontroller | | | CO3 | describe the features, architecture, I/O ports, etc. for PIC family microcontroller. |
| | To introduce Embedded system | | | CO4 | define the architecture of Embedded system. |
| | | | | CO5 | analyse real time applications of Embedded system. |

| No. | COs | Mapping with Program Outcomes (POs) | | | | | | | | | | | | Mapping with PSOs | | |
|-----|------------|-------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|-------------------|------|------|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | CO1 | 3 | 3 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 2 |
| 2 | CO2 | 3 | 3 | 3 | 3 | 3 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 3 | 3 |
| 3 | CO3 | 3 | 3 | 3 | 3 | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 |
| 4 | CO4 | 3 | 2 | 3 | 2 | 3 | 0 | 3 | 0 | 3 | 0 | 0 | 1 | 0 | 3 | 3 |
| 5 | CO5 | 3 | 2 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 3 | 2 |

SYLLABUS

| No. | Content | Hours | COs |
|-----|---|-----------|------------|
| I | 8051 Microcontroller: Features and Architecture Overview of the 8051 family, pin description, hardware connection, architectural overview, special function registers, memory organization, I/O ports, interrupts, timer/counter, serial communication. | 07 | CO1 |

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|--|--|----|-----|
| II | 8051 Programming and interfacing: with Assembly and C Instruction set, addressing modes, I/O ports programming, interrupts programming, timer/counter programming, serial communication programming, interfacing external devices. | 07 | CO2 |
| III | PIC16C6X-7X / PIC18F Family Microcontroller Introduction, features and overview on family, architecture, CPU registers, Oscillator connections, Stack, configuration registers, memory organization, I/O ports, hardware connection, interrupts, timers, watchdog timer, on-chip data converter module, Serial I/O. Introduction to dsPIC33F Family Digital Signal Controllers Introduction and overview, CPU, special MCU Features, data addressing overview, DSP engine, memory organization, interrupt and trap vectors, data address space, motor control PWM module. | 08 | CO3 |
| IV | Embedded System Embedded systems introduction and description, design considerations & requirements, processors technology, IC technology, Embedded processors for embedded systems, power sources, high performance architecture and execution. Hardware and Software Architecture. | 08 | CO4 |
| V | Concept of real time systems, data communication in embedded systems, real time operating systems (RTOS). Embedded System Case Studies: Digital Thermo meter, Smart cards, RF tags, Elevator. | 06 | CO5 |
| Total Hours | | 36 | |
| Essential Readings | | | |
| 1. M. A. Mazidi, J. G. Mazidi and R. D. Mckinlay others, "The 8051 Microcontroller and Embedded Systems", Prentice Hall, 2 nd Edition, 2005. | | | |
| 2. Ramesh Gaonkar, "Fundamental of microcontrollers and Applications in Embedded Systems", Thomson/Delmar Learning; 1 st Edition, 2007. | | | |
| 3. Frank Vahid and Tony Givargis, "Embedded System Design: A Unified Hardware/Software Approach". Wiley India, 2 nd Edition, 2001. | | | |
| Supplementary Readings | | | |
| 1. Ajay V Deshmukh, "Microcontrollers: Theory and Applications", Tata McGraw-Hill, 5 th Edition, 2011. | | | |
| 2. Richard H. Barnett, Larry O'Cull, Sarah Alison Cox, "Embedded C Programming and Microchip PIC", Cengage, 1 st Edition, 2003 | | | |
| 3. Raj Kamal, "Embedded systems: Architecture, Programming and Design", Tata McGraw-Hill, 2 nd Edition, 2008. | | | |
| 4. Muhammad Ali Mazidi, Rolin D. McKinley, Danny Causey, "PIC Microcontroller and Embedded Systems: Using Assembly and C for PIC18", Pearson Prentice Hall, 1 st Edition, 2008. | | | |
| 5. dsPIC manual: www.microchip.com | | | |