

| COURSE CODE | COURSE NAME | L-T-P-C | YEAR OF INTRODUCTION |
|---|---|----------------|-----------------------------|
| EC305 | Microprocessor & Microcontroller | 3-0-0-3 | 2016 |
| Prerequisite: EC207 Logic Circuit Design | | | |
| Course objectives: <ol style="list-style-type: none"> 1. To understand fundamental operating concepts of microprocessors and microcontrollers. 2. To communicate with various devices using controller. 3. To design a microcontroller based system with the help of the interfacing devices. 4. To program the controller to make various peripherals work for specified application. | | | |
| Syllabus: <p>Microprocessors: 8085 architecture and its operation, microprocessor initiated operations and bus organization, pin configuration and functions, generation of control signals for external operations- fetch, IO/M, read/write, machine cycles and bus timings. Addressing modes, instruction set, instruction classification. Overview/concept of peripheral IC interfacing with 8085 microprocessor (8251, 8253, 8255, 8279). Simple examples in assembly language programming for 8085 (only for internal examination). Introduction to development tools: IDE, cross assembler, builder, linker and debugger.(not required for exam). Introduction to 8086 and comparison between 8086, 80286, 80386, 80486 and Pentium.</p> <p>Microcontrollers: 8051- features, architecture, memory organization, registers, I/O ports, pin configuration and functions. Addressing modes, instruction set, instruction classification. Assembly language programming. Interrupts in 8051. Timer/Counter programming: Operating modes, time delay generation, Waveform generation. Serial communication: RS 232 interface, registers in UART, modes of operation, programming examples for serial data transmission and reception. Interfacing of DIP switch, stepper motor, ADC, DAC, LEDs and seven segment displays, alphanumeric LCD module with 8051.</p> | | | |
| Expected outcome: <p>The students will be able to:</p> <ol style="list-style-type: none"> 1. Distinguish various types of processor architectures. 2. Describe architectures, memory organization of 8085 microprocessor and 8051. 3. Develop programming skills in assembly for interfacing peripheral devices with 8051 | | | |
| Text Books: <ol style="list-style-type: none"> 1. Kenneth J. Ayala, The 8051 Microcontroller, Cengage learning, 3/e. 2. Lyla B.Das : Microprocessors and Microcontrollers, Pearson Education, India, 2011 3. Ramesh S. Goankar. 8085 Microprocessors Architecture Application and Programming. Penram International, 5/e. | | | |
| References: <ol style="list-style-type: none"> 1. Aditya P Mathur, Introduction to Microprocessor. Tata Mc Graw – Hill 2. Han Way Hung, “PIC Microcontroller, An introduction to software and hardware interfacing “, Cenage learning. 3. I.Scott Mackenzie, Raphel C.-W Phan, The 8051 microcontroller, 4th edition. 4. Muhammed Ali Mazidi, The 8051 Microcontroller and Embedded Systems, Pearson Education, 2nd edition 5. Nagoorkani, Microprocessors and Microcontrollers 2e, McGraw Hill Education India, 2012. 6. Soumitra Kumar Mandal. Microprocessors and Microcontrollers Architecture, Programming & Interfacing Using 8085, 8086 and 8051, McGraw Hill Education (2011). 7. | | | |

| Course Plan | | | |
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| Module | Course content | Hours | End Sem. Exam Marks |
| I | Microprocessors: Introduction, organization of a microprocessor based system, evolution of microprocessors, 8085 architecture and its operation, microprocessor initiated operations and bus organization, pin configuration and functions, generation of control signals for external operations-fetch, IO/M, read/write. | 5 | 15 |
| II | Machine cycles and bus timings, Addressing modes, instruction set instruction classification. | 4 | 15 |
| | Overview/concept of peripheral IC interfacing with 8085 microprocessor (8251, 8253, 8255, 8279). | 3 | |
| | Simple examples in assembly language programming for 8085 (only for internal examination) | 2 | 0 |
| | Introduction to development tools: IDE, cross assembler, builder, linker and debugger.(not required for exam) | 3 | |
| FIRST INTERNAL EXAM | | | |
| III | Introduction to 8086 and comparison between 8086,80286,80386,80486 and Pentium | 2 | 15 |
| | Microcontrollers: Introduction, comparison between microprocessors and microcontrollers, microcontroller families, 8051- features, architecture, memory organization, registers, I/O ports, pin configuration and functions. | 6 | |
| IV | Addressing modes, instruction set, instruction classification. | 2 | 15 |
| | Assembly language programming examples for 8051. | 3 | |
| SECOND INTERNAL EXAM | | | |
| V | Interrupts in 8051: Types, interrupt source, interrupt handling and programming | 2 | 20 |
| | Timer/Counter programming: Operating modes, time delay generation, Waveform generation. | 2 | |
| | Serial communication: RS 232 interface, registers in UART, modes of operation, programming examples for serial data transmission and reception | 2 | |
| VI | Interfacing: Interfacing (block schematic and assembly language programming) of DIP switch, stepper motor, ADC, DAC, LEDs and seven segment displays, alphanumeric LCD module with 8051. | 6 | 20 |
| END SEMESTER EXAM | | | |

Question Paper Pattern (End semester exam)

Max. Marks: 100

Time: 3 hours

The question paper shall consist of three parts. Part A covers modules I and II, Part B covers modules III and IV, and Part C covers modules V and VI. Each part has three questions uniformly covering the two modules and each question can have maximum four subdivisions. In each part, any two questions are to be answered. Mark patterns are as per the syllabus with 80 % for theory and 20% for logical/numerical problems and programming.