

Course No.	Course Name	L-T-P-Credits	Year of Introduction
IC206	MICROCONTROLLERS	3-0-0-3	2016
Prerequisite : Nil			
Course Objectives <ul style="list-style-type: none"> To learn the architecture of a microcontroller To learn the instruction set of a microcontroller To be able to program a microcontroller in assembly language To be able to program a microcontroller in a high level language To be able to interface memory with a microcontroller 			
Syllabus Architecture of an eight bit microcontroller- Instruction set the microcontroller- Programming the microcontroller in Assembly language and in a high level language -Interfacing memory and input/output devices to the microcontroller.			
Expected Outcome Students should be able to comprehend, design and implement a microcontroller based system complete both in hardware and software aspects for various purposes			
Text Books: <ol style="list-style-type: none"> Muhammed Ali Mazidi and Janice Gillispie Mazidi, The 8051 Microcontroller and Embedded Systems using Assembly and C, Pearson Education, 2e. Manish K. Patel, The 8051 based embedded systems, McGraw Hill Education (India), 2014. 			
References: <ol style="list-style-type: none"> Kenneth J Ayala, The 8051 Microcontroller, Cengage Learning, 3e Ramani Kalpathi and Ganesh Raja, Microcontrollers and Applications, Sanguine Technical Publishers, 2009 Raj Kamal, Microcontrollers Architecture, programming, interfacing and system design, Pearson, 2e. 			
Course Plan			
Module	Contents	Hours	Sem. Exam Marks
I	Evolution of microcontrollers-comparison with microprocessors- Classification of microcontrollers-state of the art-significance of embedded systems- Overview of Intel 8051 family of microcontrollers- Harvard and Von Neumann Architectures	3	15%
	Architecture of Intel 8051-ALU, internal RAM and ROM, Oscillator and Reset Circuits, basic timing diagram, Stack and stack pointer-Special Function Registers of 8051- Organization of ports	3	
II	Comparison of machine language, assembly language and high level languages, Assembler directives-Intel hex format-Addressing modes of 8051	2	15%
	Instruction set of 8051- Data transfer instructions, Arithmetic, logical, compare and rotate instructions- Bit processing instructions- Program flow control instructions	5	

FIRST INTERNAL EXAM			
III	Assembly language programming of 8051: Examples illustrating the use of all types of instructions. Programming the ports of 8051.	5	15%
	An introduction to programming 8051 in C language- Additional data types for 8051-illustrative examples of C programming for 8051	3	
IV	Timers of 8051: All modes of operations, programming the timers in assembly language and C language, timer as an event counter, frequency measurement using timers, pulse width measurement using timers.	3	15%
	Serial Communication with 8051: Introduction to serial communication, synchronous and asynchronous communication, RS232 protocol, all modes of operations including multiprocessor mode. Serial communication programming in assembly language and C language	4	
SECOND INTERNAL EXAM			
V	Interrupt system of 8051: introduction to interrupts- comparing polling scheme with interrupt system- interrupts in 8051-priority of interrupts- Interrupt handling and execution for timer, external and serial interrupts. Programming to handle all types of interrupts in assembly language and C language.	4	20%
	Interfacing external memory to Intel 8051: Introduction to various types of memory-memory mapping and address decoding-Examples of Interfacing data memory and code memory	3	
VI	Interfacing input and output devices: Interfacing LCD to 8051- Interfacing matrix keyboard-Interfacing ADC and DAC- Interfacing sensors- Interfacing relays, stepper motors and DC motors. An introduction to I ² C protocol	7	20%
END SEMESTER EXAM			

QUESTION PAPER PATTERN:

Maximum Marks: 100

Exam Duration: 3 Hours

There shall be three parts for the question paper.

Part A includes Modules 1 & 2 and shall have three questions of fifteen marks out of which two are to be answered. There shall be subdivisions, limited to a maximum of 4, in each question.

Part B includes Modules 3 & 4 and shall have three questions of fifteen marks out of which two are to be answered. There shall be subdivisions, limited to a maximum of 4, in each question.

Part C includes Modules 5 & 6 and shall have three questions of twenty marks out of which two are to be answered. There shall be subdivisions, limited to a maximum of 4, in each question.

Note: Each part shall have questions uniformly covering both the modules in it.