Course code	Course Name	L-T-P - Credits	Year of Introduction
CS305	Microprocessors and Microcontrollers	2-1-0-3	2016

Prerequisite: CS202 Computer Organisation and Architecture

Course Objectives
- To impart basic understanding of the internal organisation of 8086 Microprocessor and 8051 microcontroller.
- To introduce the concepts of interfacing microprocessors with external devices.
- To develop Assembly language programming skills.

Syllabus

Introduction to 8086 Microprocessor; Architecture and signals, Instruction set of 8086, Timing Diagram, Assembly Language Programming, Memory and I/O interfacing, Interfacing with 8255, 8279, 8257, Interrupts and Interrupt handling, Microcontrollers - 8051 Architecture and its salient features, Instruction Set and Simple Programming Concepts.

Expected Outcome

The Students will be able to
  i. Describe different modes of operations of a typical microprocessor and microcontroller.
  ii. Design and develop 8086 assembly language programs using software interrupts and various assembler directives.
  iii. Interface microprocessors with various external devices.
  iv. Analyze and compare the features of microprocessors and microcontrollers.
  v. Design and develop assembly language programs using 8051 microcontroller.

Text Books
1. Bhurchandi and Ray, *Advanced Microprocessors and Peripherals*, Third Edition McGraw Hill, 2012
2. Raj Kamal, *Microcontrollers: Architecture, Programming, Interfacing and System Design*, Pearson Education, 2011.
3. Douglas V. Hall, SSSP Rao, *Microprocessors and Interfacing*, Third Edition, McGrawHill Education, 2012.

References
1. Barry B. Brey, *The Intel Microprocessors – Architecture, Programming and Interfacing*, Eigth Edition, Pearson Education, 2015
2. A. NagoorKani, *Microprocessors and Microcontrollers*, Second Edition, Tata McGraw Hill, 2012.

<div align="center">Course Plan</div>

Module	Contents	Hours	End Sem. Exam Marks
I	Evolution of microprocessors, 8086 Microprocessor - Architecture and signals, Memory organisation, Minimum and maximum mode of operation, Minimum mode Timing Diagram. Comparison of 8086 and 8088.	07	15%
II	8086 Addressing Modes, 8086 Instruction set and Assembler Directives - Assembly Language Programming with Subroutines, Macros, Passing Parameters, Use of stack.	08	15%

	FIRST INTERNAL EXAM		
III	Interrupts - Types of Interrupts and Interrupt Service Routine. Handling Interrupts in 8086, Interrupt programming. Basic Peripherals and their Interfacing with 8086 - Programmable Interrupt Controller - 8259 - Architecture.	07	15%
IV	Interfacing Memory, I/O, 8255 - Detailed study - Architecture, Control word format and modes of operation, Architecture and modes of operation of 8279 and 8257 (Just mention the control word, no need to memorize the control word format)	07	15%
	SECOND INTERNAL EXAM		
V	Microcontrollers - Types of Microcontrollers - Criteria for selecting a microcontroller - Example Applications. Characteristics and Resources of a microcontroller. Organization and design of these resources in a typical microcontroller - 8051. 8051 Architecture, Register Organization, Memory and I/O addressing, Interrupts and Stack.	08	20%
VI	8051 Addressing Modes, Different types of instructions and Instruction Set, Simple programs. Peripheral Chips for timing control - 8254/8253.	08	20%
	END SEMESTER EXAM		

Question Paper Pattern

1. There will be *five* parts in the question paper – A, B, C, D, E
2. Part A
   a. Total marks : 12
   b. *Four* questions each having *3* marks, uniformly covering modules I and II; All*four* questions have to be answered.
3. Part B
   a. Total marks : 18
   b. *Three*questions each having *9* marks, uniformly covering modules I and II; T*wo* questions have to be answered. Each question can have a maximum of three subparts.
4. Part C
   a. Total marks : 12
   b. *Four* questions each having *3* marks, uniformly covering modules III and IV;All*four* questions have to be answered.
5. Part D
   a. Total marks : 18
   b. *Three*questionseach having *9* marks, uniformly covering modules III and IV; *Two* questions have to be answered. Each question can have a maximum of three subparts
6. Part E
   a. Total Marks: 40
   b. *Six* questions each carrying 10 marks, uniformly covering modules V and VI; *four* questions have to be answered.
   c. A question can have a maximum of three sub-parts.
7. There should be at least 60% analytical/numerical questions.