COURSE HANDOUT

B.Tech- 4th Semester

SYLLABUS

Course Title : Microprocessors & Interfacing **Date:** 13-11-2017

Course Code : 16EC410 **Academic Year:** 2017-18

Course Structure : 3-1-0-4

Course coordinator : P.Ravikumar

Instructor(s) : P.Ravikumar, P.Kalyan chakravarthy, BMS Srinivasa Rao

Course Description: This course includes 8086 Microprocessor Architecture, modes of operations, instruction set, Addressing modes, Assembler directives, Semiconductor Memory interfacing, Interfacing to various peripherals like 8255 PPI, 8257 DMA controller, PIC 8259A and 8251 USART. This course also includes Assembly language programming using Directives.

Course objectives:

Students undergoing this course are expected to:

1. Familiarize with the architecture of 8086 processor, assembling language programming and interfacing with various modules.
2. Learn to Interface various I/O peripherals like ADC, DAC, Keyboard, stepper motor etc., with microprocessors using 8255 PPI.
3. Do any type of industrial and real time applications by knowing the concepts of Microprocessors.
4. Understand 8251-USARTand serial communication concepts.

Text Books:

1. A. K. Ray and Bhurchandi, " Advanced Microprocessors", Tata McGraw-Hill 2nd edition 2007.
2. D.V.Hall, "Microprocessor and Interfacing ", Tata McGraw-Hill.

Reference Books :

1. Liu and GA Gibson,Microcomputer system 8086/8088 family architecture, programming and design PHI second edition.

SYLLABUS:

UNIT- I

8086 Architecture:

8086-Functional Diagram, Register Organization, Signal description, Physical Memory Organization, Minimum and Maximum mode operations of 8086, Timing Diagrams.

The architecture of 8088 processor and the difference between 8088 and 8086 microprocessors

9+3 Hours

UNIT- II

Instruction Set of 8086:

Addressing modes, Data Transfer Instructions, Arithmetic Instructions, Bit Manipulation Instructions, Branch Instructions, Processor Control Instructions and String Instructions, Assembler Directives, Procedures and macros, Assembly Language Programming Examples

Stack structure of 8086 microprocessor **12+4 Hours**

Unit III

Programmable devices and Interfacing of I/O with 8086:

Semiconductor Memory Interfacing, 8255 PPI-Various modes of operations, Stepper Motor interfacing, D/A and A/D Conversions, DMA Controller 8257.

Interfacing I/O Ports **12+4 Hours**

Unit IV

8086 Interrupts and Serial Communication:

8086 interrupts and Interrupt Vector Table (IVT), Programmable Interrupt Controller 8259A, Serial data transfer schemes. Asynchronous and Synchronous data transfer schemes, Programmable Communication Interface 8251 USART, TTL to RS 232C and RS232C to TTL conversion, Sample program of serial data transfer.

The keyboard/ Display controller 8279 **12+4 Hours**

Total: 45+ 15 Hours

Course Outcomes:

After undergoing the course, students will be able to:

1. Illustrate the internal working of a typical simple CPU including the utilization of the various hardware resources during the execution of instructions.

2. Implement memory chip and I/O chip interfacing to the 8086 microprocessor.

3. Interpret the architecture of 8086 processor, assembly language programming and interfacing with various modules.

4. Choose various I/O peripheral interfacing like ADC, DAC, Keyboard, stepper motor etc., with microprocessors using 8255 PPI.

5. Interface the 8086 interrupts and serial communication devices.

6. Use the concepts of microprocessors in real time and industrial applications.

Course Plan:

Lecture No.	Learning objectives	Topic(s) to be covered	Chapter in the textbook/reference
		UNIT-I	
1	To learn about 8086 microprocessor	**8086 Architecture:** 8086-Functional Diagram	C1,T1
2	To understand the internal registers	Register Organization	C1,T1
3	To know the description of common signals for minimum and maximum mode	Signal description (common signals for minimum and maximum)	C1,T1
4		Tutorial 1	
5	To know the description of special signals for minimum and maximum mode	Signal description (special signals for minimum and maximum mode)	C1,T1
6	To know the organization of physical memory	Physical Memory Organization	C1,T1
7	To understand the operation of 8086 minimum mode system	Minimum mode operation of 8086	C1,T1
8		Tutorial 2	
9	To understand the operation of 8086 maximum mode system	Maximum mode operation of 8086	C1,T1
10	To know the behavior of minimum mode system	Timing Diagrams for minimum mode system	C1,T1

	using timing diagrams		
11	To know the behavior of maximum mode system using timing diagrams	Timing Diagrams for maximum mode system	C1,T1
12	Tutorial 3		
UNIT-II			
13	To understand the way of accessing memory	**Instruction Set of 8086:** Addressing modes	C2,T1
14	To know about data transfer instructions	Data Transfer Instructions	C2,T1
15	To know about Arithmetic instructions	Arithmetic Instructions	C2,T1
16	Tutorial 4		
17	To know about bit manipulation instructions	Bit Manipulation Instructions	C2,T1
18	To know about Branch instructions	Branch Instructions	C2,T1
19	To know about Processor control instructions	Processor Control Instructions	C2,T1
20	Tutorial 5		
21	To know about String instructions	String Instructions	C2,T1
22	To know the Assembler directives	Assembler Directives	C2,T1
23	To know the Assembler directives	Assembler Directives	C2,T1
24	Tutorial 6		
25	To know the passing parameters into procedures	Procedures	C4,T1
26	To know the concept of Macros	Macros	C4,T1
27	To write the Assembly Language Program	Assembly Language Programming Examples	C3,T1
28	Tutorial 7		
UNIT-III			
29	Understanding about different semiconductor memories and their interfacing with 8086	**Programmable devices and Interfacing of I/O with 8086:** Semiconductor Memory Interfacing	C5,T1
30	Understanding about different semiconductor	Semiconductor Memory Interfacing	C5,T1

	memories and their interfacing with 8086		
31	To understand the internal block diagram of 8255, format of CWR register	8255 PPI Architecture	C5,T1
32	To know about operation of mode-0	8255 PPI- mode-0 operations	C5,T1
33	Tutorial 8		
34	To know about operation of mode-1	8255 PPI- mode-1 operations	C5,T1
35	To know about operation of mode-2	8255 PPI- mode-2 operations	C5,T1
36	Tutorial 9		
37	To understand the interfacing with stepper motor	Stepper Motor interfacing	C5,T1
38	To know the interfacing of D/A converter	D/A converter Interfacing	C5,T1
39	To know the interfacing of A/D converter	A/D converter Interfacing	C5,T1
40	Tutorial 10		
41	To identify the need for DMA and to know the block diagram of 8257 DMA controller	DMA Controller 8257 Architecture	C7,T1
42	To know the internal architecture of 8257 DMA controller and their registers	DMA Controller 8257 Architecture	C7,T1
43	To know the interfacing of 8257 DMA controller	DMA Controller 8257 Interfacing	C7,T1
44	Tutorial 11		
UNIT-IV			
45	To know different interrupt types available in 8086 and Interrupt Vector Table (IVT)	**8086 Interrupts and Serial Communication:** 8086 interrupts and Interrupt Vector Table (IVT)	C6,T1
46	To know different interrupt types available in 8086 and Interrupt Vector Table (IVT)	8086 interrupts and Interrupt Vector Table (IVT)	C6,T1
47	To know the architecture of 8259 programmable interrupt controller	Programmable Interrupt Controller 8259A architecture	C6,T1
48	Tutorial 12		

49	To know the format of ICWs and OCWs	Programmable Interrupt Controller 8259A command words	C6,T1
50	To know the basic idea of serial data transfer schemes	Serial data transfer schemes	C6,T1
51	To know the formats of Asynchronous and Synchronous data transfer schemes	Asynchronous and Synchronous data transfer schemes	C6,T1
52	Tutorial 13		
53	To know the block diagram of Programmable communication interface 8251	Programmable Communication Interface 8251 USART Architecture	C6,T1
54	To know the interfacing of 8251 USART	8251 USART Interfacing	C6,T1
55	To understand the conversion of TTL to RS232C	TTL to RS 232C conversion	C11,T2
56	Tutorial 14		
57	To understand the conversion of RS232C to TTL	RS232C to TTL conversion	C11,T2
58	To know the interfacing program for transmitting the serial data	Sample program of serial data transfer.	C6,T1
59	To know the interfacing program for receiving the serial data	Sample program of serial data transfer.	C6,T1
60	Tutorial 15		

Evaluation scheme:

Component	Duration (minutes)	Marks	% of weightage	Date & Time	Venue
Internal Test – 1	90	40	30 (80 % of marks secured in 1st best internal tests and 20% marks secured in 2nd best internal test)	29.1.2018 to 03.02.2018 3 to 04.30 PM	Block-5
Internal Test – 2	90	40		26.03.2018 to 31.03.2018 9 to 10.30 AM	Block-5
Comprehensive Test	60	20	10	09.04.2018 to 14.04.2018	Block-5
Semester end exam	180	60	60	23.04.2017 to 05.05.2018	Will be informed

Chamber Consultation Hour: 4 PM to 5PM

Venue: Ground Floor staff room (Block-6)

Notices: All notices regarding the course will be put in departmental notice board

Signature of the Instructors **Signature of the course-coordinator**