University of Mumbai			
CLASS: T.E. (Electronics Engineering)		**Semester - V**	
SUBJECT: Microprocessors & Microcontrollers - I			
Periods per week (each of 60 min.)	Lecture	4	
	Practical	2	
	Tutorial	-	
		Hours	Marks
Evaluation System	Theory Examination	3	100
	Practical examination	3	25
	Oral Examination	-	-
	Term Work	-	25
	Total		150

Objective	Objective of this course is to introduce to the students the fundamentals of microprocessor and microcontroller. -	
Pre-requisite	Concept of Basic Electronics and Digital Logic Systems -	
Module	**Contents**	**Hours**
1	Basics of 8085: • Basic 8085 microprocessor architecture and its functional blocks, • 8085 microprocessor IC pin outs and signals, address, data and control buses, • 8085 features • Interrupt system of 8085 • Stack and subroutine • Types of memory and memory interfacing • Decoding techniques – absolute and partial • Mapping techniques – I / O mapped I / O and memory mapped I / O • Serial I/O lines of 8085 and the implementation asynchronous serial data communication using SOD and SID	**8**
2	Programming with 8085: • Basic instruction set, • Timing states, machine cycles and	**9**

	instruction cycles • Instruction Timing diagram and , interrupt process and timing diagram of interrupt instruction execution, • Writing assembly language programs, • Looping, counting and indexing operations related programs • Stacks and subroutines operations related programs • Conditional call and return instructions operations related programs • Debugging programs.	
3	Study and Interfacing of peripherals 8155, 8255, 8253/8254, 8259 with 8085	**06**
4	Basics of 8051: • Comparison of microprocessor and microcontroller, • Architecture and pin functions of 8051 chip controller, • CPU timing and machine cycles, • Internal memory organization, • Program counter and stack, • Input/output ports, • Counters and timers, • Serial data input and output • Interrupts. • Power saving modes	**08**
5	Programming with 8051: i. Instruction set, addressing modes, ii. immediate, registers, direct and indirect data movement and exchange instructions, iii. push and pop op-codes, iv. arithmetic and logic instructions, v. bit level operations, vi. jump and call instructions, vii. input/ output port programming, viii. programming timers, ix. asynchronous serial data communications, and x. hardware interrupt service routines.	**9**

	Interfacing of LCD display, hex keyboard, ADC0808, DAC0808 and Stepper motor with 8051 Current trends in microprocessors and practical implementation	
6	**Introduction to ARM Processor** 1. ARM family architecture, 2. Register architecture, 3. Memory Access and addressing modes, 4. Arithmetic and Logical Instructions, 5. Branching Instructions Comparative study of salient features of 8051 and its derivatives like 89C51, 89C52, 89C2051 AND 89C2052. Current processor and controller survey. (cost, availability, popularity)	**8**

Recommended Books:

1. Mazidi & Mazidi, The 8085 Microcontroller & Embedded system, using Assembly and C, 2nd edi, Pearson edu.
2. Microprocessors and Interfacing 8085, Douglas V Hall, Tata Mc Gram Hill
3. Microprocessor-Architecture, programming and application with 8085, Gaonkar, Penram International.
4. Crisp, Introduction To Microprocessors & Microcontrollers, 2e, Elsevier, 2007
5. ARM system-on-chip architecture, 2e, Pearson education,
6. Calcut,8051 Microcontrollers:An Applications Based Introduction, Elsevier
7. DV Kodavade, S Narvadkar, 8085-86 Microprocessors Architecture Progg and Interfaces, Wiley
8. Udayashankara V, Mallikarjunaswamy, 8051 Microcontroller, TMH
9. Han-Way Huang, Using The MCS-51 Microcontroller, Oxford University Press.
10. Ayala, 8051 Microcontroller , Cengage (Thomson)
11. Rout, 8085 Microprocessor, Cengage (Thomson)
12. The 8085 Microcontroller-Architecture, programming and application, 2nd edi, Penram International.

Suggested Practical list

8085 Based (Max 02)

01) Addition and subtraction of two 8-bit numbers with programs based on different addressing modes of 8085A.
02) Addition and subtraction of two 16-bit numbers. (Using 2's complement method, also programs which access numbers from specified memory locations.)
03) Addition and subtraction of two 16-bit BCD numbers. (Using DAA instruction.)
04) Multiplication of two 8-bit numbers using the method of successive addition and Shift & add.
05) Division of two 8-bit numbers using the method of successive subtraction and shift & subtract.
06) Block transfer and block exchange of data bytes.
07) Finding the smallest and largest element in a block of data.
08) Arranging the elements of a block of data in ascending and descending order.
09) Converting 2 digit numbers to their equivalents.
    a) BCD to HEX and b) HEX to BCD
10) Generating delays of different time intervals using delay subroutines and measurement of delay period on CRO using SOD pin of 8085A.
11) Generation of Fibonacci Series.

Application Based (Max 2)

01) Program controlled data transfer using 8255 PPI.
    A) To INPUT data bytes from peripheral port and to store them in memory.
    B) To OUTPUT data bytes from memory to peripheral port.
02) Study of interrupts by enabling them in main line program and then executing different subroutines when TRAP, RST 7.5, RST 6.5 & RST 5.5 are activated.
03) Interfacing 7 segment LED display using 8255A – in static and dynamic mode.
04) Interfacing ADC 0808/0809.
05) Interfacing DAC 0808.
06) Interfacing stepper motor with microprocessor using 8255A – in Half and Full excitation.
07) Interfacing a Centronics type printer.
08) Interfacing of Thumbwheel switches.
09) Interfacing of 8253 / 8254.

8051 experiments (Max 2)

1. Arithmetic operations
2. Packing and unpacking
3. Ascending and descending
4. 8051 timer based experiment

5. Transmission of character using RS 232 to PC(preferably on bread board)
6. 16 * 2 LCD and Hex keyboard interface (preferably on bread board)
7. ADC or DAC interface (any application) (preferably on bread board)

On latest: Students can be perform on Proteus VSM Plateform (Min 4)

To design and test circuits on

1. LED blinking,
2. 7segments display,
3. 16x2 multiple character LCD,
4. Run stepper motor/ DC motor,
5. Implement square wave,
6. Temperature display using
7. Demonstration of traffic lights,
8. Speed control of motor,

Using ARM Processor.

Note: The above list of experiment can be done by using Proteus Vsm software

Practical/ Oral Examination:

Practical Examination will be based on experiments performed from the list of experiment given in the syllabus and the evaluation based on the same experiment.

Oral will be based on any experiment performed from the list of experiment given in the syllabus and the entire syllabus.

Term work:

Term work shall consist of minimum ten experiments and a written test.

The distribution of marks for term work shall be as follows:

Laboratory work (Experiments and Journal) : 10 marks.
Test (at least one) : 10 marks.
Attendance (Practical and Theory) : 05 marks.

The final certification and acceptance of term-work ensures the satisfactory performance of laboratory work and minimum passing in the term-work.

Theory Examination:

1. Question paper will be comprise of total 7 questions, each of 20 marks.
2. Only 5 questions need to be solved.
3. Question number 1 will be compulsory and will cover all modules.
4. Remaining questions will be from same module or mixed in nature. (e.g.- suppose Q.2 has part (a) from, module 3 then part (b) will be from any module other than module 3.)
5. In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.
6. No question should be asked from pre-requisite module.