INSTITUTE OF AERONAUTICAL ENGINEERING



Dundigal, Hyderabad - 500 043

ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE DESCRIPTION FORM

Course Title	:	Microprocessors an	Microprocessors and Microcontrollers								
Course Code	:	A60430 (R15)	A60430 (R15)								
Academic Year	:	2017 - 2018	2017 - <mark>2</mark> 018								
Branch	:	III - B. Tech II Sen	- B. Tech II Sem (ECE)								
Course Structure		Lectures	Tutorial	Practic als	Credits						
Course Structure	•	4	-	-	4						
Course Coordinator	:	Mrs C Deepthi, As	sociate Professor, ECE								
Course Faculty	:	Mr. N Paparao , As Mr. S Lakshmanac Mr. M Lakshmi Ra	s <mark>si</mark> sta <mark>nt Professor , ECE</mark> hari, Assistant Professo wi Teja, Assist <mark>ant Prof</mark> e	r, ECE ssor, ECE							

I. Course overview

Microprocessor and Microcontrollers course is intended to introduce the architecture, programming of microprocessors, microcontrollers and interfacing various hardware circuits to microprocessors and microcontrollers. The topics covered are architecture, addressing modes, instruction set of 8086 and 8051, minimum and maximum mode operation of 8086, Assembly language programming fundamentals, interfacing of static Ram, EPROM, DMA Controller, keyboard, display, 8279, stepper motor, A/D and D/A converter, 8259 interrupt controller, data transmission, 8251 USART, modes of timer operation of 8051, programming of Real time control by using basic microcontroller.

Understand need of microprocessors, microcontrollers in development of various projects and to know complete architectural, programming, interfacing details of 8086 microprocessor-8051 microcontroller.

II. **Prerequisite**(s)

Level	Credits	Periods / Week	Prerequisites
UG	4	6	Digital and switching circuits, Computer Organization

III. Marks Distribution

Sessional Marks	University	Total marks
	End Exam	
	marks	
Mid Semester Test		
There shall be 2 midterm examinations.		
Each midterm examination consists of subjective type and Objective		
type tests.	75	100
The subjective test is for 10 marks, with duration of 1 hour.		
Subjective test of each midterm exam shall contain 4 questions. The		
student has to answer 2 questions, each carrying 5 marks.		

The objective type test is for 10 marks with duration of	
20minutes. It consists of 10 Multiple choice and 10 objective type	
questions. The student has to answer all the questions and each carries	
half mark.	
First midterm examination shall be conducted for the first 21/2 units of	
syllabus and second midterm examination shall be conducted for the	
remaining 2 ¹ / ₂ units.	
Five marks are earmarked for assignments. There shall be two	
assignments in every theory course. Marks shall be awarded	
considering the average of two assignments in each course reason	
whatsoever, will get zero marks(s).	

IV. Evaluation Scheme

S.No	Component	Duration (Hrs)	Marks
1	I Mid Examination	1hr 20 min	20
2	I Assignment		5
3	II Mid Examination	1hr 20min	20
4	II Assignment		5
5	End Semester Examination	3hr	75

V. Course Educational Objectives At the end of the course, the students will be able to:

- I. Develop an in-depth understanding of the operation of microprocessors.
- II. Understand the assembly language programming using concepts like assembler directives, procedures, macros, and software interrupts etc.
- III. Create an exposure to basic peripherals, its programming and interfacing techniques
- IV. Understand the concept of Interrupts and their significance in 8086.
- V. Understand the basic concepts of serial communication in 8086.
- VI. Provide the basic concepts of programming in 8051 and understand the concept of Interrupts and their significance in 8051

VI. Course Outcomes

After completing this course the student must demonstrate the knowledge and ability to:

- 1. Understand the internal Architecture and different modes of operation of popular 8086 microprocessors.
- 2. Understand the importance of addressing modes and the instruction set of the processor which is used for programming.
- 3. Analyze the assembly language programming using 8086
- 4. Design the I/O interfacing with 8086 microprocessor with 8255
- 5. Understand the memory organization and interrupts of processors/ micro-controllers helps in various system designing aspects.
- 6. Identify the significance of serial communication in 8086.
- 7. Analyze the architecture internal architecture of 8051 microcontroller
- 8. Identify the significance of interrupts / serial communication, real time functionality in 8051 with programming.

VII. How Course Outcomes are assessed

S. No	Program Outcome	Level	Proficiency assessed by
PO 1	Engineering Knowledge Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems	Н	Lectures and Problem solving
PO 2	Problem Analysis Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural	Н	Design Exercises and Assignments
PO 3	Design/Development of Solutions Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations	н	Development of Mini Projects
PO 4	Conduct Investigations of Complex Problems Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions	н	Lab sessions, Assignments
PO 5	Modern Tool Usage Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations	S	Lectures and Lab sessions
PO 6	The Engineer And Society Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice	S	Oral discussions
PO 7	Environment and sustainability Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development	N	õ-
PO 8	Ethics Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice	N	÷
PO 9	Individual and Team Work Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings	S	Group discussions
PO 10	Communication Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give	N	
PO 11	Project management and finance Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments	S	Discussions
PO 12	Life-long learning Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change	S	Development of Mini Projects

VIII HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

	Program Specific Outcomes	Level	Proficiency
			Assessed By
PSO 1	Professional Skills: An ability to understand the basic concepts in Electronics & Communication Engineering and to apply them to various areas, like Electronics, Communications, Signal processing, VLSI, Embedded systems etc., in the design and implementation of complex systems.	Н	Lectures and Assignments
PSO 2	Problem-solving Skills: An ability to solve complex Electronics and communication Engineering problems, using latest hardware and software tools, along with analytical skills to arrive cost effective and appropriate solutions.	S	Tutorials
PSO 3	Successful career and Entrepreneurship: An understanding of social-awareness & environmental-wisdom along with ethical responsibility to have a successful career and to sustain passion and zeal for real-world applications using optimal resources as an Entrepreneur.	S	Seminars and Projects

N - None

S - Supportive

H – Highly Related

IX SYLLABUS:

Unit-I

8086 Architecture: 8086 architecture- functional diagram, Register organization, memory segmentation, programming model, Memory addresses, physical memory organization, architecture of 8086, Signal descriptions of 8086-common function signals, timing diagrams, Interrupts of 8086.

UNIT-II

Instruction set and assembly language programming of 8086: Instruction formats. Addressing modes, instruction set, assembler directives. Macros, Simple programs involving logical, branch and call instructions. Sorting, evaluating arithmetic expressions, string manipulations.

UNIT-III

I/O Interface: 8255 PPI, various modes of operation and interfacing to 8086, interfacing of key board, display, D/A &A/D converter.

Interfacing With advanced devices: Memory interfacing to 8086, Interrupt structure of 8086, Vector interrupt table, Interrupt service routine.

Communication Interface: Serial communication standards, serial data transfer schemes, 8251 USART architecture and Interfacing.

UNIT-IV

Introduction to microcontrollers: overview of 8051 microcontroller, Architecture, I/O ports, Memory organization, addressing modes and instruction set of 8051, Simple programs.

UNIT-V

8051 Real Time Control: Programming Timer interrupts, programming external hardware interrupts, Programming the serial communication interrupts, Programming 8051 timers and counters.

TEXT BOOKS:

- 1. D.V.Hall, Microprocessors and Interfacing. TMGH, 2nd edition 2006.
- 2. Kenneth.J.Ayala. The 8051 microcontroller, 3rd edition, Cengage learning, 2010
- 3. Advanced microprocessors and peripherals-A.K ray and K.M.Bhurchandani, TMH, 2nd edition 2006.

REFERENCES:

- 1. The 8051 **microcontrollers**, architecture and programming and applications-K.Uma Rao, Andhe Pallavi., Pearson, 2009.
- Micro computer system 8086/8088 family architecture, programming and design- By Liu and GA Gibson, PHI, 2nd Ed.,
- 3. Microcontrollers and application, Ajay.V.Deshmukh,TMGH,2005
- 4. The 8085
interfacing-microprocessor:
K.UdayArchitecture,
Kumar, B.S.Umashankar,2008,Pearson
- 5. Microprocessors and microcontrollers-S.V.Altaf

X. Course Plan

At the end of the course, the students are able to achieve the following course learning outcomes (CLO):

Lecture Number	Course Learning Objective	Topics to be covered	Reference Number
1	Describe the basic architecture 8085 microprocessor	Introduction of MPMC	R5:2.1
2	Describe the basic architecture 8085 microprocessor	Over view of 8085	R5:2.1
3-4	Describe the basic architecture of 8086	Architecture of 8086, Functional diagram	T3:1.2
5-6	List out the register organization	Register organization of 8086, flag register structure	T3:1.1,1.2. 2
7-8	Discuss the segmentation and programming model	Memory segmentation, memory address and physical memory	T3:1.4
9-12	Explain and interpret the fetch-decode-execute cycle and timing diagrams.	Pin diagram of 8086,Maximum and minimum mode of operations in 8086, timing diagrams	T3:1.3,1.8, 1.9
13	Identify instruction formats	Instruction format.	T3:2.1
14-15	Discuss & use addressing modes	Addressing modes of 8086	T3:2.2
16-18	Discuss & use the instruction set.	Instruction set of 8086.	T3:2.3
19	Explain macros, micros. Identify assembler directives.	Assembler directives, procedures, and macros.	T3:2.4T1:5 .1-5.20
20-21	Describe programs involving logical, branch and call instructions	Simple programs involving logical, branch and call instructions.	T3:2.4T1:5 .1-5.20
22-24	DescribeSorting,evaluatingarithmeticexpressions,stringmanipulations	Sorting, evaluating arithmetic expressions, string manipulations	T3:2.4T1:5 .1-5.20
25-26	Explain how data can be transferred between different elements of a microprocessor-based system.	8255 architecture, operation and use, interfacing 8255 to 8086.	T3:5.4

27	7-28	Analyze the modes of operations	8255 PPI – various modes of	T3:5.5
29	9-30	Explain how peripherals can be interfaced tomicroprocessor-	Interfacing Keyboard,Displays, Stepper Motor interfacing to	T1:9.19T3: 5.8
	31	Describe the principles and operations of analogue-to- digital and digital-to analogue	D/A and A/D converter and interfacing to 8086.	T3:5.7,5.6
32	2-33	Construct memory map and describe different types of memory.	Memory interfacing to 8086 (Static RAM & EPROM), memory decoding.	T3:5.1
34	4-36	Explain and describe 8086 interrupts, Illustrate service routines	Interrupt structure of 8086, vector interrupt table, Interrupt service routines, and interrupt types.	T1-8.1, T1- 8.7
37	7-39	Describe & use of the serial communication standards.	Serial data transfer schemes and standards, Asynchronous and Synchronous data transfer schemes RS-232	T3:6.4.3 T1:14.9,14 .48
40	0-41	Explain & describe the architecture of the 8251.	8251 USART architecture and interfacing to 8086	T3:6.4,6.4 4
42	2-44	Differentiate between a microprocessor and microcontroller, explain the architecture of 8051.	See the differences between microprocessors and microcontrollers, Architecture of 8051 microcontroller, Pin diagram of 8051	T2:3.1
45	5-46	Describe register	Register organization and	T2:3.1
4	47	Use and describe input/output ports	I/O ports in 8051 and operation of each port	T2:3.2
48	8-49	Describe different types of memory.	Memory organization of 8051	T2:3.3
	50	Discuss the addressing modes	Addressing modes in 8051 with examples	T2:5.1
51	1-53	Discuss the instruction set.	Instruction set of 8051 with different addressing modes.	T2:6.1 to 6.6,7.1 to 7.6, 8.1 -8.3
54	4-55	Develop assembly code for 8051 based operations	Simple programs related to 8051.	T2:6.1 to 6.6,7.1 to
56	6-58	Discuss the 8051 use in real time control and illustrate interrupts	8051 Real time control, Interrupts used in 8051	T2:3.6
59	9-61	Discuss and illustrate the Timers/counters, serial communication	Counters and timers used in 8051and operation, UART operation in 8051	T2:3.4
62	2-63	Develop assembly code for real time control.	Programming the external hard ware interrupts, serial communication interrupts,	T2:3.6,3.4 R5:24.5- 24.7
64	4-65	Explain timers, & interrupts	timers and counters	T2:3.6,3.4 R5:24.5- 24.7

X: MAPPING COURSE OBJECTIVES LEADING TO THE ACHIEVEMENT OF THE PROGRAM

Cours															
Objectives													C)utcome	s
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO	PSO	PSO
Ι	Н		Η		Н						S	S	Н	Н	Н
II	S	S	Н		S									S	S
III	S			S	S									S	
IV	S		S												Н
V	S	Н			Н							S		Н	
VI	H			Н	S						S	S	Н	Н	S
	S = Supportive								Highly	Related	1				

XI: MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF THE PROGRAM OUTCOMES:

Course	Program Out Comes											Program Specific Outcomes			
Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Ι	Н	S	S									S	S	Н	Н
II	Н	S	S												S
III	S	S		S	Н					S		S	S	S	
IV	Н		S	S									Н		S
V	S	Н	S									S		Н	Н
VI	S		S	S						S		S	S		S
VII	S	Н	S		Н					S					
VIII	S	S			Н							Н	S	Н	Н

S = Supportive **H** = Highly Related

Prepared By: Mrs. C Deepthi, Mr. N Paparao, Mr. S Lakshmanachari, Mr. M Lakshmi Ravi TejaDate: 10th December, 2017

HOD, Electronics and Communication Engineering

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