INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad -500 043

ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE DESCRIPTOR

Course Title	**MICROPROCESSORS AND MICROCONTROLLERS LAB**				
Course Code	AEC108				
Programme	B.Tech				
Semester	VI	ECE			
Course Type	Core				
Regulation	IARE - R16				
Course Structure	**Theory**			**Practical**	
	Lectures	**Tutorials**	**Credits**	**Laboratory**	**Credits**
	-	-	-	3	2
Chief Coordinator	Mr. Mohd.Khadir, Assistant Professor				
Course Faculty	Mr. V R Seshagiri Rao, Associate Professor Mr. B Naresh, Assistant Professor Mr. A Krthik, Assistant Professor Mr. B Santhosh Kumar, Assistant Professor				

I. COURSE OVERVIEW:

This laboratory course builds on the lecture course "Microprocessors and Microcontrollers" which is mandatory for all students of electronics and communication engineering. The course aims at practical experience with the characteristics and theoretical principles of linear and non linear devices and pulse circuits.

II. COURSE PRE-REQUISITES:

Level	Course Code	Semester	Prerequisites	Credits
UG	AEC002	III	Digital System Design	3

III. MARKS DISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Microprocessors and Microcontrollers Laboratory	70 Marks	30 Marks	100

IV. DELIVERY / INSTRUCTIONAL METHODOLOGIES:

✘	Chalk & Talk	✘	Quiz	✘	Assignments	✘	MOOCs
✔	LCD / PPT	✘	Seminars	✘	Mini Project	✔	Videos
✔	Open Ended Experiments						

V. EVALUATION METHODOLOGY:

Each laboratory will be evaluated for a total of 100 marks consisting of 30 marks for internal assessment and 70 marks for semester end lab examination. Out of 30 marks of internal assessment, continuous lab assessment will be done for 20 marks for the day to day performance and 10 marks for the final internal lab assessment.

Semester End Examination (SEE): The semester end lab examination for 70 marks shall be conducted by two examiners, one of them being Internal Examiner and the other being External Examiner, both nominated by the Principal from the panel of experts recommended by Chairman, BOS.

The emphasis on the experiments is broadly based on the following criteria:

20 %	To test the preparedness for the experiment.
20 %	To test the performance in the laboratory.
20 %	To test the calculations and graphs related to the concern experiment.
20 %	To test the results and the error analysis of the experiment.
20 %	To test the subject knowledge through viva – voce.

Continuous Internal Assessment (CIA):
CIA is conducted for a total of 30 marks (Table 1), with 20 marks for continuous lab assessment during day to day performance, 10 marks for final internal lab assessment.

Table 1: Assessment pattern for CIA

Component	**Laboratory**		**Total Marks**
Type of Assessment	Day to day performance	Final internal lab assessment	
CIA Marks	20	10	30

Continuous Internal Examination (CIE):
One CIE exams shall be conducted at the end of the 16th week of the semester. The CIE exam is conducted for 10 marks of 3 hours duration.

Preparation	**Performance**	**Calculations and Graph**	**Results and Error Analysis**	**Viva**	**Total**
2	2	2	2	2	10

VI. HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes (POs)		Strength	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.	3	Lab related Exercises
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences	3	Lab related Exercises
PO3	**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.	2	Lab related Exercises
PO4	**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.	2	Lab related Exercises

3 = High; 2 = Medium; 1 = Low

VII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

Program Specific Outcomes (PSOs)		Strength	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.	2	Lab related Exercises
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.	2	Lab related Exercises
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.	-	-

3 = High; 2 = Medium; 1 = Low

VIII. COURSE OBJECTIVES :

The course should enable the students to:	
I	Understand the assembly level programming
II	Identify the assembly level programming in given problem.
III	Compare different implementations and designing with interfacing circuits

IV	Understand the basic programming knowledge on processor and controller
V	Understand and develop assembly language programming with various applications
VI	Understand the applications of Microprocessors and Microcontrollers

IX. COURSE OUTCOMES (COs):

The course should enable the students to:	
CO1	Familiarize with the assembly level programming
CO2	Design circuits for various applications using microcontrollers
CO3	An in-depth knowledge of applying the concepts on real- time applications
CO4	Design and apply interfacing circuits for different applications
CO5	Understand the basic concepts of 8051 microcontroller with their application

X. COURSE LEARNING OUTCOMES (CLOs):

CLO Code	CLO's	At the end of the course, the student will have the ability to:	PO's Mapped	Strength of Mapping
AEC108.01	CLO 1	Design and develop an Assembly language program using 8086 microprocessor	PO 1, PO2	3
AEC108.02	CLO 2	Understand the 16 Bit arithmetic and logical operations using WIN862 software	PO 1, PO 2	2
AEC108.03	CLO 3	Understand the program to perform multi byte addition, subtraction and 3*3 matrix multiplication	PO 1, PO 2	3
AEC108.04	CLO 4	Understand the to perform ascending descending order using 8086	PO 1, PO 2, PO4	2
AEC108.05	CLO 5	Understand the programming concepts on strings	PO 1, PO 2	2
AEC108.06	CLO 6	Understand the programming for Code converters	PO 1, PO 2, PO4	2
AEC108.07	CLO 7	Design and interacting stepper motor to 8086.	PO 1, PO 2, PO3	3
AEC108.08	CLO 8	Analyze and interfacing to convert analog to digital	PO 1, PO 3	2
AEC108.09	CLO 9	Design and interface Matrix keyboard to 8086	PO 1, PO 3	2
AEC108.10	CLO 10	Interface tone generator using 8086	PO 1, PO 2	2
AEC108.11	CLO 11	Interface traffic light controller to 8086	PO 1, PO 2,PO 3	3
AEC108.12	CLO 12	Understand the basic programs using 8051	PO 1, PO 2, PO3	2
AEC108.13	CLO 13	Understand the program to verify timer/counter using 8051	PO 1, PO 2, PO3	2
AEC108.14	CLO 14	Design and interface keyboard to 8051.	PO 1, PO 2, PO3	2

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XI. MAPPING COURSE LEARNING OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Learning Outcomes (CLOs)	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO 1	3	3											2		
CLO 2	2	2											2		
CLO 3	3	3											2		
CLO 4	2	2		2									1	2	
CLO 5	3	2											1	2	
CLO 6	2	2		2									1	2	
CLO 7	3	3	3										2	1	
CLO 8	2		2										2		
CLO 9	3		2										2		
CLO 10	2	2											2		
CLO 11	3	2	3											2	
CLO 12	2	3	2										2		
CLO 13	2	3	2												
CLO 14	2	2	2												

3 = High; 2 = Medium; 1 = Low

XII. ASSESSMENT METHODOLOGIES – DIRECT

CIE Exams	PO 1, PO 2 PO 3, PO 4, PSO1,PSO2	SEE Exams	PO 1, PO 2 PO 3, PO 4, PSO1,PSO2	Assignments	-	Seminars	-
Laboratory Practices	PO 1, PO 2 PO 3, PO 4, PSO1,PSO2	Student Viva	-	Mini Project	-	Certification	-

XIII. ASSESSMENT METHODOLOGIES - INDIRECT

✔	Early Semester Feedback	✔	End Semester OBE Feedback
✘	Assessment of Mini Projects by Experts		

XIV. SYLLABUS

LIST OF EXPERIMENTS	
Week-1	**DESIGN APROGRAM USING WIN862**
Design and develop an Assembly language program using 8086 microprocessor and to show the following aspects. a. Programming b. Execution c. Debugging To Demonstrate the Tool Chain for MASM and Hardware for 8086 Microprocessor	
Week-2	**16 BITARITHMETIC AND LOGICAL OPERATIONS**
Write an ALP program to perform 16 Bit arithmetic and logical operations using WIN862 software	
Week-3	**MULTIBYTE ADDITION AND SUBRACTION**
a. Write an ALP program to perform multi byte addition and subtraction b. Write an ALP program to perform 3*3 matrix multiplication and addition	
Week-4	**PROGRAMS TO SORT NUMBERS**
a. Write an ALP program to perform ascending order using 8086 b. Write an ALP program to perform descending order using 8086	
Week-5	**PROGRAMS FOR STRING MANIPULATIONS OPERATIONS**
a. write an ALP program to insert or delete a byte in the given string b. Write an ALP program to search a number/character in a given string c. Write an ALP program to move a block of data from one memory location to the other & Write an ALP program for reverse of a given string.	
Week-6	**CODE CONVERSIONS**
a. Write an ALP program to convert packed BCD to Unpacked BCD b. Write an ALP program to convert packed BCD to ASCII c. Write an ALP program to convert hexadecimal to ASCII	
Week-7	**INTERFACING STEPPER MOTOR**
a. Write an ALP program to rotate stepper motor in clockwise direction b. an ALP program to rotate stepper motor in anti clockwise direction a Write	
Week-8	**INTERFACING ADC & DAC DEVICES**
a. Write an ALP program to convert analog to digital using 8086 b. Write an ALP program to convert digital to analog using 8086	
Week-9	**INTERFACING TRAFFIC LIGHT CONTROLLER AND TONE GENERATOR**
a. Write an generator ALP program to interface traffic light controller b. Write an ALP program to interface tone	
Week-10	**ARITHMETIC AND LOGICAL OPERATIONS USING 8051**
Write an ALP program to perform 16 Bit arithmetic and logical operations by using 8051 microcontroller.	
WeeK-11	**TIMER/COUNTER**
Write an ALP program and verify timer/counter using 8051	

Week-12	INTERFACING KEYBOARD TO 8051
Write an ALP program to interface keyboard to 8051	

XV. COURSE PLAN:

The course plan is meant as a guideline. Probably there may be changes.

Week No.	Topics to be covered	Course Learning Outcomes (CLOs)	Reference
1	Design and develop an Assembly language program using 8086 microprocessor and to show the following aspects. a. Programming b. Execution c. Debugging To Demonstrate the Tool Chain for WIN862 and Hardware for 8086 Microprocessor	CLO 1, CLO 2	T1:1.4 R1:1.2
2	Develop an ALP program to perform 16 Bit arithmetic and logical operations using WIN862 software	CLO 1, CLO 2	T1:1.5 R1:2.4
3	Develop an ALP program to perform multi byte addition and subtraction and 3*3 matrix multiplication and addition	CLO 1, CLO 2, CLO 3	T1:2.5 R1:2.5
4	Develop an ALP program to perform ascending order using 8086 descending order using 8086	CLO 1, CLO 2, CLO 4	T1:2.5 R1:2.6
5	Develop an ALP program to insert or delete a byte in the given string. Search a number/character in a given string. Program to move a block of data from one memory location to the other & Write an ALP program for reverse of a given string.	CLO 1, CLO 2, CLO 5	T1:22.7
6	Develop ALP program to convert packed BCD to Unpacked BCD , BCD to ASCII and hexadecimal to ASCII	CLO 1, CLO 2, CLO 6	T1:6.3 R1:5.3
7	Design and develop a ALP program to rotate stepper motor in clockwise direction as well as anti clock wise direction.	CLO 1, CLO 2, CLO 7	T1:7.5 R1:6.3
8	Design and develop a ALP program to convert analog to digital and digital to analog using 8086	CLO 1, CLO 2, CLO 8	T1:8.5 R1:6.8
9	Design and develop a Program to interface matrix keyboard using 8086	CLO 1, CLO 2, CLO 9	T1:8.5 R1:6.8
10	Design and develop a Program to interface tone generator using 8086	CLO 1, CLO 2, CLO 10	T1:8.5 R1:6.8
11	Design and develop a ALP program to interface traffic light controller	CLO 1, CLO 2, CLO 11	T1:12.2 R1:13.1
12	Develop a ALP program to perform 16 Bit arithmetic and logical operations by using 8051 microcontroller.	CLO 1, CLO 2, CLO 12	T1:12.3 R1:13.2
13	Design and develop a ALP program and verify timer/counter using 8051	CLO 1, CLO 2, CLO 13	T1:12.10 R1:13.7
14	Design and develop a ALP program to interface keyboard to 8051	CLO 1, CLO 2, CLO 14	T1:11.2 R1:10.2

XVI. GAPS IN THE SYLLABUS - TO MEET INDUSTRY / PROFESSION REQUIREMENTS:

S NO	Description	Proposed actions	Relevance with POs	Relevance with PSOs
1	To improve standards and analyze the concepts.	Lab Practices	PO 1, PO 2	PSO 1
2	Design and develop interfacing programs with advanced devices	Lab Practices / NPTEL	PO 3, PO4	PSO 2
3	Encourage students to solve real time applications and prepare towardscompetitive examinations.	NPTEL	PO 3, PO 4	PSO 1

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