



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

INFORMATION TECHNOLOGY

COURSE DESCRIPTOR

Course Title	MICROPROCESSORS AND INTERFACING LAB				
Course Code	AEC115				
Programme	B.Tech				
Semester	VI	IT			
Course Type	Core				
Regulation	IARE - R16				
Course Structure	Theory			Practical	
	Lectures	Tutorials	Credits	Laboratory	Credits
	-	-	-	3	2
Chief Coordinator	Mrs. B.Lakshmi Prasanna, Assistant Professor				
Course Faculty	Mrs. B.Lakshmi Prasanna, Assistant Professor				

I. COURSE OVERVIEW:

This laboratory course builds on the lecture course "Microprocessors and Interfacing" which is mandatory for all students of information technology. The course aims at practical experience with the characteristics and theoretical principles of computer organization and various practical real time applications.

II. COURSE PRE-REQUISITES:

Level	Course Code	Semester	Prerequisites	Credits
UG	AEC116	III	Digital Logic Design Laboratory	3

III. MARKS DISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Microprocessors and Interfacing 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		
CIA Marks	Day to day performance	Final internal lab assessment	
	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: The ability to understand ,analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based system of varying complexity.	2	Lab related Exercises
PSO 2	Software Engineering Practices: The ability to apply standard practices and strategies in software service management using open-ended programming environments with agility to deliver a quality service for business success.	2	Lab related Exercises
PSO 3	Successful Career and Entrepreneurship: The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	-	-

3 = High; 2 = Medium; 1 = Low

VIII. COURSE OBJECTIVES (COs):

The course should enable the students to:

S.No	Description
I	Developing of assembly level programs and provide the basics of the microprocessors.
II	Provide solid foundation on interfacing the external devices to the processor according to the user requirements to create novel products and solutions for the real time problems.
III	Understand various interfacing circuits necessary for various applications.

IX. 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
AEC115.01	CLO 1	Design and develop an Assembly language program using 8086 microprocessor	PO 1, PO2	3
AEC115.02	CLO 2	Understand the 8 and 16 Bit arithmetic and logical operations using WIN862 software	PO 1, PO 2	2
AEC115.03	CLO 3	Understand the program to perform multi byte addition, subtraction and 3*3 matrix multiplication using 8086 microprocessor	PO 1, PO 2	3
AEC115.04	CLO 4	Understand the to perform ascending and descending order using 8086 microprocessor	PO 1, PO 2, PO 4	2
AEC115.05	CLO 5	Understand the program to perform LCM & HCF, square and cube of a given numbers	PO 1, PO 2	2
AEC115.06	CLO 6	Understand the programming concepts on strings using 8086	PO 1, PO 2, PO4	2
AEC115.07	CLO 7	Understand the programming for Code converters.	PO 1, PO 2, PO3	3
AEC115.08	CLO 8	Design and interacting stepper motor to 8086.	PO 1, PO3	2
AEC115.09	CLO 9	Analyze and interfacing to convert analog to digital	PO 1, PO 2, PO3	2
AEC115.10	CLO 10	Analyze and interfacing to convert digital to analog.	PO 1, PO3	2
AEC115.11	CLO 11	Develop and design a ALP program to interface stepper motor to 8086.	PO1,PO2, PO3	3
AEC115.12	CLO 12	Develop and design a ALP program for serial and parallel communication between two microprocessors.	PO 1, PO 2, PO 3	2
AEC115.12	CLO 13	Develop and design an Interface traffic light controller and tone generator using 8086.	PO 1, PO 2, PO 3	2

3 = High; 2 = Medium; 1 = Low

X. 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	2	2											1	2	
CLO 6	2	2		2									1	2	
CLO 7	3	3	3										2	1	
CLO 8	2		2										2		
CLO 9	2	2	2										2		
CLO 10	2		2										2		
CLO 11	3	3	3											2	
CLO 12	2	2	2										2		
CLO 13	2	2	2										2	1	

3 = High; 2 = Medium; 1 = Low

XI. ASSESSMENT METHODOLOGIES – DIRECT

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

XII.ASSESSMENT METHODOLOGIES - INDIRECT

✓	Early Semester Feedback	✓	End Semester OBE Feedback
✗	Assessment of Mini Projects by Experts		

XIII.SYLLABUS

LIST OF EXPERIMENTS	
Week-1	DESIGN A PROGRAM 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 WIN862 and Hardware for 8086 Microprocessor.	
Week-2	8 AND 16 BIT ARITHMETIC OPERATIONS
a. Write an ALP program to perform 8 Bit arithmetic operations using WIN862 software and 8086. b. Write an ALP program to perform 16 Bit arithmetic operations using WIN862 software and 8086.	
Week-3	PALINDROME, ABSTRACT CLASS
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 TO LCM & HCF NUMBERS
a. Write an ALP program to find the LCM & HCF of given numbers. b. Write an ALP program to find square and cube of a given numbers.	
Week-6	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.	
Week-7	PROGRAMS FOR STRING MANIPULATIONS OPERATIONS
a. Write an ALP program to move a block of data from one memory location to the other b. Write an ALP program for reverse of a given string.	
Week-8	PROGRAMS FOR STRING MANIPULATIONS OPERATIONS
a. Write an ALP program to find the number of even and odd numbers in the given string. b. Write an ALP program to generate a Fibonacci series.	
Week-9	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-10	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-11	GENERATE SQUARE,SINE AND TRIANGLE WAVES
Write an ALP program to generate Saw tooth and staircase wave forms	
Week-12	INTERFACING STEPPER MOTOR
a. Write an ALP program to rotate stepper motor in clockwise direction. b. Write an ALP program to rotate stepper motor in anti clockwise direction.	
Week-13	PARALLEL AND SERIAL COMMUNICATION
a. Parallel communication between two microprocessors using 8255. b. Serial communication between two microprocessor kits using 8251.	
Week-14	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 generator.	
Text Books:	
1. D. V. Hall, “Microprocessors and Interfacing”, TataMcGraw-Hill Education, 3 rd Edition 2013. 2. A. K Ray, K. M. Bhurchandani, “Advanced Microprocessors and Peripherals”, TataMcGraw-Hill Education, 2 nd Edition 2006.	
Reference Books:	
1. D. V. Hall, -Microprocessors and Interfacing, Tata McGraw-Hill Education, 3 rd Edition 2013. 2. A. K Ray, K. M. Bhurchandani, -Advanced Microprocessors and Peripherals, Tata McGraw-Hill Education, 2 nd Edition 2006. 3. Lyla B. Das, -The x86 Microprocessors, Pearson India, 2 nd Edition, 2014.	
Web Reference:	
1. http://nptel.ac.in/courses/106108100/ 2. http://www.eazynotes.com/pages/microprocessor/8086-programs.html 3. http://80864beginner.com/	

XIV. 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. d. Programming e. Execution f. Debugging To Demonstrate the Tool Chain for WIN862 and Hardware for 8086 Microprocessor.	CLO 1, CLO 2	T1:1.4 R1:1.2
2	Write an ALP program to perform 8 and 16 Bit arithmetic operations using WIN862 software and 8086.	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 and descending order using 8086	CLO 1, CLO 2, CLO 4	T1:2.5 R1:2.6
5	Write an ALP program to find the LCM & HCF of given numbers and to find square and cube of a given numbers.	CLO 1, CLO 2, CLO 5	T1:22.7
6	Write an ALP program to insert or delete a byte in the given string and to search a number/character in a given string.	CLO 1, CLO 2, CLO 6	T1:6.3 R1:5.3

7	Write an ALP program to move a block of data from one memory location to the other and to reverse of a given string.	CLO 1, CLO 2, CLO 6	T1:7.5 R1:6.3
8	Write an ALP program to find the number of even and odd numbers in the given string and to generate a Fibonacci series.	CLO 1, CLO 2, CLO 6	T1:8.5 R1:6.8
9	Write an ALP program to convert packed BCD to Unpacked BCD, BCD to ASCII and hexadecimal to ASCII	CLO 1, CLO 2, CLO 7	T1:12.2 R1:13.1
10	Write an ALP program to convert analog to digital using 8086 and to convert digital to analog using 8086.	CLO 1, CLO 2, CLO 9, CLO 10	T1:12.3 R1:13.2
11	Write an ALP program to generate Saw tooth and staircase wave forms	CLO 1, CLO 2, CLO 10	T1:12.10 R1:13.7
12	Write an ALP program to rotate stepper motor in clockwise direction and in anti clockwise direction.	CLO 1, CLO 2, CLO 11	T1:13.2 R1:10.3
13	Parallel communication between two microprocessors using 8255 and Serial communication between two microprocessor kits using 8251.	CLO 1, CLO 2, CLO12	T1:13.2 R1:10.4
14	Write an generator ALP program to interface traffic light controller and to interface tone generator.	CLO 1, CLO 2, CLO 13	T1:13.2 R1:10.5

XV. 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 1
3	Encourage students to solve real time applications and prepare to wards competitive examinations.	NPTEL	PO 3, PO 4	PSO 1

Prepared by:

Ms. B.Lakshmi Prasanna, Assistant Professor

HOD, IT