INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

MICROPROCESSORS AND MICROCONTROLLERS LABORATORY

V Semester: ECE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AECD28	Core	-	-	2	1	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45				Total Classes: 45		
Prerequisite: Digital System Design								

I. COURSE OVERVIEW:

This laboratory course will facilitate the students to program 8086 microprocessor and 8051 microcontrollers. Win862 and Ardinuo simulation software will be used for writing and debugging assembly language programs. The course includes performing arithmetic and logical operations, string manipulations, code conversions and interfacing of I/O devices to processor/controller. The hands-on experience acquired by the student's during the course makes them to carry out processor/controller-based projects and extend their knowledge on the latest trends and technologies in the field of embedded system.

II. COURSES OBJECTIVES:

The students will try to learn

I.   Assembly language programming skills ranging from simple arithmetic operations to interfacing real time systems.
II. The usage of software tools to design, debug and test microprocessor/microcontroller based projects using assembly language programming.
III. The design of microcomputer and microcontroller based real-time applications in the fields of communication systems, home based automation systems, automobiles and unmanned applications.

III. COURSE OUTCOMES:

At the end of the course students should be able to:

CO1   Make use of emulators and assemblers for writing, compiling, and running an assembly language programs on training boards.
CO2   Develop Assembly language programs for accomplishing code conversions, string manipulations and sorting of numbers.
CO3   Choose serial or parallel communication for transmitting the data between microprocessor or microcontroller and peripherals.
CO4   Utilize Analog to Digital and Digital to Analog converters with processor or controller for data conversion.
CO5   Select suitable registers of microcontroller and write assembly language program to verify timer or counter operations.
CO6   Build an interface between processor or controller and peripherals to provide solutions to the real-world Problems.

IV. COURSE CONTENT:

WEEK-1: DESIGN A PROGRAM USING WIN862
To Demonstrate the win 862 software and Trainer kit for 8086 Microprocessor.

WEEK-2: 16 BIT ARITHMETIC AND LOGICAL OPERATION
Write an ALP program to perform 16 Bit arithmetic and logical operations using WIN862 software.

WEEK-3: MULTIBYTE ADDITION AND SUBTRACTION
Write an ALP program to perform multi byte addition and subtraction.

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.
(d) 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 ASCII to packed BCD.

WEEK -7 : INTERFACING STEPPER MOTOR WITH 8086
(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 -8: INTERFACING OF ADC AND DAC WITH 8086
(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: ARITHMETIC AND LOGICAL OPERATIONS USING 8051 MICROCONTROLLER
(a) Write an ALP program to perform Arithmetic operations.
(b) Write an ALP program to perform Logical Operation.
(c) Write an ALP program to perform Bitwise Operations.
(d) Write an ALP program to perform Shift and Rotate Operations.

WEEK -10: INTERFACING OF TIMER/COUNTERS
Write an ALP Program and verify Timer/Counter using 8051.

WEEK -11: INTERFACING OF SERVOMOTOR, RGB LED USING ARDUINO.
(a) Simulate the interfacing of servo motor with Arduino
(b)Simulate the interfacing RGB LED with Arduino

WEEK -12: EXERCISES ON INTERFACING OF SEVEN SEGMENT DISPLAY USING ARDUINO
 Simulate the interfacing of Seven Segment Display with Arduino

WEEK -13: EXERCISES ON DATA ACQUISITION FROM SENSORS USING ARDUINO
(a) Identification of obstacle using ultrasonic sensor.
(b) Detect motion based on changes in infrared light in the environment.

WEEK -14: EXERCISES ON INTERFACING OF 16×2 LCD DISPLAY USING ARDUINO
(a) LCD character display with Arduino
(b) Interface bipolar stepper motor with Arduino

V. TEXT BOOKS:
1. Shibu K.V, "Introduction to Embedded Systems", Tata McGraw Hill Education Private Limited, 2nd Edition, 2009.
2. Raj Kamal, "Embedded Systems: Architecture, Programming and Design", Tata McGraw-Hill Education, 2nd Edition, 2011.

VI. REFERENCE BOOKS:
1. Simon Monk, "Programming Arduino Getting Started with Sketches", Tata McGraw-Hill Education, 2nd Edition, 2011.
2. Andrew Sloss, Dominic Symes, Wright, "ARM System Developer's Guide Designing and Optimizing System Software", 1st Edition, 2004.

VII. ELECTRONICS RESOURCES:
1. https://www.smartzworld.com/notes/embedded-systems-es/
2. http://notes.specworld.in/embedded-systems-es/
3. http://education.uandistar.net/jntu-study-materials
4. http://www.nptelvideos.in/2012/11/embedded-systems.html

VIII. MATERIALS ONLINE
1. Course Content
2. Lab Manual