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

COURSE CONTENT

EMBEDDED SYSSTEM DESIGN AND IOT LABARATORY								
VII Semester: ECE								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
AECD61	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	-	2	1	40	60	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 45**				**Total Classes: 45**		
Prerequisite: Microprocessors and Microcontrollers Laboratory								

I. COURSE OVERVIEW:

This course provides the hands-on experience on designing and implementing embedded systems and IoT applications. Students will gain practical skills in hardware interfacing, programming microcontrollers, and developing IoT solutions. The course covers essential concepts, tools, and techniques used in the field of embedded systems and IoT.

II. COURSES OBJECTIVES:

The students will try to learn

I. The microcontroller architecture, the significance of memory management and input/output interfacing for embedded applications.
II. The microcontroller programming is to be demonstrated by languages like C/C++ for the implementation of basic algorithms and control structures for embedded applications.
III. The interfacing between variety of sensors and microcontrollers commonly used in embedded systems and IOT applications.

III. COURSE OUTCOMES:

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

CO 1 Demonstrate knowledge in designing complex energy efficient embedded systems.
CO 2 Apply appropriate techniques, resources, and CCSV6 based IDE for modeling embedded systems with understanding of limitations.
CO 3 Design embedded systems including hardware/software interfaces for devices like LCD displays, motors, keyboards, analog sensors and speakers.
CO 4 Develop the ability to interact with hardware components including communication protocols and Arduino programming for controlling lightning appliances.
CO 5 Emulate Arduino environment with interfacing of various sensors and IoT protocols with a cloud enabled backend system.
CO 6 Design and implement embedded solutions for the real time embedded and IoT applications.

IV. LIST OF EXPERIMENTS:

Week-1:LEDS INTERFACING WITHMICROCONTROLLER BOARD
To toggle all the bits of Port P1 continuously with250 mS delay led blinkwith 89V51RD2 microcontroller board.

Week-2:LCDINTERFACING WITHMICROCONTROLLER BOARD
To interface LCD data pins to port P1 and display a message on it using 89V51RD2 microcontroller board.

Week-3:SEVEN SEGMENT DISPLAY INTERFACING WITHMICROCONTROLLER BOARD
Design a circuitto display a sequence of numbers on the seven-segment displayusing89V51RD2 microcontroller board

Week-4:SERIAL COMMUNICATION
Implement serial communication between Microcontroller to PC and the data should be transfer with different baudrates using 89V51RD2 microcontroller board

Week-5:STEPPER MOTOR INTERFACING
To interface Stepper Motor to rotate the motor in clockwise and anticlockwise directions 89V51RD2 microcontroller board

Week-6:TEMPERATURE SENSOR INTERFACING
Develop necessary interfacing circuit to read data from temperature sensor and process using 89c51 sdk, the data has to display terminal window

Week-7: INTERFACE LIGHT SENSOR MODULE WITH NODE
To interface the light sensor with Node, program the Node to receive the data from sensor and print in the console.

Week-8: INTERFACING SOIL MOISTURE SENSOR WITH NODE
Design a system that measures soil moisture and irrigates plants automatically.

Week-9:INTERFACING TEMPERATURE AND HUMIDITY SENSOR WITH NODE
Interfacing temperature and humidity sensor with Node, display the sensor readings in console.

Week-10:INTERFACING SOLENOID VALVE WITH NODE
Interfacing of a Solenoid valve with Node and verify the real time applications.

Week-11:INTERFACING OLED GRAPHIC DISPLAY MODULE WITH NODE
Interfacing OLED display with Node, Program the Node to display the content on the Display by configuring the size of the display and the characters.

Week-12:CONTROLLING LED USING NODE WITH MOBILE APPLICATION NODE
Control LED using Blynk mobile applicationover the Internet.

Week-13:DEVICE TO DEVICE COMMUNICATION USING ZIGBEE
Interfacing two XBee modules With Arduino as transmitter and receiver.

Week-14:SMART HOME AUTOMATION
Develope a smart home automation model using sensors and actuators by sending data to cloud and performing ML on data and sending the results to actuators.

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. 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 template
2. Lab Manual