<div align="center">IoT APPLICATIONS LABORATORY</div>

I Semester: EPS							
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**	
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
BPSC12	**Core**	0	0	4	2	30	70	100
Contact Classes: Nil	**Total Tutorials: Nil**	**Total Practical Classes: 36**				**Total Classes: 36**		

I. COURSE OVERVIEW:

The goal of the lab to fundamental understands of IoT using Arduino programming for different electrical digital apparatus. It will also explain the interfacing of data, I/O devices with Arduino UNO like Bluetooth, sensors, Webpage etc. It will also cover the digital protection schemes. A goal of the lab is to develop test-beds and experimental facilities, demonstrating the effects of ubiquitous IoT technology.

II. COURSE OBJECTIVES:

The students will try to learn:

  I. The IoT using Arduino programming.
  II. Interfacing of data, I/O devices with Arduino UNO.
  III. Digital protection schemes in power system relays.

III. COURSE OUTCOME:

After successful completion of the course, students will be able to:		
CO 1	**Understand** the concept of Internet of Things for implementation of digital measuring devices.	Understand
CO 2	**Develop** the Arduino programming for controlling lightning appliances.	Apply
CO 3	**Analyze** the characteristics of Bluetooth modules for controlling the performance of appliances.	Analyze
CO 4	**Analyze** the features of various algorithms applicable for protection of Transformers and transmission lines.	Apply
CO 5	**Categorize** the digital relying algorithms for protection of three phase induction motor.	Analyze
CO 6	**Analyze** the various algorithms applicable for over current protection.	Analyze

IV. LIST OF EXPERIMENTS:

EXPERIMENT –I: ARDUINO BASED DIGITAL VOLTMETER, AMMETER

Design of digital voltmeter and ammeter using Arduino.

EXPERIMENT –II: ARDUINO BASED WATTMETER, ENERGY METER

Design of digital wattmeter and energy meter using Arduino.

EXPERIMENT –III: CONROLLING RGB LED

Programming for Controlling RGB LED using Arduino and Wi-Fi module.

EXPERIMENT –IV: IOT TO CONTROL REMOTE LED

Programming for Internet of things with Android and Arduino. Build an Arduino based IoT to control a remote LED.

EXPERIMENT –V: INTERFACING BLUETOOTH MODULE

Programming for how to interface HC-05 Bluetooth module with Arduino UNO for control of small dc motor.

EXPERIMENT –VI: INTERFACING TO TEMPERATURE SENSOR
Programming to Interface temperature sensor and monitoring the room temperature using IoT with Arduino Uno and display the digital value on LCD screen.

EXPERIMENT –VII: INTERFCAING IR SENSOR
Programming to Interface IR sensors and Bluetooth for detecting obstacle using Arduino with android Application.

EXPERIMENT –VIII: INTERFACE TO MOTION AND GAS SENSOR
Programming to interface a motion sensor to use GPIO pins with a Raspberry Pi
Programming to interface Gas sensor for detection and monitoring of harmful gases using Arduino and IoT.

EXPERIMENT – IX: SEND DATA FROM ARDUINO TO WEB PAGE
Programming for how to send data from Arduino to Webpage using Wi-Fi module.

EXPERIMENT –X: DIGITAL PROTECTION OF THREE PHASE INDUCTION MOTOR
Studying the ON / OFF control strategies of small dc motor using IoT.

EXPERIMENT–XI: DIGITAL PROTECTION OF TRANSFORMERS AND TRANSMISSION LINES
Study the protection schemes of three phase induction motor against over current and under voltage at remote location through IoT.

EXPERIMENT–XII: OVER CURRENT RELAY
Design of over current relay in distribution system and displaying the tripping status of the relay through IoT

V. Reference Books:
1.   Mark Torvalds, "Arduino Programming: Step-by-step guide to mastering arduino hardware and software (Arduino, Arduino projects, Arduinouno, Arduino starter kit, Arduino ide, Arduinoyun, Arduino mega, Arduinonano) Kindle 2ndEdition, 2001.
2.   Michael   J   Pont, "Embedded C", Pearson Education, 2ndEdition, 2008.

VI. Web References:
1. https://www.ee.iitkgp.ac.in
2. https://www.citchennai.edu.in
3. https://www.iare.ac.in
4. https://www.deltaww.com