INTERNET OF THINGS LABORATORY

I Semester: EPS

Course Code	Category	Hours / Expt			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
BPSB10	Core	-	-	4	2	30	70	100
Contact Classes: 36	Tutorial Classes: Nil	Practical Classes: 36				Total Classes: 36		

COURSE OBJECTIVES:

The course should enable the students to:

I. Understand the IoT using Arduino programming.
II. Explain the interfacing of data, I/O devices with Arduino UNO.
III. Describe the digital protection schemes in power system relays.

COURSE OUTCOMES (COs):

CO 1: Understand the importance of internet of things in present scenario
CO 2: Describe the interfacing of IoT with arduino.
CO 3: Design of direct and alternating type of electrical instruments using arduino
CO 4: Analyze the protection schemes of induction motor against over current and under voltage.
CO 5: Develop a relay model for protection of home appliances from over and under voltages.

COURSE LEARNING OUTCOMES (CLOs):

The students should enable to:

1. List out the different IOT applications and importance of IOT in present scenario.
2. List the application of Arduino and Node MCU
3. Know the different sensors available to measure the current and voltage
4. Design the digital voltmeter and ammeter for both AC and DC circuits
5. Design a digital frequency meter to measure the frequency in an AC circuit.
6. Measure the power and energy consumption in a home using Arduino
7. Measure the power factor and phase angle in an AC circuit using Arduino/Node MCU.
8. Design a system to control the traffic signals through IOT
9. Develop a system to control the direction of three phase induction motor
10. Model a system to control the railway gate using stepper motors.
11. Know the functioning of relay module and a 3phase contactor.
12. Design a system to protect the three phase induction motor from abnormal fault conditions
13. Design a system to control the direction and speed of DC motor
14. Design a relay to protect the home appliances from over currents, under voltages and over voltages.

LIST OF EXPERIMENTS

Expt-1	**DESIGN OF DIGITAL DC VOLTMETER AND AMMETER**

Design a Digital DC Voltmeter and Ammeter to measure the voltage and current in DC electrical circuits using Arduino and display the values in LCD display

Expt-2	**DESIGN OF DIGITAL AC VOLTMETER AND AMMETER**
Design a Digital AC Voltmeter and Ammeter to measure the voltage and current in AC electrical circuits using Arduino and display the values in LCD display.	
Expt-3	**DIRECTION CONTROL OF THREE PHASE INDUCTION MOTOR**
Design a system to control the direction of three phase induction motor through IOT	
Expt-4	**DESIGN OF DIGITAL FREQUENCY METER**
Design a Digital frequency meter to measure the frequency in any AC electrical circuit using Arduino and display the values in LCD display	
Expt-5	**MEASUREMENT OF POWER AND ENERGY**
Measure the power and energy in electrical circuit using Arduino and display the values in LCD display	
Expt-6	**MEASUREMENT OF PHASE SHIFT AND POWER FACTOR**
Measure the phase shift and power factor in an electrical circuit for different loads using Arduino and display the value in LCD display.	
Expt-7	**IMPLEMENTATION OF OVER CURRENT RELAY**
Design an over current relay for distribution system and displaying the tripping status of the relay in substation through IOT	
Expt-8	**OVER/UNDER VOLTAGE PROTECTION OF HOME APPLIANCES**
Design a system to protect home appliances from over and under voltages using Arduino.	
Expt-9	**PROTECTION OF THREE PHASE INDUCTION MOTOR**
Design a system for protecting the three phase induction motor from over voltages, over currents, temperature and displaying the status of the motor at remote location using IOT.	
Expt-10	**TRAFFIC SIGNAL CONTROL**
Design a traffic control system using IOT	
Expt-11	**RAILWAY GATE CONTROL BY STEPPER MOTORS**
Design a railway gate control using stepper motor using IOT	
Expt-12	**DIRECTION AND SPEED CONTROL OF DC MOTOR**
Control the speed and direction of a DC motor using Arduino and display the status of the motor at the remote location using IOT.	

Text 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 2nd Edition, 2001.
2	Michael J Pont, "Embedded C", Pearson Education, 2nd Edition, 2008.

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