

Year: B. Tech III (Semester VI)

Subject Name: Internet of Things (IoT)

Subject Code: BTCO14609

Type of course: Professional Elective II and III

Prerequisite: C Programming, Microprocessor, Networking

List of Courses where this course will be prerequisite: -

Teaching and Examination Scheme:

Teaching Scheme				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	
3	0	2	4	60	25	15	30	20	150

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests CA2: Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems TEE: Term End Examination TEP: Term End Practical Exam (Performance and viva on practical skills learned in course) CA3: Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Contents:

Unit No	Contents	Total Hrs
1	Introduction to Internet of Things : Application areas of IoT, Characteristics of IoT, Things in IoT, IoT stack, Enabling technologies, IoT challenges, IoT levels, IoT and cyber physical system, IoT and WSN	04
2	Sensor, Microcontrollers and Their Interfacing : Sensor interfacing, Types of sensors, Controlling sensors, Microcontrollers, ARM	08
3	Protocols for IoT : MQTT, CoAP, LiFi, IPv4, IPv6, URI, Wi-Fi, Zigbee and Ethernet, Z wave, Bacnet, BLE, Modbus, SPI , I2C, IIOT protocols – 6lowpan, lwm2m, AMPQ. RPL and 6LowPAN, WiFi, Bluetooth, BLE, LORAWan, NFC	08
4	Cloud for IoT : IoT and cloud, Fog computing, Security in cloud, Case study.	04
5	RFID and iBeacons : Introduction to RFID and iBeacon, Hardware & Software, Hardware used for IoT RFID, Connection to Serve, Data on RFID Server and Classic distributed the problem.	05
6	Industrial IoT: Various Architectures of IOT and IIOT, Advantages & disadvantages, Industrial Internet - Reference Architecture; IIOT System components: Gateways, Routers, Modem, Cloud brokers, servers and its integration. WSN, WSN network design for IOT	05
7	Case studies on IoT Applications : Food, Healthcare, Lavatory maintenance, Water quality, Warehouse, Retail, Driver Assistance, Collision impact, Connected vehicles.	03



8	Developing an IoT based Applications: Arduino: Architecture, Programming and Application ,NodeMCU: Architecture, Programming and Application,Raspberry Pi: Architecture, Programming and Application,Develop a Face Recognizing Robot, Build an IoTbased Smart Home System, IoT Based Air Quality Index Monitoring	05
9	IoT Security : IoT Security issues, architecture, requirement, challenges and algorithms	03

Suggested Specification table with Marks (Theory): (For B.Tech only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	20	10	10	0	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

Sr. No.	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication / Publication Edition
1	Internet of Things	Vasudevan, Nagarajan and Sundaram	Wiley India	Latest Edition
2	Learning Internet of Things	Peter Waher	Packt Publishing Ltd	
3	IoT Fundamentals	David Hence at el	Cisco Press	
4	21 IoT Experiments	Yashavant Kanetkar ,Shrirang Korde	BPB	
5	IoT Based Projects	Rajesh Singh	BPB	
6	Internet of Things with ARDUINO and BOLT	Ashwin Pajankar	BPB	

Course Outcomes (CO):



Sr. No.	CO statement	Marks % weightage
1	Able to understand building blocks of Internet of Things and characteristics.	15%
2	Design various IoT applications in different domains and be able to analyse data stored on cloud.	25%
3	Understand constraints and opportunities of wireless and mobile networks for Internet of Things.	20%
4	Exploring the features of predictive data analytics for IoT applications.	20%
5	Understand different IoT and IIOT protocols and their security measures.	20%

List of Open learning website:

1. www.arduino.cc
2. www.raspberrypi.org/
3. www.tutorialspoint.com/internet_of_things/index.htm
4. www.iotworldtoday.com/
5. www.aws.amazon.com/iot/
6. www.cisco.com/c/en_in/solutions/internet-of-things/overview.html
7. www.cisco.com/c/en_in/solutions/internet-of-things/iot-network-connectivity.html

List of Open-Source Software: --

1. Cisco packet tracer
2. Arduino
3. Raspberry Pi OS

List of Experiments:

Sr. No	Practical
1	Study Practical: Introduction to Arduino (Architecture, Pin Diagram, Arduino IDE)
2	Use Arduino Uno Board to perform following tasks: <ul style="list-style-type: none"> • LED Blink without serial command input. • LED Blink with serial command input.
3	Perform practical to detect obstacle using IR sensor and Arduino Uno.
4	Implement a IoT based practical using packet tracer - "Controlling of garage door and window for home environment based on CO2 level"



5	Implement a IoT based practical using packet tracer - "Controlling of fan and light for home environment based on motion"
6	Use Adafruit cloud to implement a practical by detecting obstacle with IR sensor module and NodeMCU.
7	Implement a practical to monitor Pulse rate with Arduino Uno board. (Serial Monitor Control)
8	Implement a practical to detect the obstacle and give the notification-based distance using Ultrasonic Sensor HC-SR04 and Arduino.
9	Perform a practical to build NodeMCU Webserver and control an LED from a Webpage.
10	Implement a practical to detect the smoke using MQ-02 sensor & Arduino and blow green and red light based on threshold value.
11	Study practical based on Raspberry Pi.
12	Perform LED blinking practical using Raspberry Pi and Python program.

Major Equipment Needed: -

