GANPAT UNIVERSITY									
FACULTY OF ENGINEERING & TECHNOLOGY									
Programme	Bachelor of Technology					Branch/Spec.	Computer Engineering (CBA)		
Semester	VII					Version	1.0.0.0		
Effective from Academic Year	2021-22					Effective for the batch Admitted in	July 2018		
Subject code	2CSE70E16		Subject Name			INTERNET OF THINGS			
Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	0	4	Theory	40	60	100
Hours	3	0	2	0	5	Practical	30	20	50

Pre-requisites:

C language, Microprocessor and microcontroller, operating system, computer architecture and organization

Learning Outcome:

After successful completion of this subject students will be able to:

- Understand architecture, protocols, applications and devices of IoT.
- Learn interfacing IoT devices with controllers and cloud platform.
- Analyze aggregated data of IoT devices.
- Design and Develop IoT applications.

Theory Syllabus

Unit	Content	Hrs
1	**Internet of Things Devices :** Characteristics,Architecture, Arduino, Node MCU, ESP 8266, Raspberry Pi programming	**10**
2	**Sensor and Actuators :** Types of Sensors & Actuators, ,Wired and Wireless Sensor - PIR Motion Sensor, Temperature and Humidity Sensor, Bluetooth, Servo Motor, Ultrasonic Sensor, Programming and Interfaces with devices.	**10**
3	**Protocols** Data Protocols - MQTT, CoAP, XMPP, AMQP, Communication / Connectivity Protocols - IEEE 802.15.4, 6LoWPAN, Bluetooth Low Energy, Zigbee, NFC, RFID, Wireless HART, Z-Wave.	**10**
4	**Machine-to-Machine Communications:** Definition of M2M, Applications of M2M, Key features of M2M, Architecture and components of M2M, Requirements for M2M, Issues /concerns in M2M, Standardization Efforts for M2M.	**7**
5	**Cloud Interfacing** Arduino & Azure IoT Cloud & Architecture - Integrating IoT Devices with cloud and monitoring.	**8**

Practical Content

Designing and developing practicals based on IoT Devices, sensors and actuators using Arduino & Raspberry Pi programming. Using LED, Bulb, Ultrasonic, Smoke, PIR Motion and Temperature Sensors for IoT Programming.

Text Books

1	"The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press)
Reference Books	
1	"Internet of Things: A Hands-on Approach", by ArshdeepBahga and Vijay Madisetti (Universities Press)
Self-study:	
Survey research papers on recent technologies and protocols	
ICT/MOOCs Reference	
● https://onlinecourses.nptel.ac.in/noc21_cs17/preview ● https://www.udemy.com/course/internet-of-things-iot-for-beginners-getting-started/ ● https://www.udemy.com/course/internet-of-things-raspberrypi-azure/	
Course Outcomes:	
COs	Description
CO 1	Understand architecture, protocols, applications and devices of IoT.
CO 2	Learn interfacing IoT devices with controllers and cloud platform.
CO 3	Analyze aggregated data of IoT devices.
CO 4	Design and Develop IoT applications.

Mapping of CO and PO:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	3	0	0	0	2	0	0	2
CO2	3	2	3	1	3	0	0	0	0	0	0	1
CO3	3	2	2	1	2	0	0	0	0	0	2	0
CO4	3	2	3	2	2	2	2	0	3	0	2	2