Internet of Things	L	T	P	Fundamental of Computer Networks
	3	-	2	

Course Objective: (1) To introduce the terminology, technology and its applications (2) To introduce the concept of M2M (machine to machine) with necessary protocols (3) To introduce the Python Scripting Language which is used in many IoT devices
(4) To introduce the Raspberry PI platform, that is widely used in IoT applications
(5) To introduce the implementation of web-based services on IoT devices

S. NO	Course Outcomes (CO)
CO1	Understand IoT value chain structure (device, data cloud), application areas and technologies involved.

CO2	Explore IoT sensors and technological challenges faced by IoT devices, with a focus on wireless, energy, power, and sensing modules
CO3	Explore and learn about Internet of Things with the help of preparing projects designed for Raspberry Pi.

S. NO	Contents	Contact Hours
UNIT 1	**Introduction to Internet of Things:** Definition and Characteristics of IoT, Sensors, Actuators, Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs, IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Embedded Systems, IoT Levels and Templates, Domain Specific IoTs – Home, City, Environment, Energy, Agriculture and Industry	**9**
UNIT 2	**IoT and M2M:** Software defined networks, network function virtualization, difference between SDN and NFV for IoT, Basics of IoT System Management with NETCONF, YANG- NETCONF, YANG, SNMP NETOPEER	**8**
UNIT 3	**IoT Physical Devices and Endpoints:** Introduction to Arduino and Raspberry Pi- Installation, Interfaces (serial, SPI, I2C) Controlling Hardware- Connecting LED, Buzzer, Switching High Power devices with transistors, Controlling AC Power devices with Relays, Controlling servo motor, speed control of DC Motor, unipolar and bipolar Stepper motors	**8**
UNIT 4	**Introduction to Sensors:** Light sensor, temperature sensor with thermistor, voltage sensor, ADC and DAC, Temperature and Humidity Sensor DHT11, Motion Detection Sensors, Wireless Bluetooth Sensors, Level Sensors, USB Sensors, Embedded Sensors, Distance Measurement with ultrasound sensor	**8**
UNIT 5	**IoT Physical Servers and Cloud Offerings**: Introduction to Cloud Storage models and communication APIs Web Server – Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API	**9**
	TOTAL	**42**

REFERENCES

S.No.	Name of Books/Authors/Publishers	Year of Publication / Reprint
1	Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, ISBN: 9788173719547	2015
2	Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), ISBN: 9789350239759	2014
3	Sudip Misra, Anandarup Mukherjee, Arijit Roy, Introduction to IoT, Cambridge University Press	2021
4	Raspberry Pi Cookbook, Software and Hardware Problems and solutions, Simon Monk, O'Reilly (SPD), ISBN 7989352133895	2016

5	Peter Waher, 'Learning Internet of Things', Packt Publishing, 2015, Editors Ovidiu Vermesan	2015
6	Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications	2013
7	Peter Friess,'Internet of Things – From Research and Innovation to Market Deployment', River Publishers, 2014	2014
8	N. Ida, Sensors, Actuators and Their Interfaces, SciTech Publishers, 2014	2014
9	Honbo Zhou, “The Internet of Things in the Cloud: A Middleware Perspective”, CRC Press,2012	2012
10	Olivier Hersent, David Boswarthick, Omar Elloumi , “The Internet of Things – Key applicationsand Protocols”, Wiley, 2012.	2012

B.Tech. Information Technology				
Course code: Course Title	**Course Structure**			**Pre-Requisite**
Computer Graphics	**L**	**T**	**P**	**-**
	3	**-**	**2**	

Course Objective: To provide students with a comprehensive understanding of the fundamental principles and