INTERNET OF THINGS AND APPLICATIONS

II Semester: CSE								

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
BCSC19	**Elective**	3	0	0	3	30	70	100

Contact Classes: 45	Total Tutorials: Nil	Total Practical Classes: Nil	Total Classes: 45

I. COURSE OVERVIEW:

Internet of things (IoT) is a network of things that are embedded with software and sensors to process data. This course includes physical and logical design of IoT systems, M2M systems, SDN, IoT Architecture components such as physical devices and endpoints, physical servers and cloud offerings. This is used in various applications such as Smart Refrigerator, Smart Homes and Smart environments.

II. COURSE OBJECTIVES:

The students will try to learn:
1. The architecture of Internet of Things and connected world.
2. The different hardware and sensing technologies to build IoT applications.
3. The real time IoT applications to make smart world.
4. The available cloud services and communication API's for developing smart cities.

III. COURSEOUTCOMES:

After successful completion of the course, students should be able to

CO 1	**Summarize** the characteristics and appropriate levels of IoT for reusing of deployed IoT resources across application domains.	Remember
CO 2	**Identify** the necessity of communication models, protocols and API's for accessing data from sensors and actuators to overcome issues like failure of any connected devices.	Understand
CO 3	**Compare** Machine to Machine withIoT and identifying the role of SDN,NFV, NETCONFG-YANG for data exchange between devices and management on network.	Understand
CO 4	**Illustrate** architectural reference models and state of the art methodologies in IoT application domains for managing access control of IoT devices.	Apply
CO 5	**Analyze** different cloud storage models and protocols that are scalable	Understand

IV. COURSE SYLLABUS

MODULE – I: INTRODUCTION (08)

Definition and characteristics of IoT, physical design of IoT, logical design of IoT, IoT enabling technologies, IoT levels and deployment, domain specific IoTs.

MODULE-II: IOT AND M2M (10)

Introduction, M2M, difference between IoT and M2M, software defined networking (SDN) and network Function virtualization (NFV) for IoT, basics of IoT system management with NETCONF-YANG.

MODULE-III: IOT ARCHITECTURE AND TOOLS (08)

IoT Architecture: State of the art introduction, state of the art; Architecture reference model: Introduction, reference model and architecture, IoT reference model. IoT Reference model-IoT ecosystem and Business models- Introduction to Protocols of IoT: D2D, D2S, S2S, Introduction to simulation tools.

MODULE-IV: MODELLING TECHNIQUES (09)

Introduction to Raspberry Pi interfaces (Serial, SPI, I2C), programming Raspberry PI with Python, other IoT devices.

MODULE-V: IOT PHYSICAL SERVERS AND CLOUD OFFERINGS (08)

Introduction to cloud storage models and communication APIs; WAMP: AutoBahn for IoT, Xively cloud For IoT; Case studies illustrating IoT design: Home automation, smart cities, smart environment.

V. TEXT BOOKS:

1. ArshdeepBahga, Vijay Madisetti, "Internet of Things: A Hands-on-Approach", VPT, 1st Edition, 2014.
2. Matt Richard son,ShawnWallace, "Getting Started with RaspberryPi", O_Reilly (SPD), 3rd Edition, 2014.

VI. REFERENCE BOOKS:

1. Derek Molloy, "Exploring Raspberry Pi: Interfacing to the Real World with Embedded Linux" Wiley publishers, 1st Edition, 2020.

VII. Web References:

1. https://www.upf.edu/pra/en/3376/22580.
2. https://www.coursera.org/learn/iot.

VIII. E-Text Books:

1. https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf
2. https://www.cs.bris.ac.uk/~flach/mlbook/.
3. http://mylovelibrabry.com/emylibraryus/free.php?asin=1466583282.