Third Year B.C.A. (Under Science) Semester VI

Course Code: BCA603   **Course Title: Recent Trends in IT (Internet of Things)**
Total Contact Hours: 48 hrs.   **Total Credits: 04**   **Total Marks: 100**
(60 Lectures)

Teaching Scheme: Theory- 05 Lect./ Week

Pre-Requisite: Basic understanding of electronics and microprocessors.
Course Objectives:
1. The Internet of Things (IoT) is aimed at enabling the interconnection and integration of the physical world and the cyber space.
2. To learn about SoC architectures, programming Raspberry Pi and implementation of internet of things and protocols.

Expected Learning Outcomes:
1. Enable learners to understand System On Chip Architectures.
2. Introduction and preparing Raspberry Pi with hardware and installation.
3. Learn physical interfaces and electronics of Raspberry Pi and program them using practical‟s
4. Learn how to design IoT based prototypes.

Unit No.	Contents	No. of Lecctures
Unit 1	**System on Chip (SoC) and Internet of Things (IoT) Overview** - **System on Chip:** What is System on chip? Structure of System on Chip. - **SoC products:** Field Programmable Gate Array (FPGA)**,** General Purpose Graphics Processing Units (GPU), Accelerated Processing Unit (APU), Compute Units. -**The IoT paradigm** giving overview of IoT supported Hardware platforms such as: Raspberry pi, SoC on ARM 8 Processors, Arduino and Intel Galileo boards. -**Network Fundamentals**: Wired Networking(Router, Switches), Wireless Networking(Access Points) **-Introduction to Raspberry Pi:** Introduction to Raspberry Pi, Raspberry Pi Hardware, Preparing your raspberry Pi. **-Raspberry Pi Boot:** Learn how this small SoC boots without BIOS. Configuring boot sequences and hardware. **-Introduction to IoT:** What is IoT? IoT examples, Simple IoT LED Program. **-IoT and Protocols**	**20**

	-IoT Security: HTTP, UPnp, CoAP, MQTT, XMPP. **-IoT Service as a Platform:** Clayster, Thinger.io, SenseIoT, carriots and Node RED. **-IoT Security and Interoperability:** Risks, Modes of Attacks, Tools for Security and Interoperability.	
Unit 2	**Programming Raspberry Pi** **Raspberry Pi and Linux:** About Raspbian, Linux Commands, Configuring Raspberry Pi with Linux Commands **Programing interfaces:** Introduction to Node.js, Python. **Raspberry Pi Interfaces:** UART, GPIO, I2C, SPI **Useful Implementations:** Cross Compilation, Pulse Width Modulation, SPI for Camera.	**15**
Unit 3	**Case Study & advanced IoT Applications:** IoT applications in home, infrastructures, buildings, security, Industries, Home appliances, other IoT electronic equipments. Use of Big Data and Visualization in IoT, Industry 4.0 concepts. Sensors and sensor Node and interfacing using any Embedded target boards (Raspberry Pi / Intel Galileo/ARM Cortex/ Arduino)	**15**
Unit 4	**Internet of Things Privacy, Security and Governance** Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security	**10**

TEXT BOOKS:

1. 6LoWPAN: The Wireless Embedded Internet, Zach Shelby, Carsten Bormann, Wiley
2. Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems, Dr. Ovidiu Vermesan, Dr. Peter Friess, River Publishers
3. Interconnecting Smart Objects with IP: The Next Internet, Jean-Philippe Vasseur,
   Adam Dunkels, Morgan Kuffmann
4. Internet of Things : A hands- on Approach by Arshdeep Bahga, Vijay Madisetti
5. IoT Programming: A Simple and Fast Way of Learning IOT by David Etter

REFERENCES:

1. The Internet of Things: From RFID to the Next-Generation Pervasive Networked Lu Yan, Yan Zhang, Laurence T. Yang, Huansheng Ning
2. Internet of Things (A Hands-on-Approach) , Vijay Madisetti , Arshdeep Bahga
3. Designing the Internet of Things , Adrian McEwen (Author), Hakim Cassimally
4. "Mobile Computing," Tata McGraw Hill, Asoke K Talukder and Roopa R Yavagal, 2010.
5. Computer Networks; By: Tanenbaum, Andrew S; Pearson Education Pte. Ltd., Delhi, 4th Edition
6. Data and Computer Communications; By: Stallings, William; Pearson Education Pte. Ltd., Delhi, 6th Edition
7. "Fundamentals of Mobile and Pervasive Computing," F. Adelstein and S.K.S. Gupta, McGraw Hill, 2009. 8. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010