# 20IT41E1 - INTERNET OF THINGS

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| Course Category: | Professional Elective | Credits: | 3 |
| Course Type: | Theory | Lecture-Tutorial-Practical: | 3-0-0 |
| Prerequisite: | Require Data communication, networking fundamentals and Internet Technologies | Sessional Evaluation:  Univ. Exam Evaluation:  Total Marks: | 40  60  100 |
| Objectives: | * To study about the fundamentals of Internet of Things, protocols used, its applications, programming language used and the programming about Raspberry Pi kit. * To study about the latest advancement in the Internet of Things | | |

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| Course Outcomes | Upon successful completion of the course, the students will be able to: | |
| CO1 | Knowing about the definition and characteristics of Internet of Things |
| CO2 | Distinguish between IoT and M2M and also manages IoT Systems using NETCONG protocol and YANG Data modeling Language |
| CO3 | Designing an IoT system independent of any specific product / programming language |
| CO4 | Knowledgeable about IoT Devices and Endpoints like Raspberry Pi, pcDuino, Cubieboard etc. and also makes some case studies on IoT Role in Environment, Agriculture etc. |
| CO5 | Good at deciding which Framework / Cloud Service to use for a specific IoT Application. |
| CO6 | Well conversant with a few tools like Chef and Puppet used in IoT |
| Course Content | UNIT-I  **Introduction and Concepts:**  Introduction – Definition and characteristics of IoT, Physical design of IoT – IoT protocols, Logical design of IoT – Functional Communication models, communication API’s, IoT Enabling Technologies: Wireless Sensor Networks, Cloud Computing, Big Data Analytics, Communication Protocols, Embedded Systems, IoT Levels & Deployment (6 levels)  UNIT-II  **IoT and M2M:**  Introduction- Differences between IoT and M2M, Software Defined Networking and Network Function Virtualization  **IoT System Management:**  Need for IoT Systems Management, SNMP and its limitations, Network Operator Requirements, NECONF, YANG, IoT Systems Management with NETCONF-YANG, NETOPPER Tools  UNIT-III  **Design Methodology of IoT Platforms:**  Introduction, Specification of: Purpose and Requirements, the process, Domain and Information Models, Service, IoT Levels, Functional and Operational Views. Device and Component Integration, Application Development. Weather Monitoring IoT System: Case Study, Why Python Language for IoT?  UNIT-IV  **IoT Physical Devices and Endpoints:**  Basic building blocks of an IoT Device, Exemplary Device: Raspberry Pi, About the Board, Linux on Raspberry Pi, Rapberry Pi Interfaces, Programming Raspberry Pi with Python, other IoT devices – pcDuino, BeagleBone Black, Cubieboard.  **Case Studies Illustrating IoT Design:** Cities – Smart Parking, Environment – Air Pollution Monitoring, Agriculture – Smart Irrigation  UNIT-V  **IoT Physical Servers and Cloud Offerings:**  Introduction, WAMP and AutoBahn Framework for IoT, Xively loud for IoT, Django the WebApp Framework, Designing RESTful web API (Extension over Django), Amazon Web Services for IoT – EC2 and AutoScaling, S3, RDS, SQS and EMR, SkyNet IoT Messaging Platform.  UNIT-VI  **Tools for IoT:**  Python Packages of interest for IoT – JSON, XML, HTTPLib, & URLib, SMTPLib. Tools For IoT: Setting up Chef and Puppet, Multi-tier Application Deployment creation using Chef and Puppet (comprising of HAProxy, Load Balancer, Django App Server and MongoDB Database Server). Steps for IoT Device Management with NETCONF-YANG and Smart Irrigation Management Case Study with the same. | |
| Text Books &  Reference  Books | **TEXT BOOKS:**   1. Vijay madisetti and ArshdeepBahga,” Internet of Things: Introduction to a New Age of Intelligence”, First edition, Apress Publications 2013   **REFERENCE BOOKS:**   1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesnd, Stamatis Kamouskos, Dvaid Boyle, “From Machine-toMachine to the Internet of Things: Introduction to a New Age of Intelligence”, First edition, Academic Press, 2014 | |
| E-Resources | 1. <https://nptel.ac.in/courses/106105166/> 2. <https://onlinecourses.nptel.ac.in/noc17_cs22/preview> | |