| 21IOT04 | Big Data in IoT | L | T | P | C |
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## Course Objectives

- To understand the different architectures for IoT.
- To learn various protocols at the different layers for IoT.
- To develop prototype systems using Arduino / Rasberry Pi.
- To apply the use of data analytics in IoT.
- To develop applications of IoT in Industrial contexts.

| UNIT I | ARCHITECTURES AND MODELS | 9 Hours |
|---|---|---|

Introduction to IoT – IoT Architectures – Core IoT Functional Stack, Sensors and Actuators Layer, Communications Network Layer, Applications and Analytics Layer – IoT Data Management and Compute Stack, Fog Computing, Edge Computing, Cloud Computing – Sensors, Actuators, Smart Objects, Sensor networks.

| UNIT II | CONNECTIVITY | 9 Hours |
|---|---|---|

Communications Criteria – Access Technologies – IP as IoT Network Layer – Business case – Optimization – Profiles and compliances – Application Protocols – Transport Layer – Application Transport Methods.

| UNIT III | SYSTEM DEVELOPMENT | 9 Hours |
|---|---|---|

Design Methodology – Case study – Basic blocks of IoT device – Raspberry Pi – Board, Interfaces, Linux, Setting up, Programming – Arduino – Other IoT Devices.

| UNIT IV | DATA ANALYTICS AND IoT SECURITY | 9 Hours |
|---|---|---|

Data Analytics for IoT – Big Data Analytics Tools and Technology – Edge Streaming Analytics – Network Analytics.Applications.Security history, challenges, variations – Risk Analysis Structures – Application in Operational Environment.

| UNIT V | IoT IN INDUSTRY | 9 Hours |
|---|---|---|

Manufacturing, Architecture, Protocols – Utilities, Grid Blocks - Smart Cities, Architecture, Use cases – Transportation, Architecture, Use cases.

## Course Outcomes:

- **Upon completion of the course, the students will be able to**
- Explain the underlying architectures and models in IoT.
- Analyse different connectivity technologies for IoT.
- Develop simple applications using Arduino / Raspberry Pi.
- Apply data analytics techniques to IoT.
- Study the needs and suggest appropriate solutions for Industrial applications.

**Text books:**
1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things", Cisco Press, 2017
2. Olivier Hersent, David Boswarthick, Omar Elloum, "The Internet of Things – Key applications and Protocols", Wiley, 2012.
3. Michael Miller, "The Internet of Things", Pearson Education, 2015.

**Reference Books:**
1. Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A hands-on approach", Universities Press, 2015.
2. Jan Ho¨ ller, VlasiosTsiatsis, Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle,"From Machine - to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.
3. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), "Architecting the Internet of Things", Springer, 2011.

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## Course Objective:

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| LIST OF EXPERIMENTS | 30 Periods |
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## Course Outcomes:

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