

**Nirma University**  
**Institute of Technology, School of Technology**  
**MTech Computer Science and Engineering/ MTech Computer Science and**  
**Engineering (Cyber Security)**  
**Semester – II**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
3	0	2	4

<b>Course Code</b>	6CS264
<b>Course Name</b>	Internet of Things

**Course Learning Outcomes (CLOs):**

At the end of the course, students will be able to

1. comprehend the architectural components and platforms of IoT ecosystem
2. apply appropriate access technology and protocol as per the application requirement
3. identify data analytics and data visualization tools as per the problem characteristics

**Syllabus:**

**Teaching  
Hours**

**Unit I**

Introduction, applications, need and scope of IoT, Various IoT architectures, functional stack, Processors and Operating Systems for resource constrained devices

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**Unit II**

Sensors and actuators, smart objects, Connecting objects, protocols and access technologies like IEEE802.15.4, LFNBPCLC, LoRaWAN, WirelessHART, LTE-M, BLE, NB-IoT, Sigfox, White-Fi and HaLow

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**Unit III**

IoT network layer, IPv6: IPv6 structure, addressing, routing, interconnecting issues, 6LoWPAN: forwarding, addressing, header compression, neighbour discovery, Routing in LLN, RPL

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**Unit IV**

Application layer protocols, CoAP, MQTT, AMQP, XMPP, Integrating Internet Services with Interoperable data encoding with XML, JSON and CBOR, Sensor data models and representation, The Sensor Mark-up Language (SENML), lightweight web services for IoT

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**Unit V**

Data analytics for IoT, machine learning, big data analytics tools and technology like NoSQL, Hadoop

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## Unit VI

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Securing IoT, Challenges in IoT security, provisions for securing IoT network

## Unit VII

Case studies on IoT applications: Connected Vehicles, Autonomous Vehicles, Industrial Applications of IoT

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### Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

### Laboratory Work:

Laboratory work will be based on above syllabus with minimum 6 experiments to be incorporated.

### Suggested Readings<sup>^</sup>:

1. David Hanes, G. Salgueiro, IoT Fundamentals - Networking Technologies, Protocols, and Use Cases for Internet of Things, Cisco Press
2. Jean-Philippe Vasseur, Adam Dunkels, Interconnecting Smart Objects with IP: The Next Internet, Morgan Kaufmann
3. Pethuru Raj, Anupama Raman, The Internet of Things - Enabling Technologies, Platforms and Use Cases, CRC Press
4. Robert Stackowiak, Art Licht, VenuMantha and Louis Nagode, Big Data and The Internet of Things, Apress
5. Peter Waher, Learning Internet of Things, Packt Publishing Ltd
6. Daniel Kellmerit, Daniel Obodovski, The Silent Intelligence: The Internet of Things, DND Ventures
7. Olivier Hersent, David Boswarthick, Omar Elloumi, The Internet of Things: Key Applications and Protocols, Wiley Publications

L=Lecture, T=Tutorial, P=Practical, C=Credit

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<sup>^</sup>this is not an exhaustive list

