Nirma University
Institute of Technology
B.Tech. Computer Science and Engineering
Semester VI
Department Elective-II

L	T	P	C
3	0	2	4

Course Code	2CSDE66
Course Title	Internet of Things

Course Outcomes:

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 protocols as per the application requirement
3. appreciate the role of big data, cloud computing and data analytics in a typical IoT system
4. design applications with suitable lightweight data processing and communication methodologies

Syllabus:

Teaching Hours: 45

Unit I — **06**
Introduction, applications, need and scope of IoT, IoT reference model and Various IoT architectures, functional stack, Processors and Operating Systems for resource constrained devices

Unit II — **11**
M2M Communication, Sensors and actuators, smart objects, Connecting objects, protocols and access technologies like IEEE802.15.4, LoRaWAN, LTE-M, BLE, NB-IoT, Sigfox

Unit III — **07**
IoT network layer, 6LoWPAN, IPv6: IPv6 structure, addressing, routing, interconnecting issues, 6LoWPAN: forwarding, addressing, header compression, neighbour discovery, Routing in LLN, RPL

Unit IV — **09**
Application layer protocols, CoAP, MQTT, AMQP, XMPP, Integrating Internet Services with Interoperable data encoding with XML, JSON and CBOR, Sensor data models and representation, lightweight web services for IoT

Unit V
Data analytics for IoT, machine learning, Big Data Analytics tools like NoSQL, Hadoop — **05**

Unit VI — **04**
Securing IoT, Challenges in IoT security, provisions for securing IoT network

Unit VII — **03**

Case studies on IoT applications: Connected Vehicles and Autonomous Vehicles, Industrial IoT, IoMT(Internet of Medical Things), Smart Grid

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 the above syllabus with minimum 6 experiments to be incorporated.

Suggested Readings^:

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 Kellmereit, 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

^this is not an exhaustive list