

COURSE TITLE	INTERNET OF THINGS
COURSE CODE	01CT1620
COURSE CREDITS	3

Objective:

- 1 This course explores the fundamentals of electronic communication systems it provides the knowledge of various analog and digital modulation and demodulation techniques used in communication system. Comparison of various techniques will enable the student to select most appropriate technique for the application

Course Outcomes: After completion of this course, student will be able to:

- 1 Understand basics of analog and digital communication techniques
- 2 Learn working of AM-FM Transmitters and receivers.
- 3 Facilitate the understanding of the baseband and carrier modulation.
- 4 Understand the effect and performance of communication systems in presence of noise
- 5 Analyse Communication System based on different Modulation & Demodulation Techniques and analyse performance.

Pre-requisite of course: Introduction to Single Board Computer Programming, Computer Networks, Internet and Web Technology

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	0	50	30	20	0	0

Contents : Unit	Topics	Contact Hours
1	Introduction to Internet of Things Definitions, Core Concepts, Related Concepts, Challenges, IoT framework, IoT Reference Models, IoT Architecture: IoTWF architecture, IoT Architecture: IoTWF architecture, architecture of edge computing, OPC unified architecture, oneM2M	7
2	Hardware in IoT RFID, Sensors, Actuators, MEMS, Smart Objects, IoT Hardware Boards, Case study – Sensor tag energy harvesting, batteries and super capacitors,	6
3	Communication technology in IoT Communication Criteria, Access technologies and communication protocols:, Bluetooth, BLE, LoRaWAN, WirelessHART, Zwave, LTE-M, NB-IoT, Sigfox, 6LowPAN, 6TiSCH, LLN, RPL	8

Contents : Unit	Topics	Contact Hours
4	Cloud and IoT MQTT, Publish-Subscribe Operation, Packet Structure, Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP)-(TLS, DTLS), Session Layer- HTTP, XMPP, AMQP, 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, ContikiOS	8
5	Security in IoT protocols and technologies, Lightweight formats for crypto security, CoAP, DTLS, Object security for constrained RESTful environments, OAuth based authorization, Denial of Service attacks, selective jamming in wireless networks, Intrusion detection systems and firewalls	8
6	Recent trends in IoT IoT application domains: Smart Cities, Smart Manufacturing, Smart Grid, Smart Buildings, Intelligent Transportation Systems, Healthcare	5
Total Hours		42

Textbook :

- 1 Internet of Things A to Z Technologies and Applications, Qusay F. Hassan, Wiley, 2018
- 2 IoT Fundamentals Networking Technologies, Protocols, and Use Cases for the Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, Pearson Education, 2017
- 3 From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence, Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Elsevier Science, 2014
- 4 The Internet of Things Enabling Technologies, Platforms, and Use Cases, Pethuru Raj, Anupama C. Raman , CRC Press, 2017

References:

- 1 IEEE Standard for an Architectural Framework for the Internet of Things (IoT), IEEE Standard for an Architectural Framework for the Internet of Things (IoT), IEEE, IEEE, 2020

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
15.00	30.00	20.00	15.00	10.00	10.00

Instructional Method:

- 1 The course delivery method will depend upon the requirement of the content and need of the students. The teacher in addition to the conventional teaching method (Chalk and Talk) may use any of the tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc. for effective teaching.
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the class-room

Supplementary Resources:

- 1 <https://www.coursera.org/specializations/iot>
- 2 <https://www.coursera.org/specializations/internet-of-things>
- 3 <https://nptel.ac.in/courses/106/105/106105166/>