

Course Name: **MTech Exec (CS) 4th Semester**

Subject Code: **CS-6630**

Subject Name: **Internet of Things**

Aim of the Subject

To impart knowledge with a solid theoretical foundation, and strong practical skills in the fields of computer technology, communications networks and IT, that are required to develop a wide range of IoT applications.

Learning Outcomes

The students are expected to learn following after completion of the course:

-
-

Unit 1

Introduction to IoT: Definition, Characteristics, Conceptual framework, Architectural view.

Technology involved - Server-end technology, Hardware and Software components, Development tools & Open source framework, APIs & Device interfacing components, Platforms & Integration tools, Sources of IoT, Advantages and Disadvantages of IoT.

Machine-to-Machine Communication: Definition, M2M Vs. IoT, M2M architecture.

Unit 2

Design principles for connected devices: Communication Technologies – Near-field communication, RFID, Bluetooth, Zigbee (ZigBee IP/ZigBee SE 2.0), Wi-Fi, GPRS/GSM cellular Networks-Mobile Internet.

Design principles for web connectivity: Constrained Application Protocol (CoAP), MQTT, XMPP.

Data formats: JSON, XML, TLV, MIME.

Connectivity Models: Request/Response, Publish/Subscribe, Pull/ Push Data, Message cache, Message queue.

Gateway Protocols for Web Connectivity: HTTP, SOAP, REST, RESTful HTTP and WebSockets.

Unit 3

Data Acquiring: Data generation, Data Acquisition, Data validation, Data categorization for storage, Data Store – definition, Key/value store, Document store, tabular store (Column Family & Big Table), Object store, Graph Stores-Graph Databases

Data Organizing: Definition, DBMS-ACID rules, Distributed database, CAP theorem , Query processing, SQL, NoSQL, ETL, MPP, in-memory databases , columnar database.

Unit 4

Data Processing: Definition, Online transactions and processing (OLTP), Stream processing, Real-Time processing, Event Stream processing, Business process, Business Intelligence, Distributed Business Process, Enterprise Systems, Service Oriented Architecture(SOA).

Data Analytics: Definition, Analytics phases- Descriptive, Predictive, Prescriptive), Online analytical processing (OLAP), Statistical tools for data analysis -descriptive and inferential statistics, random analysis, sampling concept, Sampling distribution techniques, statistical inference, regression analysis.

Machine Learning basics: Supervise and un-supervised techniques,

Big Data analytics - Big data definition, Characteristics, Big data Classifications on the basis of: sources, format, stores, analysis, type, users, rate.

Big data Analytics: Architecture, Hadoop components, Berkley Data Analytics Stack (BDAS) Architecture.

Knowledge Management: Definition, Knowledge Management Reference Architecture.

Unit 5

Cloud Storage models and communication APIs for IoT, IoT Privacy, Security and Vulnerabilities Issues and Solutions, Prototyping and designing the software for IoT applications, Interoperability in IoT.

Introduction to Arduino Programming: Integration of Sensors and Actuators with Arduino.

IoT Case Studies: Agriculture, Healthcare, SCM, Connected Cars, Smart city, Smart Home.

Text Book(s)

1. Adrian McEwen, Hakim Cassimally, "Designing the Internet of Thing", Wiley
2. Rajkamal, "Internet of Things: Architecture and Design Principles", McGraw Hill Education, 2017.

Reference Material(s)

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
2. Dr. Ovidiu Vermesa

Course Name: **MTech Exec (CS) 4th Semester**

Subject Code: **CS-6624**

Subject Name: **Network Management & Cyber Security**

Aim of the Subject

To familiarize the student with the design, analysis, operation and management of data communications networks.

Learning Outcomes

The students are expected to learn following after completion of the course:

-
-

Unit 1

Introduction: Computer Network, Goals and Applications, Data Communications and Network Management Overview : Communications protocols and Standards. Case Histories of Networking and Management, Network Management: Goals, Organization, and Functions, Network and System Management, Network Management System Platform, Current Status and future of Network Management.

Fundamentals of computer network technology: Network Topology, LANs, Network node components Hubs, Bridges, Routers, Gateways, Switches, WAN, ISDN Transmission Technology. Network Management Standards, Network Management Model, Organization Model, Information Model, Communication Model, ASN.1, Encoding Structure.

Unit 2

SNMPv1 Network Management: Managed network: Case Histories and Examples, The History of SNMP Management. The SNMP Model, The Organization Model, System Overview. The Information Model, The SNMP Communication Model, Functional Model.

SNMPv2 Management: Major Changes in SNMPv2, SNMPv2 System Architecture, SNMPv2 Structure of Management Information. The SNMPv2 Management Information Base, SNMPv2 Protocol, Compatibility with SNMPv1.

Unit 3

SNMP Management-RMON: Introduction, RMON SMI and MIB, RMON1.

Broadband Network Management-ATM Networks: Broadband Networks and Services, ATM Technology, ATM Network Management.

Unit 4

Broadband Network Management: Broadband Access Networks and Technologies, HFC Technology, HFC Management, DSL Technology, ADSL Technology, ADSL Management.

Telecommunication Management Network: Introduction, Operations Systems, TMN conceptual Model, TMN Architecture, TMN Management Service Architecture, An integrated view of TMN.

Unit 5

Network Management Tools and Systems: Network Management Tools, Network Statistics Measurement Systems, History of Enterprise Management. Network Management systems, Commercial Network management Systems, System Management, Enterprise Management Solutions.

Network Management Applications: Configuration management, Fault management, performance management. Event Correlation Techniques, security Management, Accounting management, Report Management, Policy Based Management Service Level Management.

Text Book(s)

- Mani Subrahmanian, Network Management: Principles and Practice, Pearson Education, 2nd Edition 2010.

Reference Material(s)

- Morris, Network management, Pearson Education.
- Mark Burges, Principles of Network System Administration, Wiley Dreamtech Publication.
- Paul, Distributed Network Management, John Wiley Publication.
- Andrew S. Tanenbaum, Computer Networks, Addison-Wes