

## MTCST205, MTBDA205 :INTERNET OF THINGS

(Common Elective for MTech CST and MTech CST with Big Data Analytics)

Theory : 4 Hrs/week

Credits : 4

Int Marks : 25

Ext Marks : 75

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### UNIT – I

**Introduction to Internet of Things:** Definition & Characteristics of IoT, Physical Design of IoT Logical Design of IoT, IoT Enabling Technologies, IoT Levels & Deployment Templates Domain Specific IoTs: Home, Cities, Environment, Energy systems, Logistics, Agriculture, Health & Lifestyle

### UNIT – II

**IOT & M2M:** Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT, 1 Need for IoT Systems Management, Simple Network Management Protocol (SNMP) , Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IoT Systems Management with NETCONF-YANG, NETOPEER

### UNIT – III

**IoT Platforms Design Methodology:** IoT Design Methodology, Case Study on IoT System for Weather Monitoring , Motivation for Using Python , IoT Systems - Logical Design using Python ,Installing Python , Python Data Types & Data Structures ,Control Flow , Functions, Modules, Packages , File Handling I, Date/Time Operations , Classes ,Python Packages of Interest for IoT

### UNIT – IV

**IoT Physical Devices & Endpoints:** Raspberry Pi , About the Board , Linux on Raspberry Pi , Raspberry Pi Interfaces , Programming Raspberry Pi with Python , Other IoT Devices, IoT Physical Servers & Cloud Offerings , Introduction to Cloud Storage Models & Communication APIs , WAMP - AutoBahn for IoT , Xively Cloud for IoT , Python Web Application Framework - Django , Designing a RESTful Web API , Amazon Web Services for ,SkyNetIoT Messaging Platform

#### Text Book:

1. Internet of Things, A. Bahgya and V. Madiseti, Univesity Press, 2015

#### Reference Book:

1. Fundamentals of Python, K.A. Lambert and B.L. Juneja, Cengage Learning, 2012

## MTCST205, MTBDA205: WEB TECHNOLOGIES

(Common Elective for MTech CST and MTech CST with Big Data Analytics)

Theory : 4 Hrs/week

Credits : 4

Int Marks : 25

Ext Marks : 75

### UNIT- I

**Introduction:** The World Wide Web, Web Browsers, Web Servers, Uniform Resource Locators, Introduction and Web Development Strategies, History of Web and Internet, Protocols governing Web, Connecting to Internet, Introduction to Internet services and tools, Introduction to client-server computing.

**Introduction to HTML/XHTML:** Origins and Evolution of HTML and XHTML, Basic Syntax of HTML, Standard HTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists, Tables, Forms, HTML5, Syntactic Differences between HTML and XHTML.

**Introduction to Java Script:** Objects in Java Script. Dynamic HTML, Java Script – declaring variables, scope of variables, functions, even handlers (onclick, onsubmit,...etc), form validations

### UNIT- II

**XML:** Introduction to XML, Defining XML tags, their attributes and values, Document Type Definition, XML Schemes, Document Object Model, XHTML Parsing XML Data – DOM and SAX Parsers in java. XML AJAX A New Approach: Introduction to AJAX. Consuming WEB services in AJAX: (SOAP, WSDL).

**Introduction to PERL:** Perl language elements, Interface with CGI- A form to mail program, Simple page search

### UNIT- III

**Introduction to Servlets:** Common Gateway Interface (CGI), Life cycle of a Servlet, deploying a servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Handling Http Request & Responses, Using Cookies and Sessions, connecting to a database using JDBC.

**Introduction to JSP:** The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Cookies and session for session tracking, connecting to database in JSP.

### UNIT- IV

**Introduction to PHP:** Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, Reading data from web form controls like text boxes, radio buttons, and lists etc., Handling File Uploads. Connecting to database (MySQL as reference), executing simple queries, handling results, Handling sessions and cookies

**File Handling in PHP:** File operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories.

### Text Books:

1. Deitel H.M. and Deitel P.J., “Internet and World Wide Web How to program”, Pearson International, 2012, 4th Edition. (Ch-1,4,5,6,12,14,26,27)
2. Programming the World Wide Web, Robert W Sebesta, 7ed, Pearson.
3. Advanced Java 2 Platform How to Program, Deitel/Deitel/Santry 3.
4. Java Server Pages –Hans Bergsten, SPD O’Reilly
5. The Complete Reference PHP — Steven Holzner, Tata McGraw-Hill

**MTCST206:CYBER SECURITY**  
**(M.Tech CST)**

**Theory : 4 Hrs/week**

**Credits : 4**

**Int Marks : 25**

**Ext Marks : 75**

**UNIT – I**

**Information Security and Threats:** Information Security, Information Assets, Threats to Information Assets

**Fundamentals of Information Security:** Elements of information security, Principles and concepts – data security, Types of controls

**UNIT – II**

**Data Leakage:** Introduction – Data Leakage, Organizational Data Classification, Location and Pathways, Content Awareness, Content Analysis Techniques, Data Protection, DLP Limitations, DRM-DLP Conundrum.

**Information Security Policies, Procedures, Standards and Guidelines:** Information Security Policies, Key Elements of a Security Policy, Security Standards, Guidelines and Frameworks, Laws, Regulations and Guidelines

**UNIT – III**

**Information Security Performance Metrics:** Introduction – Security Metrics, Types of Security Metrics, Using Security Metrics, Developing the Metrics Process, Metrics and Reporting, Designing Information Security Measuring Systems

**Risk Assessment:** Risk Overview, Risk Identification, Risk Analysis, Risk Treatment, Risk Management Feedback Loops, Risk Monitoring

**UNIT – IV**

**Log Correlation and Management:** Event Log Concepts, Log Management and its need Log Management Process, Configuring Windows Event Log, IIS Log Files, Analysis and Response

**Data Backup:** Data Backup, Types of Backup, Backup Procedures, Types of Storage, Features of a Good Backup Strategy

**Text Books:**

1. NASSCOM, Handbook of Security Analyst, SSC/Q0901, 2015.
2. Jennifer L. Bayuk, J. Healey, P. Rohmeyer, Marcus Sachs, Jeffrey Schmidt, Joseph Weiss Cyber Security Policy Guidebook, John Wiley & Sons 2012.

**Reference Books:**

1. Rick Howard, Cyber Security Essentials, Auerbach Publications 2011.
2. Richard A. Clarke, Robert Knake, Cyberwar: The Next Threat to National Security & What to Do About It, Ecco 2010.
3. Dan Shoemaker Cyber security The Essential Body of Knowledge, 1st ed. Cengage Learning 2011.
4. Augustine, Paul T., Cyber Crimes and Legal Issues”, Crecent Publishing Corporation, 2007.

**MTCST206: IMAGE PROCESSING**  
**(M.Tech CST)**

**Theory** : 4 Hrs/week

**Credits** : 4

**Int Marks** : 25

**Ext Marks** : 75

**UNIT- I**

**Fundamentals of Image Processing:** Image Acquisition, Image Model, Sampling, Quantization, Relationship Between Pixels, Distance Measures, Connectivity, Image Geometry, Photographic Film.

**Histogram:** Definition, Decision Of Contrast Basing On Histogram, Operations Basing on Histograms Like Image Stretching, Image Sliding, Image Classification. Definition and Algorithm of Histogram Equalization.

**UNIT- II**

**Image Transforms:** A Detail Discussion On Fourier Transform, DFT,FFT,

**Image Enhancement:**

- a) Arithmetic and Logical Operations, Pixel or Point Operations, Size Operations,
- b) Smoothing Filters-Mean, Median, Mode Filters – Comparative Study
- c) Edge Enhancement Filters – Directorial Filters, Sobel, Laplacian, Robert, KIRSCH Homogeneity
- d) Low Pass Filters, High Pass Filters, Sharpening Filters. – Comparative Study

**UNIT-III**

**Image Enhancement:** Design of Low Pass, High Pass, EDGE Enhancement, Smoothing Filters in Frequency Domain. Butter Worth Filter, Homomorphic Filters in Frequency Domain Advantages of Filters in Frequency Domain, Comparative Study of Filters in Frequency, Domain and Spatial Domain.

**Image Compression:** Run Length Encoding, Contour Coding, Huffman Code, Compression Due to Change in Domain, Compression Due to Quantization Compression at the Time of Image Transmission. Brief Discussion on:- Image Compression Standards.

**UNIT-IV**

**Image Segmentation:** Characteristics of Segmentation, Detection of Discontinuities, Thresholding Pixel Based Segmentation Method. Region Based Segmentation Methods, Segmentation by Pixel Aggregation, Segmentation by Sub Region Aggregation, Histogram Based Segmentation, Spilt and Merge Technique, Motion in Segmentation.

**Morphology:** Dilation, Erosion, Opening, Closing, Hit-And-Miss Transform, Boundary Extraction, Region Filling, Connected Components, Thinning, Thickening, Skeletons, Pruning Extensions to Gray – Scale Images, Application of Morphology in IP

**Text Book:**

1. Digital Image Processing, Rafael C. Gonzalez And Richard E. Woods, Addison Wesley

**Reference Books:**

1. Fundamentals Of Electronic Image Processing By Arthyr –R – Weeks, Jr.(PHI)
2. Image Processing, Analysis, And Machine Vision By Milan Sonka Vaclan Halava Roger Boyle, Vikas Publishing House.
3. Digital Image Processing, S. Jayaraman, S. Esakkirajan& T. Veera Kumar, TMH
4. Fundamentals of Digital Image Processing, Chris Solomon, Tobi Breckon, Wiley-Blackwell

**MTBDA206: PARALLEL AND DISTRIBUTED DATABASES**  
(MTech CST with Big Data Analytics)

<b>Theory</b>	<b>: 4 Hrs/week</b>	<b>Credits</b>	<b>: 4</b>
<b>Int Marks</b>	<b>: 25</b>	<b>Ext Marks</b>	<b>: 75</b>

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**UNIT – I**

**Introduction to Parallel Databases:** Need of Parallelism - Forms of parallelism – Parallel Database Architectures – Basic Operations in Parallel Databases - Parallel Search Queries – Parallel Search Algorithms – Serial External Sort and Parallel External Sort Algorithms - Parallel Algorithms for Group By Queries - Serial Join and Parallel Join Algorithms.

**UNIT -II**

**Advanced Query Processing In Parallel Databases:** Parallel indexing Structures: Non Replicated, Partially Replicated, Fully Replicated Indexing Structures, Parallel Processing of One Index and Multi Index Search Queries, Parallel One Index and Two Index Join, Serial and Parallel Subquery Execution Scheduling Strategies, Skewed and Non Skewed Subqueries..

**UNIT- III**

**Introduction to Distributed Databases (DDB):** What is a DDB? - Promises of DDB – Design Issues: DDB Design, Query Processing, Concurrency Control and Deadlock Management, DDB Architecture: Centralised, Client-Server, Peer to Peer, Multidatabase System Architectures, Views in Centralised and DDBs.

**Query Processing in Distributed Databases :** Objectives of Query Processing – Query Decomposition: Normalization, Elimination of Redundancy, Rewriting- Localization of Distributed Data: Reduction for Horizontal, Vertical, Derived and Hybrid Fragmentation – Centralised Query Optimization: Statics, Dynamic and Hybrid- Distributed Query Optimization: Static, Dynamic, Hybrid.

**UNIT- IV**

**Transaction Management:** Properties of Transactions - Types of Transactions - Distributed Concurrency Control Algorithms: Centralised 2PL, Distributed 2PL – Deadlock Management: Deadlock Prevention, Avoidance, Detection and Resolution - Distributed DBMS Reliability: Failures in Distributed DBMS, Distributed Reliability Protocol 2PC – Consistency of Replicated Databases: Mutual and Transaction Consistency, Replication Protocols – Eager Centralised, Eager Distributed, Lazy Centralised and Lazy Distributed Protocols.

**Text Books:**

1. David Taniar, Clement H.C.Leung, Wenny Rahayu, Sushant Goel , “High Performance Parallel Database Processing and Grid Databases” , Wiley-Blackwell.
2. M. Tamer Ozsu and Patrick Valduriez, “Principles of Distributed Database Systems”, Springer Science Business Media , Third Edition, 2011

**Reference Books:**

1. Saeed K Rahimi, Frank S Haug “Distributed Database Management Systems: A Practical Approach” Wiley – IEEE Computer Society

**MTBDA206: NATURAL LANGUAGE PROCESSING**  
**(M.Tech CST with Big Data Analytics)**

<b>Theory</b>	<b>: 4 Hrs/week</b>	<b>Credits</b>	<b>: 4</b>
<b>Int Marks</b>	<b>: 25</b>	<b>Ext Marks</b>	<b>: 75</b>

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**UNIT- I**

**Overview and Language Modeling:** Origins and challenges of NLP-Language and Grammar-Processing Indian Languages-NLP Applications-Information Retrieval. Language Modelling: Introduction-Variou Grammar-based Language Models-Statistical Language Model

**Word Level Analysis:** Introduction- Regular Expressions-Finite-State Automata-Morphological Parsing-Spelling Error Detection and correction-Words and Word classes-Part-of Speech Tagging.

**UNIT- II**

**Syntactic & Semantic Analysis:** Introduction-Context-free Grammar-Constituency Parsing-Probabilistic Parsing. Introduction- Meaning Representation-Lexical Semantics Ambiguity-Word Sense Disambiguation.

**Discourse Processing:** Introduction- cohesion-Reference Resolution Discourse Coherence and Structure

**UNIT- III**

**Natural Language Generation:** Introduction-Architecture of NLG Systems Generation Tasks and Representations-Application of NLG.

**Machine Translation:** Introduction-Problems in Machine Translation Characteristics of Indian Languages- Machine Translation Approaches-Translation involving Indian Languages

**UNIT- IV**

**Information Retrieval:** Introduction-Design features of Information Retrieval Systems-Classical, Non-classical, Alternative Models of Information Retrieval – Evaluation

**Lexical Resources:** Introduction – WordNet – FrameNet – Stemmers - POS Tagger Research Corpora

**Text Book:**

1. Tanveer Siddiqui, U.S. Tiwary, “Natural Language Processing and Information Retrieval”, Oxford University Press, 2008.

**Reference Books:**

1. Daniel Jurafsky and James H Martin, “Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition”, Prentice Hall, 2nd Edition, 2008.
2. James Allen, Benjamin/cummings, “Natural Language Understanding”, 2nd edition, 1995