DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
UNIVERSITY COLLEGE OF ENGINEERING (A): JNTU KAKINADA

M.Tech- INFORMATION TECHNOLOGY - COURSE STRUCTURE

Academic Year 2016-17

M TECH – IT- I —SEMESTER

S.NO	SUBJECT	L	P	C
1	ADVANCED DATA STRUCTURES AND ALGORITHM ANALYSIS	4	—	3
2	ADVANCED GRAPH THEORY	4	—	3
3	PARALLEL ALGORITHMS	4	—	3
4	DATA MINING AND KNOWLEDGE DISCOVERY	4	—	3
5	ADVANCED COMPUTER NETWORKS	4	—	3
6	WEB TECHNOLOGIES	4	--	3
7	IT LAB 1	—	3	2
	TOTAL			20

M TECH – IT- II— SEMESTER

S.NO	SUBJECT	L	P	C
1	ADVANCED UNIX PROGRAMMING	4	—	3
2	APPLIED CRYPTOGRAPHY	4	—	3
3	BIG DATA ANALYTICS	4	—	3
4	CLOUD COMPUTING	4	—	3
5	**Elective – 1** ADHOC & SENSOR NETWORKS SEMANTIC WEBSERVICES PRINCIPLES OF PROGRAMMING LANGUAGES INTERNET OF THINGS	4	—	3
6	**Elective - 2** MACHINE LEARNING INFORMATION RETRIEVAL SYSTEM IMAGE PROCESSING & PATTERN RECOGNITION SOFTWARE TESTING METHODOLOGIES	4	--	3
7	IT LAB 2	—	3	2
	TOTAL			20

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III —SEMESTER

S.NO	SUBJECT	L	P	C
1	COMPREHENSIVE VIVA	—	—	2
2	SEMINAR-I	—	—	2
3	THESIS WORK PART - I	—	—	16
	TOTAL			20

IV— SEMESTER

S.NO	SUBJECT	L	P	C
1	SEMINAR-II	—	—	2
2	THESIS WORK PART - II	—	—	18
	TOTAL			20

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ADVANCED DATA STRUCTURES AND ALGORITHM ANALYSIS

UNIT- I
Introduction to Data Structures, Singly Linked Lists, Doubly Linked Lists, Circular Lists-Algorithms. Stacks and Queues: Algorithm Implementation using Linked Lists.

UNIT-II
Searching-Linear and Binary Search Methods.Sorting-Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort.Trees- Binary trees, Properties, Representation and Traversals (DFT,BFT),Expression Trees(Infix,prefix,postfix).Graphs-Basic Concepts , Storage Structures and Traversals.

UNIT- III
Dictionaries, ADT, The List ADT, Stack ADT, Queue ADT, Hash Table Representation, Hash Functions, Collision Resolution-Separate Chaining, Open Addressing-Linear Probing, Double Hashing.

UNIT- IV
Priority queues- Definition, ADT, Realising a Priority Queue Using Heaps, Definition, Insertion, Deletion .Search Trees- Binary Search Trees, Definition, ADT, Implementation,Operations-Searching, Insertion, Deletion.

UNIT -V
Search Trees- AVL Trees, Definition, Height of AVL Tree, Operations, Insertion, Deletion and Searching.Search Trees- Introduction to Red-Black and Splay Trees, B-Trees,Height of B-Tree, Insertion, Deletion and Searching, Comparison of Search Trees.

TEXT BOOKS:
1. Data Structures: A PseudoCode Approach, 2/e, Richard F.Gilberg, Behrouz A. Forouzon, Cengage.
2. Data Structures, Algorithms and Applications in java, 2/e, Sartaj Sahni,University Press.

REFERENCES BOOKS:
1. Data Structures And Algorithm Analysis, 2/e, Mark Allen Weiss,Pearson.
2. Data Structures And Algorithms, 3/e, Adam Drozdek, Cenage.
3. C and DataStructures: A Snap Shot Oriented Treatise Using Live Engineering Examples, N.B.Venkateswarulu, E.V.Prasad, S Chand & Co,2009.

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ADVANCED GRAPH THEORY

UNIT I:
Basic Concepts: Graphs and digraphs, incidence and adjacency matrices, isomorphism, the automorphism group;
Trees: Equivalent definitions of trees and forests, Cayley's formula, the Matrix-Tree theorem,

UNIT II:
Connectivity: Cut vertices, cut edges, bonds, the cycle space and the bond space, blocks, Menger's theorem;
Paths and Cycles: Euler tours, Hamilton paths and cycles, theorems of Dirac, Ore, Bondy and Chvatal, circumference, the Chinese Postman Problem, the Traveling Salesman problem, diameter and maximum degree

UNIT III:
Matchings: Berge's Theorem, perfect matchings, Hall's theorem, Tutte's theorem, Konig's theorem, Petersen's theorem, algorithms for matching and weighted matching (in both bipartitie and general graphs), factors of graphs (decompositions of the complete graph), Tutte's f-factor theorem;
Extremal problems: Independent sets and covering numbers, Turan's theorem, Ramsey theorems;

UNIT IV:
Colorings: Brooks theorem, the greedy algorithm, the Welsh-Powell bound, critical graphs, chromatic polynomials, girth and chromatic number, Vizing's theorem;
Graphs on surfaces: Planar graphs, duality, Euler's formula, Kuratowski's theorem, toroidal graphs, 2-cell embeddings, graphs on other surfaces;

UNIT IV:
Directed graphs: Tournaments, directed paths and cycles, connectivity and strongly connected digraphs
Networks and flows: Flow cuts, max flow min cut theorem
Selected topics: Dominating sets, the reconstruction problem

TEXT BOOKS:
1. Douglas B. West, Introduction to Graph Theory, Prentice Hall of India.
2. Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science. Prentice-Hall.

REFERENCE BOOKS:
1. Frank Harary, Graph Theory, Narosa.
2. R. Ahuja, T. Magnanti, and J. Orlin, Network Flows: Theory, Algorithms, and Applications, Prentice-Hall.

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PARALLEL ALGORITHMS

UNIT1: Introduction :
Computational demand in various application areas, advent of parallel processing, terminology-pipelining, Data parallelism and control parallelism-Amdahl's law.

UNIT II: Scheduling:
Organizational features of Processor Arrays, Multi processors and multi-computers. Mapping and scheduling aspects of algorithms. Mapping into meshes and hyper cubes-Load balancing-List scheduling algorithm Coffman-graham scheduling algorithm for parallel processors.

UNIT III: Algorithms :
Elementary Parallel algorithms on SIMD and MIMD machines, Analysis of these algorithms. Matrix Multiplication algorithms on SIMD and MIMD models. Fast Fourier Transform algorithms. Implementation on Hyper cube architectures. Solving linear file - system of equations, parallelizing aspects of sequential methods back substitution and Tri diagonal.

UNIT IV: Sorting:
Parallel sorting methods, Odd-even transposition Sorting on processor arrays, Biotonic ,merge sort on shuffle - exchange ID , Array processor,2D-Mesh processor and Hypercube Processor Array. Parallel Quick-sort on Multi processors. Hyper Quick sort on hypercube multi computers. Parallel search operations. Ellis algorithm and Manber and ladner's Algorithms for dictionary operations.

UNIT V: Searching
Parallel algorithms for Graph searching, All Pairs shortest paths and inimum cost spanning tree. Parallelization aspects of combinatorial search algorithms with Focus on Branch and Bound Methods and Alpha-beta Search methods.

TEXT BOOKS:

1. Parallel computing theory and practice, Michel J.Quinn
2. Programming Parallel Algorithms, Guy E. Blelloch, Communications of the ACM

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DATA MINING AND KNOWLEDGE DISCOVERY

Unit 1:
Introduction to Data mining, types of Data, Data Quality, Data Processing, Measures of Similarity and Dissimilarity, Exploring Data: Data Set, Summary Statistics, Visualization, OLAP and multi dimensional data analysis.

Unit 2:
Classification: Basic Concepts, Decision Trees and model evaluation: General approach for solving a classification problem, Decision Tree induction, Model over fitting: due to presence of noise, due to lack of representation samples, Evaluating the performance of classifier. Nearest Neighborhood classifier, Bayesian Classfier, Support vector Machines: Linear SVM, Separable and Non Separable case.

Unit 3:
Association Analysis: Problem Definition, Frequent Item-set generation, rule generation, compact representation of frequent item sets, FP-Growth Algorithms. Handling Categorical , Continuous attributes, Concept hierarchy, Sequential , Sub graph patterns

Unit 4:
Clustering: Over view, K-means, Agglomerative Hierarchical clustering, DBSCAN, Cluster evaluation: overview, Unsupervised Cluster Evaluation using cohesion and separation, using proximity matrix, Scalable Clustering algorithm

Unit 5:
Web data mining: Introduction, Web terminology and characteristics, Web content mining, Web usage mining, web structure mining, Search Engines :Characteristics, Functionality, Architecture, Ranking of WebPages, Enterprise search

TEXT BOOKS:
1. Introduction to Data Mining: Pang-Ning tan, Michael Steinbach, Vipinkumar, Addision- Wesley.
2. Introduction to Data Mining with Case Studies: GK Gupta; Prentice Hall.

REFERENCE BOOKS:
1. Data Mining: Introductory and Advanced Topics, Margaret H Dunham, Pearson, 2008.
2. Fundamentals of data warehouses, 2/e ,Jarke, Lenzerini, Vassiliou, Vassiliadis, Springer.
3. Data Mining Theory and Practice, Soman, Diwakar, Ajay, PHI, 2006.
4. Data Mining , Concepts and Techniques, 2/e, Jiawei Han, MichelineKamber, Elsevier, 2006.

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ADVANCED COMPUTER NETWORKS

Unit-I:
Network layer: Network Layer design issues: store-and forward packet switching, services provided transport layers, implementation connection less services, implementation connection oriented services, comparison of virtual –circuit and datagram subnets.
Routing Algorithm –shortest path routing, flooding, distance vector routing, link state routing, Hierarchical routing, Broadcast routing, Multicasting routing, routing for mobiles Hosts, routing in Adhoc networks-
congestion control algorithms-Load shedding, Congestion control in Data gram Subnet.

Unit-II:
IPV4 Address address space, notations, classful addressing, classless addressing network addressing translation(NAT) , **IPV6 Address** structure address space, **Internetworking** need for network layer internet as a data gram, internet as connection less network.
IPV4 datagram, Fragmentation, checksum, options.
IPV6 Advantages, packet format, extension Headers, Transition form IPV4 to IPV6

Unit–III:
Process to process delivery: client/server paradigm, multiplexing and demultiplexing, connectionless versus connection oriented services, reliable versus reliable.
UDP: well known ports for UDP, user data gram, check sum, UDP operation, and uses of UDP
TCP: TCP services, TCP features, segement, A TCP connection, Flow control, error control, congestion control.
SCTP: SCTP services SCTP features, packet format, An SCTP association, flow control, error control.
Congestion control: open loop congestion control, closed loop congestion control, Congestion control in TCP, frame relay,
QUALITY OF SERVICE: flow characteristics, flow classes **TECHNIQUES TO IMPROVE QOS**: scheduling, traffic shaping, resource reservation, admission control.

Unit –IV:
Multimedia: introduction digital a audio , Audio compression, streaming audio, internet radio, voice over IP, introduction to video, video compression, video on demand, the MBone-the multicast back bone

Unit –V: Emerging trends Computer Networks:
Mobile Ad hoc networks :applications of Ad hoc networks, challenges and issues in MANETS,MAC layers issues, routing protocols in MANET, transport layer issues, Ad Hoc networks security.
Wireless sensors networks: WSN functioning, operation system support in sensor devices, WSN Characteristics, sensor network operation, sensor Architecture: cluster management;
Wireless mesh networks WMN design, Issues in WMNs;

TEXT BOOKS:
1. Data communications and networking 4th edtion Behrouz A Fourzan, TMH
2. Computer networks 4th editon Andrew S Tanenbaum, Pearson
3. Computer networks, Mayank Dave, CENGAGE

REFERENCE BOOKS:
1. Computer networks, A system Approach, 5th ed, Larry L Peterson and Bruce S Davie, Elsevier

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WEB TECHNOLOGIES

UNIT-I:
Javascript : The Basic of Javascript: Objects, Primitives Operations and Expressions, Screen Output and Keyboard Input, Control Statements, Object Creation and Modfication, Arrays, Functions, Constructors, Patttern Matching using Regular Expressions

UNIT-II:
XML: Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX Approaches,
AJAX A New Approach: Introduction to AJAX, Integrating PHP and AJAX.

UNIT-III:
PHP Programming: Introducing PHP: Creating PHP script, Running PHP script.
Working with variables and constants: Using variables, Using constants, Data types, Operators. **Controlling program flow:** Conditional statements, Control statements, Arrays, functions. Working with forms and Databases such as MySQL.

UNIT-IV:
PERL: Introduction to PERL, Operators and if statements, Program design and control structures, Arrays, Hashs and File handling, Regular expressions, Subroutines, Retrieving documents from the web with Perl.

UNIT-V:
RUBY: Introduction to Ruby, Variables, types, simple I/O, Control, Arrays, Hashes, Methods, Classes, Iterators, Pattern Matching. Overview of Rails.

Text Books:
1. Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
2. Web Technologies, Uttam K Roy, Oxford
3. The Web Warrior Guide to Web Programming, Bai, Ekedahl, Farrelll, Gosselin, Zak, Karparhi, Maclntyre, Morrissey, Cengage

Reference Books:
1. Ruby on Rails Up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly (2006)
2. Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012)
3. Web Technologies, HTML< JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
4. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning
5. http://www.upriss.org.uk/perl/PerlCourse.html

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IT LAB 1

1) Write a c program to implement one to one chat application using sockets?
2) Write a c program to implement redundancy check using CRC?
3) Write a java program to implement simulation of sliding window protocol?
4) Write a java program to get the MAC or Physical address of the system using Address Resolution Protocol?
5) By using Data mining tool Demonstration of preprocessing on dataset student.arff?
6) By using Data mining tool Demonstration of classification rule process on dataset employee.arff using j48 algorithm
7) By using Data mining tool Demonstration of Association rule process on dataset test.arff using apriori algorithm?
8) By using Data mining tool Demonstration of classification rule process on dataset employee.arff using naïve baye's algorithm?
9) By using Data mining tool Demonstration of clustering rule process on dataset iris.arff using simple k-means algorithms.
10) To perform various Recursive & Non-Recursive operations on Binary Search Tree
11) To implement BFS & DFS for a Graph
12) To implement Merge & Heap Sort of given elements
13) To perform various operations on AVL trees
14) To implement Krushkal's algorithm to generate a min-cost spanning tree
15) To implement Prim's algorithm to generate a min-cost spanning tree
16) To implement functions of Dictionary using Hashing

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ADVANCED UNIX PROGRAMMING

UNIT-I
Introduction to unix-Brief History-What is Unix-Unix Components-Using Unix-Commands in Unix-Some Basic Commands-Command Substitution-Giving Multiple Commands.

UNIT-II
The File system –The Basics of Files-What's in a File-Directories and File Names-Permissions-I Nodes-The Directory Hierarchy, File Attributes and Permissions-The File Command knowing the File Type-The Chmod Command Changing File Permissions-The Chown Command Changing the Owner of a File-The Chgrp Command Changing the Group of a File.

UNIT-III
Using the Shell-Command Line Structure-Met characters-Creating New Commands-Command Arguments and Parameters-Program Output as Arguments-Shell Variables- -More on I/O Redirection-Looping in Shell Programs.

UNIT-IV
Filters-The Grep Family-Other Filters-The Stream Editor Sed-The AWK Pattern Scanning and processing Language-Good Files and Good Filters.

UNIT-V
Shell Programming-Shell Variables-The Export Command-The Profile File a Script Run During Starting-The First Shell Script-The read Command-Positional parameters-The $? Variable knowing the exit Status-More about the Set Command-The Exit Command-Branching Control Structures-Loop Control Structures-The Continue and Break Statement-The Expr Command: Performing Integer Arithmetic-Real Arithmetic in Shell Programs-The here Document(<<)-The Sleep Command-Debugging Scripts-The Script Command-The Eval Command-The Exec Command.The Process-The Meaning-Parent and Child Processes-Types of Processes-More about Foreground and Background processes-Internal and External Commands-Process Creation-The Trap Command-The Stty Command-The Kill Command-Job Control.

TEXT BOOKS:
1. The Unix programming Environment by Brain W. Kernighan & Rob Pike, Pearson.
2. Introduction to Unix Shell Programming by M.G.Venkateshmurthy, Pearson.

REFERENCE BOOKS:
1. Unix and shell programmingby B.M. Harwani, OXFORD university press.

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APPLIED CRYPTOGRAPHY

UNIT- I:
Basic Principles
Security Goals, Cryptographic Attacks, Services and Mechanisms, Mathematics of Cryptography.

UNIT- II:
Symmetric Encryption
Mathematics of Symmetric Key Cryptography, Introduction to Modern Symmetric Key Ciphers, Data Encryption Standard, Advanced Encryption Standard.

UNIT- III:
Asymmetric Encryption
Mathematics of Asymmetric Key Cryptography, Asymmetric Key Cryptography

UNIT- IV:
Data Integrity, Digital Signature Schemes & Key Management
Message Integrity and Message Authentication, Cryptographic Hash Functions, Digital Signature, Key Management.

UNIT -V:
Network Security-I
Security at application layer: PGP and S/MIME, Security at the Transport Layer: SSL and TLS
Network Security-II
Security at the Network Layer: IPSec, System Security

TEXT BOOKS:

1) Cryptography and Network Security, Behrouz A Forouzan, DebdeepMukhopadhyay, (3e) Mc Graw Hill.
2) Cryptography and Network Security, William Stallings, (6e) Pearson.
3) Everyday Cryptography, Keith M.Martin, Oxford.

REFERENCE BOOKS:

1) Network Security and Cryptography, Bernard Meneges, Cengage Learning.

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BIG DATA ANALYTICS

UNIT-I

Data structures in Java: Linked List, Stacks, Queues, Sets, Maps; Generics: Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization

UNIT-II

Working with Big Data: Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, Job Tracker, Task Tracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

UNIT-III

Writing MapReduce Programs: A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New), Basic programs of Hadoop MapReduce: Driver code, Mapper code, Reducer code, Record Reader, Combiner, Partitioner

UNIT-IV

Hadoop I/O: The Writable Interface, Writable Comparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, Bytes Writable, Null Writable, Object Writable and Generic Writable, Writable collections, Implementing a Custom Writable: Implementing a Raw Comparator for speed, Custom comparators

UNIT-V

Pig: Hadoop Programming Made Easier: Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin

Applying Structure to Hadoop Data with Hive: Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data

TEXT BOOKS:

1. Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC
2. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly
3. Hadoop in Action by Chuck Lam, MANNING Publ.
4. Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss

REFERENCE BOOKS:

1. Hadoop in Practice by Alex Holmes, MANNING Publ.
2. Hadoop MapReduce Cookbook, Srinath Perera, Thilina Gunarathne

SOFTWARE LINKS:

1. Hadoop:http://hadoop.apache.org/
2. Hive: https://cwiki.apache.org/confluence/display/Hive/Home
3. Piglatin: http://pig.apache.org/docs/r0.7.0/tutorial.html

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CLOUD COMPUTING

UNIT I:

Introduction: Network centric computing, Network centric content, peer-to –peer systems, cloud computing delivery models and services, Ethical issues, Vulnerabilities, Major challenges for cloud computing

Parallel and Distributed Systems: introduction, architecture, distributed systems, communication protocols, logical clocks, message delivery rules, concurrency, model concurrency with Petri Nets.

UNIT II:

Cloud Infrastructure: At Amazon, The Google Perspective, Microsoft Windows Azure, Open Source Software Platforms, Cloud storage diversity, Intercloud, energy use and ecological impact, responsibility sharing, user experience, Software licensing

Cloud Computing : Applications and Paradigms: Challenges for cloud, existing cloud applications and new opportunities, architectural styles, workflows, The Zookeeper, The Map Reduce Program model, HPC on cloud, biological research

UNIT III:

Cloud Resource virtualization: Virtualization, layering and virtualization, virtual machine monitors, virtual machines, virtualization- full and para, performance and security isolation, hardware support for virtualization, Case Study: Xen, vBlades

Cloud Resource Management and Scheduling: Policies and Mechanisms, Applications of control theory to task scheduling, Stability of a two-level resource allocation architecture, feed back control based on dynamic thresholds, coordination, resource bundling, scheduling algorithms, fair queuing, start time fair queuing, cloud scheduling subject to deadlines, Scheduling Map Reduce applications, Resource management and dynamic application scaling

UNIT IV:

Storage Systems: Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system., Apache Hadoop, BigTable, Megastore (text book 1), Amazon Simple Storage Service(S3) (Text book 2)

Cloud Security: Cloud security risks, security – atop concern for cloud users, privacy and privacy impact assessment, trust, OS security, Virtual machine security, Security risks

UNIT V:

Cloud Application Development: Amazon Web Services : EC2 – instances, connecting clients, security rules, launching, usage of S3 in Java, Installing Simple Notification Service on Ubuntu 10.04, Installing Hadoop on Eclipse, Cloud based simulation of a Distributed trust algorithm, Cloud service for adaptive data streaming (Text Book 1)

Google: Google App Engine, Google Web Toolkit (Text Book 2)

MicroSoft: Azure Services Platform, Windows live, Exchange Online, Share Point Services, Microsoft Dynamics CRM (Text Book 2)

TEXT BOOKS:

1. Cloud Computing, Theory and Practice, Dan C Marinescu,MK Elsevier
2. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH

REFERNCE BOOK:

1. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammarai selvi, TMH

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ADHOC & SENSOR NETWORKS

UNIT I: Introduction to Ad Hoc Wireless Networks
Cellular and Ad Hoc Wireless Networks, Characteristics of MANETs, Applications of MANETs, Issues and Challenges of MANETs, Ad Hoc Wireless Internet, MAC protocols for Ad hoc Wireless Networks-Issues, Design Goals and Classifications of the MAC Protocols

UNIT II: Routing Protocols for Ad Hoc Wireless Networks
Issues in Designing a Routing Protocol, Classifications of Routing Protocols, Topology-based versus Position-based Approaches, Issues and design goals of a Transport layer protocol, Classification of Transport layer solutions, TCP over Ad hoc Wireless Networks, Solutions for TCP over Ad Hoc Wireless Networks, Other Transport layer protocols.

UNIT III: Security protocols for Ad hoc Wireless Networks
Security in Ad hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad hoc Wireless Networks, Cooperation in MANETs, Intrusion Detection Systems.

UNIT IV: Basics of Wireless Sensors and Applications
The Mica Mote, Sensing and Communication Range, Design Issues, Energy Consumption, Clustering of Sensors, Applications, Data Retrieval in Sensor Networks-Classification of WSNs, MAC layer, Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs.

UNIT V: Security in WSNs
Security in WSNs, Key Management in WSNs, Secure Data Aggregation in WSNs, Sensor Network Hardware-Components of Sensor Mote, Sensor Network Operating Systems–TinyOS, LA-TinyOS, SOS, RETOS, Imperative Language-nesC, Dataflow style language: TinyGALS, Node-Level Simulators, NS-2 and its sensor network extension, TOSSIM.

TEXT BOOKS:

1. Ad Hoc Wireless Networks – Architectures and Protocols, C. Siva Ram Murthy, B. S. Murthy, Pearson Education, 2004
2. Ad Hoc and Sensor Networks – Theory and Applications, *Carlos Corderio Dharma P.Aggarwal,* World Scientific Publications / Cambridge University Press, March 2006
3. Wireless Sensor Networks – Principles and Practice, Fei Hu, Xiaojun Cao, An Auerbach book, CRC Press, Taylor & Francis Group, 2010

REFERENCE BOOKS:

1. Wireless Sensor Networks: An Information Processing Approach, *Feng Zhao, Leonidas Guibas*, Elsevier Science imprint, Morgan Kauffman Publishers, 2005, rp2009
2. Wireless Ad hoc Mobile Wireless Networks – Principles, Protocols and Applications, Subir Kumar Sarkar, et al., Auerbach Publications, Taylor & Francis Group, 2008
3. Ad hoc Networking, *Charles E.Perkins*, Pearson Education, 2001
4. Wireless Ad hoc Networking, *Shih-Lin Wu, Yu-Chee Tseng,* Auerbach Publications, Taylor & Francis Group, 2007

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SEMANTIC WEBSERVICES

Unit I: Web Intelligence
Thinking and Intelligent Web Applications, The Information Age ,The World Wide Web, Limitations of Todays Web, The Next Generation Web, Machine Intelligence, Artifical Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

Unit II: Knowledge Representation for the Semantic Web
Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web – Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema.

Unit III:Ontology Engineering
Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

Unit IV: Semantic Web Applications, Services and Technology
Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base, XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods,

Unit V:.Social Network Analysis and semantic web
What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks. Building Semantic Web Applications with social network features.

TEXT BOOKS:
1. Thinking on the Web - Berners Lee,Godel and Turing,Wiley interscience,2008.
2. Social Networks and the Semantic Web ,Peter Mika,Springer,2007.

REFERENCE BOOKS:
1. Semantic Web Technologies ,Trends and Research in Ontology Based Systems, J.Davies, Rudi Studer, Paul Warren, JohnWiley&Sons.
2. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers, (Taylor & Francis Group)
3. Information Sharing on the semantic Web - Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.

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PRINCIPLES OF PROGRAMMING LANGUAGES

UNIT I:
Syntax and semantics: Evolution of programming languages, describing syntax, context, free grammars, attribute grammars, describing semantics, lexical analysis, parsing, recursive - decent bottom - up parsing

UNIT II:
Data, data types, and basic statements: Names, variables, binding, type checking, scope, scope rules, lifetime and garbage collection, primitive data types, strings, array types, associative arrays, record types, union types, pointers and references, Arithmetic expressions, overloaded operators, type conversions, relational and boolean expressions , assignment statements , mixed mode assignments, control structures – selection, iterations, branching, guarded Statements

UNIT III:
Subprograms and implementations: Subprograms, design issues, local referencing, parameter passing, overloaded methods, generic methods, design issues for functions, semantics of call and return, implementing simple subprograms, stack and dynamic local variables, nested subprograms, blocks, dynamic scoping

UNIT IV:
Object- orientation, concurrency, and event handling: Object – orientation, design issues for OOP languages, implementation of object, oriented constructs, concurrency, semaphores,
Monitors, message passing, threads, statement level concurrency, exception handling, event handling

UNIT V:
Functional programming languages: Introduction to lambda calculus, fundamentals of functional programming languages, Programming with Scheme, –
Programming with ML,
Logic programming languages: Introduction to logic and logic programming, –
Programming with Prolog, multi - paradigm languages

TEXT BOOKS:
1. Robert W. Sebesta, “Concepts of Programming Languages”, Tenth Edition, Addison Wesley, 2012.
2. Programming Langugaes, Principles & Paradigms, 2ed, Allen B Tucker, Robert E Noonan, TMH

REFERENCE BOOKS:
1. R. Kent Dybvig, “The Scheme programming language”, Fourth Edition, MIT Press, 2009.
2. Jeffrey D. Ullman, “Elements of ML programming”, Second Edition, Prentice Hall, 1998.
3. Richard A. O'Keefe, “The craft of Prolog”, MIT Press, 2009.
4. W. F. Clocksin and C. S. Mellish, “Programming in Prolog: Using the ISO Standard”, Fifth Edition, Springer, 2003.

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INTERNET OF THINGS

Unit I:
The Internet of Things: An Overview of Internet of things,Internet of Things Technology, behind IoTs Sources of the IoTs, M2M Communication, Examples OF IoTs, Design Principles For Connected Devices
Internet Connectivity Principles, Internet connectivity, Application Layer Protocols: HTTP, HTTPS, FTP, Telnet.

Unit II:
Business Models for Business Processes in the Internet of Things ,IoT/M2M systems LAYERS AND designs standardizations ,Modified OSI Stack for the IoT/M2M Systems ,ETSI M2M domains and High-level capabilities ,Communication Technologies, Data Enrichment and Consolidation and Device Management Gateway Ease of designing and affordability

Unit III:
Design Principles for the Web Connectivity for connected-Devices, Web Communication protocols for Connected Devices, Message Communication protocols for Connected Devices, Web Connectivity for connected-Devices.

Unit IV:
Data Acquiring, Organizing and Analytics in IoT/M2M, Applications/Services/Business Processes, IOT/M2M Data Acquiring and Storage, Business Models for Business Processes in the Internet Of Things, Organizing Data, Transactions, Business Processes, Integration and Enterprise Systems.

Unit V:
Data Collection, Storage and Computing Using a Cloud Platform for IoT/M2M Applications/Services, Data Collection, Storage and Computing Using cloud platform Everything as a service and Cloud Service Models, IOT cloud-based services using the Xively (Pachube/COSM), Nimbits and other platforms Sensor, Participatory Sensing, Actuator, Radio Frequency Identification, and Wireless, Sensor Network Technology, Sensors Technology ,Sensing the World.

TEXTBOOKS:

1. Internet of Things: Architecture, Design Principles And Applications,Rajkamal, McGraw Hill Higher Education
2. Internet of Things, A.Bahgya and V.Madisetti, Univesity Press, 2015

REFERNCE BOOKS:

1. Designingthe Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley
2. Getting Started with the Internet of Things CunoPfister , Oreilly.

M Tech II Sem – R16

MACHINE LEARNING

UNIT -I: The ingredients of machine learning, Tasks: the problems that can be solved with machine learning, Models: the output of machine learning, Features, the workhorses of machine learning. **Binary classification and related tasks:** Classification, Scoring and ranking, Class probability estimation

UNIT- II: Beyond binary classification: Handling more than two classes, Regression, Unsupervised and descriptive learning. **Concept learning**: The hypothesis space, Paths through the hypothesis space, Beyond conjunctive concepts

UNIT- III: Tree models: Decision trees, Ranking and probability estimation trees, Tree learning as variance reduction. **Rule models:** Learning ordered rule lists, Learning unordered rule sets, Descriptive rule learning, First-order rule learning

UNIT -IV: Linear models: The least-squares method, The perceptron: a heuristic learning algorithm for linear classifiers, Support vector machines, obtaining probabilities from linear classifiers, Going beyond linearity with kernel methods. **Distance Based Models:** Introduction, Neighbours and exemplars, Nearest Neighbours classification, Distance Based Clustering, Hierarchical Clustering.

UNIT- V: Probabilistic models: The normal distribution and its geometric interpretations, Probabilistic models for categorical data, Discriminative learning by optimising conditional likelihood Probabilistic models with hidden variables. **Features:** Kinds of feature, Feature transformations, Feature construction and selection. Model ensembles: Bagging and random forests, Boosting

TEXT BOOKS:

1. Machine Learning: The art and science of algorithms that make sense of data, Peter Flach, Cambridge.
2. Machine Learning, Tom M. Mitchell, MGH.

REFERENCE BOOKS:

1. Understanding Machine Learning: From Theory to Algorithms, Shai Shalev-Shwartz, Shai Ben-David, Cambridge.
2. Machine Learning in Action, Peter Harington, 2012, Cengage.

M Tech II Sem – R16

INFORMATION RETRIEVAL SYSTEM

Unit I : Introduction to Information storage and retrieval systems:
Domain Analysis of IR systems, IR and other types of Information Systems, IR System Evaluation
Introduction to Data structures and algorithms related to Information Retrieval: Basic Concepts, Data structures, Algorithms.

Unit II: Inverted Files and Signature Files:
Introduction, Structures used in Inverted Files, Building an Inverted file using a sorted array, Modifications to the Basic Techniques.
Signature Files: Concepts of Signature files, Compression, Vertical Partitioning, Horizontal Partitioning.

Unit III: New Indices for Text, Lexical Analysis and Stoplists:
PAT Trees and PAT Arrays: Introduction, PAT Tree structure, Algorithms on the PAT Trees, Building PAT Trees as PATRICA Trees, PAT representation as Arrays. Stoplists.

Unit IV: Stemming Algorithms and Thesaurus Construction:
Types of Stemming algorithms, Experimental Evaluations of Stemming, Stemming to Compress Inverted Files.
Thesaurus Construction: Features of Thesauri, Thesaurus Construction, Thesaurus construction from Texts, Merging existing Thesauri.

Unit V: String Searching Algorithms:
Introduction, Preliminaries, The Naive Algorithm, The Knutt-Morris-Pratt Algorithm, The Boyer-Moore Algorithm, The Shift-Or Algorithm, The Karp-Rabin Algorithm.

TEXT BOOKS

1. Modern Information Retrieval,Ricardo Baeza-Yates, Neto, PEA,2007.
2. Information Storage and Retrieval Systems: Theory and Implementation, Kowalski, Gerald, Mark Academic Press, 2000.

M Tech II Sem – R16

IMAGE PROCESSING & PATTERN RECOGNITION

UNIT I:

Pattern Recognition:machine perception,pattern recognition example, pattern recognition systems,the design cycle,learning and adaptation.

Bayesian Decision Theory: Introduction,continuous features-two categories classifications,minimum error rate classification-zero-one loss function,classifiers ,discriminant functions,and decision surfaces.

UNIT II:

Normal density: Univariate and multivariate density, discriminant functions for the normal density-different cases, Bayes decision theory – discrete features, compound Bayesian decision theory and context.

Component analyses:Principal component analysis,non-linear component analysis,Low dimensional representations,and multi dimensional scaling.

UNIT III:

Digitized Image and its properties: Basic concepts, Image Functions, the dirac distribution and convolution, the Fourier transform, Images as a Stochastic process, Images as linear systems.

Image Digitization: Sampling, Quantization, Colour Images.

Digital Image Properties: Metric and topological properties of Digital Images, Histograms, Visual perception of the Image, Image quality, Noise in Images.

UNIT IV:

Data Structures for Image Analysis: Levels of Image Data representation, traditional Image Data Structures- Matrices, Chains, Topological Data Structures, Relational Structures.

UNIT V:

Image Pre-processing: Pixel brightness transfomation – Position dependent brightness correction, Gray scale transformation. Geometric Transformations -- Pixel co-ordinate transformation, Brightness interpolation. Local Pre-processing – Image smoothing, Edge-detectors, Zero crossings of the second deritives, scale in Image processing, canny edge detection, parametric edge models, edges in multi spectral images, other local pre-processing operators, adaptive neighborhood pre-processing.

Text Books:

1. Image Processing, Analysis and Machine Vision – Milan Sonka, Vaclav Hlavac, Roger Boyle, Second Edition – Vikas Publishing House.
2. pattern classification ,Richard o.Duda,peter E.Hart,David G.Stroke, Wiley student edition,2nd edition.
3. Digital Image processing , Rafeal C.Gonzalez,Richard E.Woods, 2nd edition,Pearson Education/ PHI.

Reference:

1. Digital Image Processing And Analysis – Chanda & Majumder

M Tech II Sem – R16

SOFTWARE TESTING METHODOLOGIES

UNIT-I:

Introduction: Purpose of Testing, Dichotomies, Model for Testing, Consequences of Bugs,Taxonomy of Bugs.

Flow graphs and Path testing: Basics Concepts of Path Testing, Predicates, Path Predicates andAchievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing.

UNIT-II:

Transaction Flow Testing: Transaction Flows, Transaction Flow Testing Techniques.

Dataflow testing: Basics of Dataflow Testing, Strategies in Dataflow Testing, Application ofDataflow Testing.

UNIT-III:

Domain Testing: Domains and Paths, Nice & Ugly Domains, Domain testing, Domains andInterfaces Testing, Domain and Interface Testing, Domains and Testability.

Paths, Path products and Regular expressions: Path Products & Path Expression, Reduction Procedure, Applications, Regular Expressions & Flow Anomaly Detection.

UNIT-IV:

Logic Based Testing: Overview, Decision Tables, Path Expressions, KV Charts, and Specifications.

State, State Graphs and Transition Testing: State Graphs, Good & Bad State Graphs, State Testing, and Testability Tips.

Graph Matrices and Application:-Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm.

UNIT – V:

Software Testing Tools: Introduction to Testing, Automated Testing, Concepts of Test Automation, Introduction to list of tools like Win runner, Load Runner, Jmeter, About Win Runner ,Using Win runner, Mapping the GUI, Recording Test, Working with Test, Enhancing Test, Checkpoints, Test Script Language, Putting it all together, Running and Debugging Tests, Analyzing Results, Batch Tests, Rapid Test Script Wizard.

TEXT BOOKS:

1. Software testing techniques – Boris Beizer, Dreamtech, second edition.
2. Software Testing- Yogesh Singh, Camebridge

REFERENCE BOOKS:

1. The Craft of software testing - Brian Marick, Pearson Education.
2. Software Testing, 3rd edition, P.C. Jorgensen, Aurbach Publications (Dist.by SPD).
3. Software Testing, N.Chauhan, Oxford University Press.
4. Introduction to Software Testing, P.Ammann&J.Offutt, Cambridge Univ.Press.

M Tech II Sem – R16

IT LAB 2

1. Write a Program to count the number of words and lines supplied at standard input using UNIX shell programming?
2. Write a shell script to find the factorial of a number entered through keyboard?
3. Write a shell script to find the gross salary given that if the basic salary is less then 1500 then HRA =10% of basic salary and DA=90% if the basic salary is greater then or equal to 1500 then HRA=500 and DA=98% of basic salary. The employee's basic salary is the input through keyboard?
4. Write a shell script to display following information using case statement?
   a. List users
   b. Show date
   c. Display file
   d. Change working directory
   e. Return to original directory
   f. Quit
5. Write a c program to implement one to one chat application using sockets?
6. Write a c program to implement redundancy check using CRC?
7. Write a java program to implement simulation of sliding window protocol?
8. Write a java program to get the MAC or Physical address of the system using Address Resolution Protocol?
9. Write a java program to implement Play Fair Cipher to encrypt and decrypt a given message?
10. Write a java program to demonstrate public-key based asymmetric algorithms for encryption-based security of information?
11. Write a java program that implement secured Internet Protocol (IP) communications by using Internet Protocol Security (IPSec)?
12. Write a java program to implement RSA algorithm?