JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE STRUCTURE AND SYLLBI FOR

M.Tech-Computer Science & Engineering and M. Tech - Computer Science

w.e.f. 2017-18 Admitted Batch onwards

M.Tech I Semester

S.No	Subject Code	Subject	L	T	P	C
1.	17D58101	Advanced Data Structures and Algorithms	4	-	-	4
2.	17D58102	Fundamentals of Data Science	4	-	-	4
3.	17D58103	Software Patterns	4	-	-	4
4.	 17D25205 17D58104 17D58105 17D58106	Elective-I a. Software Project Management b. Information Security c. Distributed Databases d. Neural Networks	4	-	-	4
5.	 17D25106 17D58107 17D58108 17D58109	Elective-II a. Professional Aspects In Software Engineering b. Artificial Intelligence c. Internals of Operating Systems d. Multicore Architecture & Programming	4	-	-	4
6.	17D58110	Advanced Data Structures and Algorithms Lab	-		4	2
7.	17D58111	R & Analytics Lab	-		4	2
8.	17D58112	Software Patterns Lab	-		4	2
		Total	**20**		**12**	**26**

M.Tech II Semester

S.No	Subject Code	Subject	L	T	P	C
1.	17D25201	Advances in Software Testing	4	-	-	4
2.	17D58201	Big Data Analytics	4	-	-	4
3.	17D58202	Mobile Application Development	4	-	-	4
4.	 17D58203 17D58204 17D08102 17D58205	Elective-III a. Internet of Things b. Distributed Computing c. Network Security & Cryptography d. NOSQL Databases	4	-	-	4
5.	 17D58206 17D58207 17D25207 17D58208	Elective-IV a. Machine Learning b. Cloud Computing c. Software Configuration Management d. Natural Language Processing	4	-	-	4
6.	17D25209	Advances in Software Testing Lab	-	-	4	2
7.	17D58209	Map Reduce Programming Lab	-	-	4	2
8.	17D58210	Mobile Application Development Lab	-	-	4	2
		Total	**20**		**12**	**26**

M.Tech III Semester

S.No	Subject Code	Subject	L	T	P	C
1.	17D20301 17D20302 17D20303	Elective-V (Open Elective) 1. Research Methodology 2.Human Values & Professional Ethics 3.Intellectual Property Rights	4	-	-	4
2.	17D58301	Elective-VI (MOOCs)	-	-	-	-
3.	17D58302	Comprehensive Viva-Voice	-	-	-	2
4.	17D58303	Seminar	-	-	-	2
5.	17D58304	Teaching Assignment	-	-	-	2
6.	17D58305	Project work Phase-I	-	-	-	4
		Total	**04**	**-**	**-**	**14**

M.Tech IV Semester

S.No.	Subject Code	Subject	L	T	P	C
1.	17D58401	Project work Phase - II	-		-	12
		Total	**-**		**-**	**12**

Project Viva Voce Grades:

A: Satisfactory
B: Not Satisfactory

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech I semester (CSE & CS)

L	T	P	C
4	0	0	4

(17D58101) ADVANCED DATA STRUCTURES AND ALGORITHMS

UNIT I : Overview of Data Structures - Arrays, Stacks, Queues, linked lists , Linked stacks and Linked queues, Applications

Algorithm Analysis - Efficiency of algorithms, Asymptotic Notations, Time complexity of an algorithm using O notation, Polynomial Vs Exponential Algorithms, Average, Best, and Worst Case Complexities, Analyzing Recursive Programs.

UNIT II: Trees and Graphs – Basics of trees and binary trees, Representation of trees and Binary trees, Binary tree Traversals, Threaded binary trees, Graphs, representation and traversals.

Binary Search Trees, AVL Trees and B Trees - Binary Search Trees: Definition, Operations and applications. AVL Trees: Definition, Operations and applications. B Trees: Definition, Operations and applications.

UNIT III: Red – Black Trees, Splay Trees and Hash Tables - Red–Black Trees, Splay Trees and their applications, Hash Tables, Hash Functions and various applications, File Organizations.

UNIT IV: Divide – and – Conquer & Greedy Method - General Method, Binary Search, Finding Maximum and Minimum, Quick Sort, Merge sort, Strassen's Matrix Multiplication, Greedy Method- General Method, Minimum Cost Spanning Trees, Single Source Shortest Path.

Back Tracking and Branch – and – Bound - General Method, 8 – Queen's Problem, Graph Coloring. Branch – and – Bound: The Method, LC Search, Control Abstraction, Bounding, 0 / 1 Knapsack Problem.

UNIT V: Dynamic Programming - General Method, All Pairs Shortest Path, Single Source Shortest Path, 0 /1 Knapsack problem, Reliability Design, Traveling Sales Person's Problem.

Text Books:

1. Fundamentals of Computer Algorithms by Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, 2nd edition, University Press.

References:

1. Data Structures and Algorithms Using C++ by Ananda Rao Akepogu and Radhika Raju Palagiri, Pearson Education, 2010.
2. Classic Data Structures by D. Samanta, 2005, PHI
3. Data Structures and Algorithms by G.A.V. Pai, 2009, TMH.
4. Design and Analysis of Computer Algorithms by Aho, Hopcraft, Ullman 1998, PEA.
5. Introduction to the Design and Analysis of Algorithms by Goodman, Hedetniemi, TMG
6. Design and Analysis of Algorithms by E. Horowitz, S. Sahani, 3rd Edition, Galgotia.
7. Data Structures and Algorithms in C++ by Drozdek 2nd Edition, Thomson.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech I semester (CSE & CS)

L	T	P	C
4	0	0	4

(17D58102) FUNDAMENTALS OF DATA SCIENCE

UNIT - I

Introduction, What Is Statistical Learning?, Why Estimate f?, How Do We Estimate f?, The Trade-Off Between Prediction Accuracy and Model Interpretability, Supervised Versus Unsupervised Learning, Regression Versus Classification Problems, Assessing Model Accuracy, Measuring the Quality of Fit, The Bias-Variance Trade-of, The Classification Setting, Introduction to R, Basic Commands, Graphics, Indexing Data, Loading Data, Additional Graphical and Numerical Summaries.

UNIT – II

Linear Regression, Simple Linear Regression, Multiple Linear Regression, Other Considerations in the Regression Model, Comparison of Linear Regression with K-Nearest Neighbours, Linear Regression.

UNIT-III

Classification, Logistic Regression, Linear Discriminant Analysis, A Comparison of Classification Methods, Logistic Regression, LDA, QDA, and KNN.

UNIT- IV

Programming for basic computational methods such as Eigen values and Eigen vectors, sparse matrices, QR and SVD, Interpolation by divided differences.

Data Wrangling: Data Acquisition, Data Formats, Imputation, The split-apply-combine paradigm.

UNIT-V

Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and Dissimilarity.

Data Warehouse: Basic Concepts, Data Warehouse Modeling: Data Cube and OLAP, Data Warehouse Design and Usage, Data Warehouse Implementation, Data Generalization by Attribute-Oriented Induction.

Text Books:

1. Gareth James Daniela Witten Trevor Hastie, Robert Tibshirani, An Introduction to Statistical Learning with Applications in R, February 11, 2013, web link: www.statlearning.com.
2. Mark Gardener, Beginning R The statistical Programming Language, Wiley, 2015.
3. Han , Kamber, and J Pei, Data Mining Concepts and Techniques, 3rd edition, Morgan Kaufman, 2012.

References:

1. Sinan Ozdemir, Principles of Data Science, Packt Publishing Ltd Dec 2016.
2. Joel Grus, Data Science from Scratch, Oreilly media, 2015.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech I semester (CSE & CS)

L	T	P	C
4	0	0	4

(17D58103) SOFTWARE PATTERNS

UNIT I

Envisioning Architecture - What is Software Architecture, Architectural patterns, reference models, reference architectures, architectural structures and views and the Architecture Business Cycle.

Creating an Architecture - Quality Attributes, Achieving qualities, designing the Architecture, Documenting software architectures, Reconstructing Software Architecture.

UNIT II

Introduction to Patterns - What is a Pattern? What makes a Pattern? Pattern Categories, Relationships between Patterns, Pattern Description, Patterns and Software Architecture.

Architectural Patterns

Layers, Pipes and Filters, Blackboard, Broker, Microkernel, MVC, PAC, Reflection.

UNIT III

What is Design Pattern, Organizing catalogs, Role in solving design problems, Selection and Usage, **Creational Patterns -** Abstract factory, builder, factory method, prototype, singleton,

UNIT IV

Structural Patterns - Adapter, bridge, composite, decorator, façade, flyweight, Proxy, Decorator, façade, flyweight, Proxy.

UNIT V

Behavioral Patterns - Chain of responsibility, command, Interpreter, iterator, mediator, memento, observer, state, strategy, template method, and visitor.

Case Studies – Designing a Document Editor **-** Design issues of Lexi Editor in Deign Patterns, The World Wide Web - a case study in interoperability

TEXT BOOKS:

1. Software Architecture in Practice, second edition, Len Bass, Paul Clements & Rick Kazman, Pearson Education,2003.
2. Pattern-Oriented Software Architecture", A System of Patterns, Frank Buschmann Regine Meunier, Hans Rohnert, Peter Sommerlad and Michael Stal, WlLEY.
3. Design Patterns: Elements of Reusable Object-Oriented Software, Erich Gamma, Pearson Education.

REFERENCE BOOKS:

1. AntiPatterns: Refactoring Software, Architectures, and Projects in Crisis, by William J. Brown, Raphael C. Malveau, Hays W. "Skip" McCormick , Thomas J. Mowbray (Author) 1st Edition,
2. Java testing patterns, John Thomas etc, wiley.
3. Software architecture, David M. Dikel, David Kane and James R. Wilson, Prentice Hall PTR,2001
4. Head First Design patterns, Eric Freeman & Elisabeth Freeman, O'REILLY, 2007.
5. Design Patterns in Java, Steven John Metsker & William C. Wake, Pearson education, 2006

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech I semester (CSE & CS)

L	T	P	C
4	0	0	4

(17D25205) SOFTWARE PROJECT MANAGEMENT
(Elective-I)

UNIT I : Project Evaluation And Project Planning

Importance of Software Project Management, Activities Methodologies, Categorization of Software Projects , Setting objectives , Management Principles, Management Control, Project portfolio Management, Cost-benefit evaluation technology, Risk evaluation, Strategic program Management, Stepwise Project Planning.

UNIT II : Project Life Cycle And Effort

Software process and Process Models, Choice of Process models, mental delivery, Rapid Application development, Agile methods, Extreme Programming, SCRUM, Managing interactive processes, Basics of Software estimation, Effort and Cost estimation techniques, COSMIC Full function points, COCOMO II A Parametric Productivity Model, Staffing Pattern.

UNIT III : Activity Planning And Risk Management

Objectives of Activity planning, Project schedules, Activities, Sequencing and scheduling, Network Planning models, Forward Pass & Backward Pass techniques, Critical path (CRM) method, Risk identification, Assessment, Monitoring, PERT technique, Monte Carlo simulation, Resource Allocation, Creation of critical patterns, Cost schedules.

UNIT IV : Project Management And Control

Framework for Management and control, Collection of data Project termination, Visualizing progress, Cost monitoring, Earned Value Analysis- Project tracking, Change control- Software Configuration Management, Managing contracts, Contract Management.

UNIT V : Staffing In Software Projects Managing people, Organizational behavior, Best methods of staff selection, Motivation, The Oldham-Hackman job characteristic model, Ethical and Programmed concerns, Working in teams, Decision making, Team structures, Virtual teams, Communications genres, Communication plans.

Text Books:

1. Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, Tata McGraw Hill, New Delhi, 2012.

References Books:

1. Robert K. Wysocki "Effective Software Project Management" – Wiley Publication,2011.
2. Walker Royce: "Software Project Management"- Addison-Wesley, 1998.
3. Gopalaswamy Ramesh, "Managing Global Software Projects" – McGraw Hill Education (India), Fourteenth Reprint 2013.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech I semester (CSE & CS)

L	T	P	C
4	0	0	4

(17D58104) INFORMATION SECURITY
(Elective-I)

Unit-I

Computer Security concepts, The OSI Security Architecture, Security attacks, Security services and Security mechanisms, A model for Network Security

Classical encryption techniques- symmetric cipher model, substitution ciphers, transposition ciphers, Steganography.

Modern Block Ciphers: Block ciphers principles, Data encryption standard (DES), Strength of DES, linear and differential cryptanalysis, block cipher modes of operations, AES, RC4.

Unit-II

Introduction to Number theory – Integer Arithmetic, Modular Arithmetic, Matrices, Linear Congruence, Algebraic Structures, GF(2^n) Fields, Primes, Primality Testing, Factorization, Chinese remainder Theorem, Quadratic Congruence, Exponentiation and Logarithm.

Public-key cryptography - Principles of public-key cryptography, RSA Algorithm, Diffie-Hellman Key Exchange, ELGamal cryptographic system, Elliptic Curve Arithmetic, Elliptic curve cryptography

Unit-III

Cryptographic Hash functions: Applications of Cryptographic Hash functions, Requirements and security, Hash functions based on Cipher Block Chaining, Secure Hash Algorithm (SHA)

Message Authentication Codes: Message authentication Requirements, Message authentication functions, Requirements for Message authentication codes, security of MACs, HMAC, MACs based on Block Ciphers, Authenticated Encryption

Digital Signatures-RSA with SHA & DSS

Unit-IV

Key Management and distribution: Symmetric key distribution using Symmetric Encryption, Symmetric key distribution using Asymmetric, Distribution of Public keys, X.509 Certificates, Public key Infrastructure.

User Authentication: Remote user Authentication Principles, Remote user Authentication using Symmetric Encryption, Kerberos, Remote user Authentication using Asymmetric Encryption, Federated Identity Management, Electronic mail security: Pretty Good Privacy (PGP), S/MIME.

Unit-V

Security at the Transport Layer (SSL and TLS) : SSL Architecture, Four Protocols, SSL Message Formats, Transport Layer Security, HTTPS, SSH

Security at the Network layer (IPSec): Two modes, Two Security Protocols, Security Association, Security Policy, Internet Key Exchange.

System Security: Description of the system, users, Trust and Trusted Systems, Buffer Overflow and Malicious Software, Malicious Programs, worms, viruses, Intrusion Detection System(IDS), Firewalls

Text books:

1. “Cryptography and Network Security”, Behrouz A. Frouzan and DebdeepMukhopadhyay, McGraw Hill Education, 2nd edition, 2013.

2.“Cryptography and Network Security: Principals and Practice”, William Stallings, Pearson Education , Fifth Edition, 2013.

References:

1. “Network Security and Cryptography”, Bernard Menezes ,Cengage Learning.
2. “Cryptography and Security”, C.K. Shymala, N. Harini and Dr. T.R. Padmanabhan, Wiley-India.
3. “Applied Cryptography, Bruce Schiener, 2nd edition, John Wiley & Sons.
4. “Cryptography and Network Security”, AtulKahate, TMH.
5. ‘Introduction to Cryptography”, Buchmann, Springer.
6. ‘Number Theory in the Spirit of Ramanujan”, Bruce C.Berndt, University Press
7. “Introduction to Analytic Number Theory”, Tom M.Apostol, University Press

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech I semester (CSE & CS)

L	T	P	C
4	0	0	4

(17D58105) DISTRIBUTED DATABASES
(Elective-I)

UNIT-I: Introduction of DDBMS

Distributed data processing- Data delivery alternatives- challenges of DDBSs-Design issues-Distributed DBMS Architecture-Overview of relational DBMS-review of computer networks- Distributed databases design-Top down design process-Distribution design issues-Fragmentation- Allocation-data directory-database integration- bottom up design methodology-schema matching- schema integration- schema mapping- data cleaning.

UNIT-II: Data and Access control

View management-data security-semantic integrity control-overview of query processing-query processing problem-objectives of query processing-complexity of relational Algebra operations-characterization of query processors-layers of query processing-query decomposition and data localization-query decomposition-localization of distributed data.

UNIT-III: Optimization of queries and transaction management

Query optimization-centralized query optimization-join ordering in distributed queries-Distributed query optimization-multi database query processing-issues in multi database query processing- multi database query processing archicture-query rewriting using views-query optimization and execution-query translation and execution-introduction to transaction management- definition of a transaction-properties of transactions-types of transactions-archicture revisited.

UNIT-IV: Distributed concurrency control & Replication

Serializability theory-Taxonomy of concurrency control mechanisms-locking based concurrency control algorithms-timestamp based concurrency control algorithms-optimistic concurrency control algorithms-deadlock management-“Relaxed” concurrency control-Distributed DBMS Reliability- Reliability concepts and measures-failures in Distributed DBMS-local Reliability protocols- Distributed Reliability protocols-Dealing with site failure-network partitioning-architectural considerations-data replication-consistency of replicated databases-update management strategies-replication protocols-group communication-replication and failures-replication mediator service.

UNIT-V: Database systems-Various Models

Parallel database system architectures-parallel data placement-parallel query processing load balancing-database clusters-distributed object database management-fundamental object concepts and object models-object distributed design- architectural issues-object

management-distributed object storage-object query processing-transaction management-web data management-web graph management-web search-web querying-distributed XML Processing.

TEXT BOOKS:

1. M. Tamer Ozsu, Patrick Valduriez, Principles of Distributed Database Systems, Springer, 2011.

REFERENCE BOOKS:

1. Chhandra Ray, Distributed database systems, Pearson education, India, 2012.
2. Stefano Ceri, Giuseppu Pelagatti, Distributed databases: Principles and systems, Mc Graw Hill Education, 2008.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech I semester (CSE & CS)

L	T	P	C
4	0	0	4

(17D58106) NEURAL NETWORKS

(Elective-I)

UNIT – I

BASICS OF ARTIFICIAL NEURAL NETWORKS: Characteristics of Neural Networks, Historical Development of Neural Network Principles, Artificial Neural Networks: Terminology, Models of Neuron, Topology, Basic Learning Laws

UNIT II

ACTIVATION AND SYNAPTIC DYNAMICS: Activation Dynamics Models, Synaptic Dynamics Models, Learning Methods, Stability and Convergence, Recall in Neural Networks.

UNIT III

FUNCTIONAL UNITS OF ANN FOR PATTERN RECOGNITION TASKs: Pattern Recognition Problem, Basic Functional Units, Pattern Recognition Tasks by the Functional Units: Pattern Recognition Tasks by Feed forward Neural Networks, Pattern Recognition Tasks by Feedback Neural Networks, Pattern Recognition Tasks by Competitive Learning Neural
Networks

UNIT IV

FEEDFORWARD NEURAL NETWORKS: Analysis of Pattern Association Networks, Analysis of Pattern Classification Networks, Analysis of Pattern Mapping Networks

UNIT V

FEEDBACK NEURAL NETWORKS: Analysis of Linear Auto associative FF Networks, Analysis of Pattern Storage Networks, Stochastic Networks and Simulated Annealing, Boltzmann Machine

Text Books:

1. “Artificial Neural Networks”, B. Yegnanarayana – PHI Publications

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech I semester (CSE & CS)

L	T	P	C
4	0	0	4

(17D25106) PROFESSIONAL ASPECTS IN SOFTWARE ENGINEERING

(Elective-II)

UNIT-I:

Intellectual Property rights Confidential Information, Copyright, Infringement of Copyright, Acts permitted in Relation to Copyright Works, Licensing and Assignment of Copyright, Moral Rights, Designs, Trademarks, The tort of passing off, Domain Names, Patents.

UNIT-II:

Software Licenses, Copyright, Contract, Patent, Free Software and Open Source Software, MIT License, BSD, License, GNU General Public License, GNU Lesser General Public License, Q Public License, Proprietary License, Sun Community License.

UNIT-III:

Software Contracts:

Basics of Software Contracts, Extent of liability, Contract for the supply of custom-built software at a fixed price, other types of software service Contract, Liability for defective software.

UNIT-IV:

Software Crime Prevention

Computing and criminal Activity, Reforms of Criminal Law, Categories of Misuse, Computer Fraud, Obtaining Unauthorized Access to Computer, Unauthorized Alteration or Destruction of Information, Denying Access to an Authorized user, Unauthorized Removal of Information Stored in a Computer.

UNIT-V:

Data Protection Regulations, Data Protection and Privacy, The impact of the Internet, Factors Influencing the Regulation of Data Processing, Convergence of Data Protection Practice, Defamation and the protection of Reputation.

REFERENCES:

1. Andrew M. St. Laurent, “Open Source and Free Software Licensing”, O’Reilly, Publications.

2. Frank Bott, et. al, “Professional Issues in Software Engineering”, Taylor &

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech I semester (CSE & CS)

L	T	P	C
4	0	0	4

(17D58107) ARTIFICIAL INTELLIGENCE

(Elective-II)

Unit – I

Foundations of AI: What is AI, History of AI, Strong and weak AI, The State of the Art.

Intelligent Agents: Agents and Environments, Good Behavior: The Concept of Rationality, The Nature of Environments, The Structure of Agents.

Unit – II

Solving Problems by Searching: Problem – Solving Agents, Example Problems, Searching for Solutions, uniformed search Strategies, Informed (Heuristic) Search Strategies, Heuristic Functions.

Unit – III

Knowledge Representation: Ontological Engineering, Categories and Objects, Events, Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information, The Internet Shopping World.

Unit – IV

Learning from Examples: Forms of Learning, Supervised Learning, Learning Decision Trees, Evaluating and Choosing the Best Hypothesis, The Theory of Learning, Regression and Classification with Learner Models, Nonparametric Models, Support Vector Machines, Ensemble Learning, Practical Machine Learning.

Unit – V

Learning Probabilistic Models: Statistical Learning, Learning with Complete data, Learning with Hidden variables: The EM Algorithm.

Text Books :

1. "Artificial Intelligence A Modern Approach", Stuart J. Russell & Peter Norvig – Pearson.
2. "Artificial Intelligence", Elaine Rich, Kevin Knight & Shivashankar B Nair – McGraw Hill Education.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech I semester (CSE & CS)

L	T	P	C
4	0	0	4

(17D58108) INTERNALS OF OPERATING SYSTEMS

(Elective-II)

UNIT-I : BUFFER CACHE AND FILE SUB-SYSTEM

Introduction to kernel- Architecture of the UNIX operating system, System Concepts, Data structures.

Buffer Cache: Buffer header, Structure of buffer pool, Reading and writing disk blocks. Files INODES, Structure of a regular file, Directories, Super block, Inode assignment.

UNIT-II : SYSTEM CALLS AND PROCESS SUB-SYSTEM

System calls- OPEN, READ, CLOSE, WRITE, CREATE, CHMOD, CHOWN, Pipes, Mounting and Unmounting. Process Layout the system memory, context, process control, process creation, signals, process scheduling, time, clock.

UNIT-III : INTER PROCESS COMMUNICATIONS

Inter-process communications- Process tracing, System V IPC, Shared Memory, Semaphores. Network Communications- Socket Programming: Sockets, descriptors, connections, socket elements, Stream and datagram sockets.

UNIT-IV : WINDOWS SYSTEM COMPONENTS

Windows Operating System- versions, concepts and tools, Windows internals, System architecture, requirements and design goals, operating system model, architecture overview, key system components. System mechanisms- Trap dispatching, object manager, synchronization, system worker threads, windows global flags, local procedural calls, kernel event tracing.

UNIT-V : REGISTRY AND PROCESS MANAGEMENT

Windows management mechanisms- the registry, registry usage, registry data types, local structure, trouble shooting registry problems, registry internals, services, applications, accounts, service control manager, windows management instrumentation, processes, threads and jobs: Process internals, flow of create process, thread internals, examining thread creation, thread scheduling, job objects.

TEXT BOOKS:

1. Maurice J. Bach, The design of the UNIX operating system, Prentice hall of India,1991
2. Mark E. Russinovich and David A. Solomon, Microsoft Windows Internals, Microsoft Press, 2004.

REFERENCE BOOKS:

1. William Stallings, “Operating Systems: Internals and Design Principles”, 5th Edition, Prentice Hall, 2005.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech I semester (CSE & CS)

L	T	P	C
4	0	0	4

(17D58109) MULTI-CORE ARCHITECTURES & PROGRAMMING
(Elective-II)

UNIT - I

Fundamentals of SuperScalar Processor Design, Introduction to Multicore Architecture – Chip Multiprocessing, homogeneous Vs heterogeneous design - SMP – Multicore Vs Multithreading. Shared memory architectures– synchronization – Memory organization – Cache Memory – Cache Coherency Protocols - Design of Levels of Caches.

UNIT - II

Multicore programming Model – Shared memory model, message passing model, transaction model – OpenMP and MPI Programming. PowerPC architecture – RISC design, PowerPC ISA, PowerPC Memory Management - Power 5 Multicore architecture design, Power 6 Architecture.

UNIT - III

Cell Broad band engine architecture, PPE (Power Processor Element), SPE (Synergistic processing element), Cell Software Development Kit, Programming for Multicore architecture.

UNIT - IV

PRAM Model – PRAM Algorithms – Parallel Reduction – Prefix Sums – List Ranking – Preorder Tree Traversal – Merging Two Sorted Lists – Graph Coloring – Reducing Number of Processors – NC Class. Classifying MIMD Algorithms – Hypercube SIMD Model – Shuffle Exchange SIMD Model – 2D Mesh SIMD Model – UMA Multiprocessor Model – Broadcase – Prefix Sums. Enumeration Sort – Lower Bound on Parallel Sorting – Odd-Even Transposition Sort –Bitonic Merge – Parallel Quick Sort – Complexity of Parallel Search – Searching on Multiprocessors.

UNIT - V

P-Depth Search – Breadth Death Search – Breadth First Search – Connected Components – All pair Shortest Path – Single Source Shortest Path – Minimum Cost Spanning Tree. Matrix Multiplication on 2-D Mesh, Hypercube and Shuffle Exchange SIMD Models – Algorithms for Multiprocessors – Algorithms for Multicomputers – Mapping Data to Processors.

REFERENCES

1. Hennessey and Pateterson, “Computer Architecture A Quantitative Approach”, Harcourt Asia, Morgan Kaufmann, 1999.
2. Joseph JaJa, “Introduction to Parallel Algorithms”, Addison-Wesley, 1992.
3. Kai Hwang, “Advanced Computer Architecture: Parallelism, Scalability and Programmability” McGraw-Hill, 1993.
4. Richard Y. Kain, “Advanced Computer Architecture: A System Design Approach”, PHI, 1999.
5. Rohit Chandra, Ramesh Menon, Leo Dagum, and David Kohr, “Parallel Programming in OpenMP”, Morgan Kaufmann, 2000.
6. Michael J. Quinn, “Parallel Computing: Theory & Practice”, Tata McGraw Hill Edition, 2003.
7. Ananth Grame, George Karpis, Vipin Kumar and Anshul Gupta, “Introduction to
8. Parallel Computing”, 2nd Edition, Addison Wesley, 2003.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech I semester (CSE & CS)

L	T	P	C
0	0	4	2

(17D58110) ADVANCED DATA STRUCTURES AND ALGORITHMS LAB

1. Write C++ programs to implement the following using an array.

   a) Stack ADT b) Queue ADT

2. Write C++ programs to implement the following using a singly linked list.

   a) Stack ADT b) Queue ADT

3. Write C++ programs to implement the deque (double ended queue) ADT using a doubly linked list and an array.

4. Write a C++ program to perform the following operations:

   a) Insert an element into a binary search tree.

   b) Delete an element from a binary search tree.

   c) Search for a key element in a binary search tree.

5. Write C++ programs that use recursive functions to traverse the given

   binary tree in

   a) Preorder b) inorder and c) postorder.

6. Write C++ programs that use non-recursive functions to traverse the given

   binary tree in

   b) Preorder b) inorder and c) postorder.

7. Write C++ programs for the implementation of bfs and dfs for a given graph.

8. Write C++ programs for implementing the following sorting methods:

   a) Merge sort b) Heap sort

9. Write a C++ program to perform the following operations

    a) Insertion into a B-tree b) Deletion from a B-tree

10. Write a C++ program to perform the following operation

    a) Insertion into an AVL-tree

11. Write a C++ program to implement all the functions of a dictionary (ADT) using hashing.

12. Write a C++ program for implementing Knuth-Morris- Pratt pattern matching algorithm.

(Note: Use Class Templates in the above Programs**)**

References::

1. Data Structures and Algorithms Using C++ by Ananda Rao Akepogu and Radhika Raju Palagiri, Pearson Education, 2010.
2. Classic Data Structures by D. Samanta, 2005, PHI
3. Data Structures and Algorithms by G.A.V. Pai, 2009, TMH.
4. Design and Analysis of Computer Algorithms by Aho, Hopcraft, Ullman 1998, PEA.
5. Introduction to the Design and Analysis of Algorithms by Goodman, Hedetniemi, TMG
6. Design and Analysis of Algorithms by E. Horowitz, S. Sahani, 3rd Edition, Galgotia.
7. Data Structures and Algorithms in C++ by Drozdek 2nd Edition, Thomson.
8. Fundamentals of Computer Algorithms by Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, 2nd edition, University Press

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech I semester (CSE & CS)

L	T	P	C
0	0	4	2

(17D58111) R & ANALYTICS LAB

1. Installation of R

   Installing R in windows, R Console (R window to edit and execute R Commands), Commands and Syntax (R commands and R syntax), Packages and Libraries (Install and load a package in R), Help In R, Workspace in R.

2. Implement the data structures using R Programming

   Introduction to Data Types (Why Data Structures?, Types of Data Structures in R), Vectors, Matrices, Arrays, Lists, Factors, Data Frames, Importing and Exporting Data.
3. Implement the Graphical Analysis using R

   Creating a simple graph (Using plot() command), Modifying the points and lines of a graph (Using type, pch, font, cex, lty, lwd, col arguments in plot() command), Modifying Title and Subtitle of graph (Using main, sub, col.main, col.sub, cex.main, cex.sub, font.main, font.sub arguments in plot() command), Modifying Axes of a Graph (Using xlab, ylab, col.lab, cex.lab, font.lab, xlim, ylim, col.axis, cex.axis, font.axis arguments and axis() command), Adding Additional Elements to a Graph (Using points(), text(), abline(), curve() commands), Adding Legend on a Graph (Using legend() command), Special Graphs (Using pie(), barplot(), hist() commands), Multiple Plots (Using mfrow or mfcol arguments in par() command and layout command).
4. Implement the Descriptive Statistics using R.

   Measure of Central Tendency (Mean, Median and Mode), Measure of Positions (Quartiles, Deciles, Percentiles and Quantiles), Measure of Dispersion (Range, Median, Absolute deviation about median, Variance and Standard deviation), Measure of Distribution (Skewness and Kurtosis), Box and Whisker Plot (Box Plot and its parts, Using Box Plots to compare distribution).

5. **In memory Data Analytics**: Window and text functions in SQL; Advanced SQL functions
6. **MongoDB**: Installation of MongoDB, Features of MongoDB: CRUD operations; import and export functions, indexes, aggregate functions, dealing with Nulls, count, limit, skip and sort functions and cursors
7. **Experiments on Hive and Pig**

Data Wrangling using R
Open refine tool for handling messy data

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M.Tech I semester (CSE & CS)

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(17D58112) SOFTWARE PATTERNS LAB

Course Objectives:

Construct UML diagrams for static view and dynamic view of the system.

Generate creational patterns by applicable patterns for given context.

Create refined model for given Scenario using structural patterns.

Construct behavioral patterns for given applications.

Construct architectural patterns for given applications.

Course Outcomes:

Understand the Case studies and design the Model..

Understand how design patterns solve design problems.

Develop design solutions using creational patterns.

Construct design solutions by using structural, behavioral and architectural patterns

Student is expected to complete the following experiments as a part of laboratory work.

1. Identify the application where you can use single pattern and implement it.
2. Using UML design one of the architectural patterns.
3. Using UML design one of the creational patterns.
4. Using UML design one of the structural patterns.
5. Using UML design one of the behavioral patterns.
6. User gives a print command from a word document. Design to represent this chain of responsibility design pattern.
7. User gives a print command from a word document. Design to represent this Singleton design pattern.

8. Identify the application where you can use multiple creational patterns and implement it.
9. Identify the application where you can use multiple structural patterns and implement it.
10. Identify the application where you can use multiple behavioral patterns and implement it.
11. Identify the application where you can use architectural patterns and implement it.

References:

1. AntiPatterns: Refactoring Software, Architectures, and Projects in Crisis, by William J. Brown, Raphael C. Malveau, Hays W. "Skip" McCormick , Thomas J. Mowbray (Author) 1st Edition,
2. Java testing patterns, John Thomas etc, wiley.
3. Software architecture, David M. Dikel, David Kane and James R. Wilson, Prentice Hall PTR,2001
4. Head First Design patterns, Eric Freeman & Elisabeth Freeman, O'REILLY, 2007.
5. Design Patterns in Java, Steven John Metsker & William C. Wake, Pearson education, 2006

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M.Tech II semester (CSE & CS)

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4	0	0	4

(17D25201) ADVANCES IN SOFTWARE TESTING

Course objectives:

- Study the significance of testing
- Study the testing to be done at various levels
- Understand the procedure for designing test cases

Course Outcomes:

- Ability to systematically test the applications
- Ability to write the test cases
- Ability to use testing tools effectively

UNIT I

Control flow graph – basic blocks, flow graphs, paths, basic paths, path conditions and domains, Dominators and post-dominators; Program dependence graph – data dependence, control dependence, call graph,

Tests generation - Test selection Problem, equivalence partitioning, Equivalence class partitioning, boundary value analysis and category partitioning method.

UNIT II

Finite state machines (FSM) - properties of FSM, Conformance testing, test generation, test optimization, Fault detection. **Combinatorial designs** – combinatorial test design process. **Pairwise design**: Binary factors and multi-valued factors. **Orthogonal arrays** and multi level orthogonal arrays.

UNIT III

Test Adequacy: Basics, measurement of test adequacy, infeasibility and test adequacy. Adequacy criteria based control – statement, block, conditions and decisions coverage techniques. Basics of Junit tool for Java.

Metrics

Importance of Metrics in Testing - Effectiveness of Testing – Defect Density – Defect Leakage Ratio – Residual Defect Density – Test Team Efficiency – Test Case Efficiency.

UNIT IV

Regression Testing

What is Regression Testing? Regression test process. Regression test selection techniques: Test all, Random selection, modification traversing tests, using execution trace. Test minimization and prioritization.

UNIT V

Non-functional testing

Load testing, performance testing, GUI testing, Security testing techniques and tools.

Automation: Case studies functional test automation using Selenium.

Text Books:

1. Aditya P Mathur, Foundations of software testing, 2nd edition, Pearson , 2013.
2. Boris Beizer, “Software Testing Techniques”, 2nd Edition, Dream tech press, 2003.

Reference Books:

1. M G Limaye, “Software Testing – Principles, Techniques and Tools”, Tata McGraw Hill, 2009.
2. Edward Kit, “Software Testing in the Real World - Improving the Process”, Pearson Education, 2004.
3. William E. Perry, “Effective methods for software testing”, 2nd Edition, John Wiley, 2000.

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M.Tech II semester (CSE & CS)

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(17D58201) BIG DATA ANALYTICS

Objectives:

- To learn to analyze the big data using intelligent techniques.
- To understand the various search methods and visualization techniques.
- To learn to various techniques for mining data stream.
- To understand the applications using Map Reduce Concepts.

Outcomes:

On completion of this course the student will able to

- Analyze the big data analytics techniques for useful business application.
- Design efficient algorithms for mining the data from large volumes.
- Analyze the HADOOP and Map Reduce technologies associated with big data analytics.
- Explore on big data applications using Pig and Hive.

UNIT-I

Introduction to Big Data

Introduction to Big Data Platform – Challenges of Conventional System – Intelligent data analysis – Nature of Data – Analytic Processes and Tool – Analysis vs Reporting – Modern Data Analytic Tool – Statistical Concepts: Sampling Distributions – Re-Sampling – Statistical Inference – Prediction Error.

UNIT- II

Mining Data Streams

Introduction To Stream Concepts – Stream Data Model and Architecture - Stream Computing – Sampling Data in a Stream – Filtering Stream – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window – Real time Analytics Platform(RTAP) Applications – Case Studies – Real Time Sentiment Analysis, Stock Market Predictions.

UNIT – III

Hadoop

History of Hadoop- The Hadoop Distributed File System – Components of Hadoop – Analyzing the Data with Hadoop – Scaling Out – Hadoop Streaming – Design of HDFS- Java interfaces to HDFSBasics- Developing a Map Reduce Application – How Map Reduce Works – Anatomy of a Map Reduce Job run – Failures – Job Scheduling – Shuffle and Sort – Task Execution – Map Reduce Types and Formats – Map Reduce Features.

UNIT – IV

Hadoop Environment

Setting up a Hadoop Cluster – Cluster specification – Cluster Setup and Installation –Hadoop Configuration – Security in Hadoop – Administering Hadoop – HDFS – Monitoring – Maintence – Hadoop Benchmarks – Hadoop in the Cloud.

UNIT –V

Frameworks

Applications on Big Data Using Pig and Hive – Data Processing operators in Pig – Hive Services – HiveQL – Querying Data in Hive – fundamentals of HBase and Zookeeper – IBM Info Sphere Big Insights and Streams. Visualization - Visual data analysis techniques, interaction techniques; Systems and applications.

Text Books:

1. Michael Berthold, David J.Hand, Intelligent Data Analysis, Spingers, 2007.
2. Tom White, Hadoop: The Definitive Guide Third Edition, O'reilly Media, 2012.
3. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, Uderstanding Big Data : Analytics for Enterprise Class Hadoop and Streaming Data, McGrawHill Publishing, 2012.
4. AnandRajaraman and Jeffrey David UIIman, Mining of Massive Datasets Cambridge University Press, 2012.

Reference Books:

1. Bill Franks, Taming the big Data tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics, John Wiley & sons, 2012.
2. Glenn J. Myatt, Making Sense of Data , John Wiley & Sons, 2007 Pete Warden, Big Data Glossary, O'Reilly, 2011.
3. Jiawei Han, MichelineKamber, Data Mining Concepts and Techniques, Second Edition.

4. Elsevier, Reprinted 2008. Da Ruan, Guoquing Chen, Etienne E.Kerre, Geert Wets, Intelligent Data Mining, Springer, 2007.
5. Paul Zikopoulos, Dirk deRoos, Krishnan Parasuraman, Thomas Deutsch, James Giles, David Corrigan, Harness the Power of Big Data the IBM Big Data Platform, Tata McGraw Hill Publications, 2012.
6. Michael Minelli (Author), Michele Chambers (Author), AmbigaDhirraj (Author), Big Data, BigSnalytics.

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M.Tech II semester (CSE & CS)

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(17D58202) MOBILE APPLICATION DEVELOPMENT

Objectives:

- To understand fundamentals of android operating systems.
- Illustrate the various components, layouts and views in creating android applications
- To understand fundamentals of android programming.

Out comes:

- Create data sharing with different applications and sending and intercepting SMS.
- Develop applications using services and publishing android applications.
- To demonstrate their skills of using Android software development tools

Unit 1:

Basics of Mobile Applications Development:

Tools: Eclipse ADT, Android Studio.

Understanding the Role of Android Application Components, Understanding the Utility of Android API, Overview of the Android Project Files, Understanding Activities, Role of the Android Manifest File, Creating the User Interface, Commonly Used Layouts and Controls, Event Handling, Displaying Messages Through Toast, Creating and Starting an Activity, Using the Edit Text Control, Choosing Options with Checkbox, Choosing Mutually Exclusive Items Using Radio Buttons

Unit 2: Building Blocks for Android Application Design:

Introduction to Layouts, Linear Layout, Relative Layout, Absolute Layout, Using Image View, Frame Layout, Table Layout, Grid Layout, Adapting to Screen orientation.

Utilizing Resources and Media Resources, Creating Values Resources, Using Drawable Resources, Switching States with Toggle Buttons, Creating an Images Switcher Application, Scrolling Through Scroll View, playing Audio, Playing Video, Displaying Progress with Progress Bar, Using Assets

Unit 3: Using Selection widgets and Debugging:

Using List View, Using the Spinner control, Using the GridView Control, Creating an Image Gallery Using the ViewPager Control, Using the Debugging Tool: Dalvik Debug Monitor Service(DDMS), Debugging Application, Using the Debug Perspective.

Displaying And Fetching Information Using Dialogs and Fragments: What Are Dialogs?, Selecting the Date and Time in One Application, Fragments, Creating Fragments with java Code, Creating Special Fragments

Unit 4: Building Menus: Creating Interface Menus and Action Bars, Menus and Their Types, Creating Menus Through XML, Creating Menus Through Coding, Applying a Context Menu to a List View, Using the Action Bar, Replacing a Menu with the Action Bar, Creating a Tabbed Action Bar, Creating a Drop-Down List Action Bar

Unit 5 Storing Data & Communicating with SMS and Emails:

Using the SQLiteOpenHelperclasss, Accessing Databases with the ADB, Creating a Data Entry Form.

Understanding Broadcast Receivers, Using the Notification System, Sending SMS Messages with Java Code, Receiving SMS Messages, Sending Email, Working With Telephony Manager.

Text Books

1. Android Programming by B.M Harwani, Pearson Education, 2013.

References Text Books:

1. Android application Development for Java Programmers, James C Sheusi, Cengage Learning
2. Android In Action by w.Frank Ableson, Robi Sen, Chris King, C. Enrique Ortiz., Dreamtech.
3. Professional Android 4 applications development, Reto Meier, Wiley India, 2012.
4. Beginning Android 4 applications development, Wei- Meng Lee, Wiley India,2013
5. PawPrints Learning Technologies, Beginning Android Development: Create Your Own Android Apps Today, 2014.
6. Erik Hellman, Android Programming: Pushing the Limits, John Wiley and sons ltd, 2014.
7. Neil Smyth, Android Studio Development Essentials.
8. Joseph Annuzzi,Jr, Lauren Darcey, Introduction to Android Application Development, Addison-Wesley, Fourth Edition.

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M.Tech II semester (CSE & CS)

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(17D58203) INTERNET OF THINGS
Elective-III

Objectives

- Makes clear view over physical computing, ubiquitous computing, or the Internet of Things, it's a hot topic in technology.
- It discusses design concepts that will make IOT products eye-catching and appealing.

Outcomes

- Ability to combine sensors, servos, robotics, Arduino chips, and more with various or the Internet, to create interactive, cutting-edge devices.
- Better idea of the overview of necessary steps to take the idea of IOT concept through production.

UNIT 1

Introduction - Internet of Things – **Design Principles for Connected Devices** – Web Thinking for Connected Devices – **Internet Principles** – IP – TCP – IP Protocol Suite – UDP – IP Address – MAC Address – TCP and UDP Ports – Application Layer Protocols.

UNIT 2

Prototyping – Prototypes and Production – Cloud – Open Source vs Closed Source – Tapping into the Community **– Prototyping Embedded Devices** – Electronics – Embedded Computing Basics – Ardunio – Raspberry Pi – Beagle Bone Black – Electronic Imp.

UNIT 3

Prototyping the Physical Design – Laser Cutting – 3D Printing – CNC Milling – Repurposing and Recycling – **Prototyping Online Components** – New API – Real Time Reactions – Other Protocols.

UNIT 4

Techniques for writing Embedded Code – Memory Management – Performance and Battery life – Libraries – Debugging – **Business Models** – Models – Funding an Internet of Things Startup.

UNIT 5

Moving to Manufacture – Designing Kits – Designing Printed Circuit Boards – Manufacturing Printed Circuit Boards – Mass Producing the case and other Fixtures – Scaling up Software – **Ethics** – Characterizing the Internet of Things – Control – Environment – Solutions.

Text Books:

1. Adrian Mcewen and HakinCassimally, "Designing The Internet of Things" Wiley Publications , 2015

Reference Books:

1. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)", 1stEdition, VPT, 2014.
2. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013

CunoPfister, "Getting Started with the Internet of Things",

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M.Tech II semester (CSE & CS)

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(17D58204) DISTRIBUTED COMPUTING
Elective-III

Objectives

- Broad and detailed coverage of the theory is balanced with practical systems-related issues such as mutual exclusion, deadlock detection, authentication, and failure recovery.
- Gives clear understanding of the fundamental principles and models underlying the theory, algorithms and systems aspects of distributed computing.

Outcomes

- Provides solid understanding of the design problems and the theoretical and practical aspects of their solutions.
- Simple explanations and illustrations are used to elucidate the algorithms.

Unit 1

Introduction - Message-passing systems versus shared memory systems - Primitives for distributed communication - Synchronous versus asynchronous executions - **A model of distributed computations** - A model of distributed executions - Models of communication networks - Models of communication networks - Models of process communications.

Unit 2

Global state and snapshot recording algorithms - System model and definitions - Snapshot algorithms for FIFO channels - Variations of the Chandy–Lamport algorithm - Snapshot algorithms for non-FIFO channels - Snapshots in a causal delivery system - Monitoring global state - **Terminology and basic algorithms** - Topology abstraction and overlays - Classifications and basic concepts - Complexity measures and metrics.

Unit 3

Message ordering and group communication - Asynchronous execution with synchronous communication - Synchronous program order on an asynchronous system - Group communication - A nomenclature for multicast - Propagation trees for multicast - Classification of application-level multicast algorithms - **Termination detection** - Termination detection using distributed snapshots - Termination detection by weight throwing - A spanning-tree-based termination detection algorithm.

Unit 4

Distributed mutual exclusion algorithms - Lamport's algorithm - Ricart–Agrawala algorithm - Singhal's dynamic information-structure algorithm - Lodha and Kshemkalyani's fair mutual exclusion algorithm - Quorum-based mutual exclusion algorithms - Maekawa's algorithm - Agarwal–El Abbadi quorum-based algorithm

Unit 5

Deadlock detection in distributed systems - Models of deadlocks - Knapp's classification of distributed deadlock detection algorithms - Mitchell and Merritt's algorithm for the singleresource model - Chandy–Misra–Haas algorithm for the AND model - Chandy–Misra–Haas algorithm for the OR model.

Text Book

1. Kshemkalyani, Ajay D., and Mukesh Singhal, "Distributed computing: principles, algorithms, and systems Cambridge University Press, 2011.

Reference Books

1. SunitaMahajan and Seema Shah, "Distributed Computing", Oxford University Press, Second Edition, 2011.
2. Albert Y.Zomaya, "Parallel and Distributed Computing Hand book", Second edition, McGrawl Publications, 2005.
3. Francesco Pierfederici, "Distributed Computing with Python", First Edition, Packt Publishing, 2016.
4. Mahajan, Sunita, and Seema Shah, "Distributed Computing", Oxford University Press, Inc., 2013.

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M.Tech II semester (CSE & CS)

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(17D08102) NETWORK SECURITY & CRYPTOGRAPHY
Elective-III

Course Objectives:

- Extensive, thorough and significant understanding of the concepts, issues, principles and theories of computer network security
- Identifying the suitable points for applying security features for network traffic
- Understanding the various cryptographic algorithms and implementation of the same at software level
- Understanding the various attacks, security mechanisms and services

Course Outcomes:

- Protect the network from both internal and external attacks
- Design of new security approaches
- Ability to choose the appropriate security algorithm based on the requirements.

UNIT I

Computer Security Concepts, The OSI Security Architecture, Security Attacks, Security Services And Security Mechanisms, Classical Encryption Techniques- Symmetric Cipher Model, Substitution Ciphers, Transposition Ciphers, Steganography, Modern Block Ciphers, Modern Stream Ciphers.

Modern Block Ciphers: Block Ciphers Principles, Data Encryption Standard (DES), Linear And Differential Cryptanalysis, Block Cipher Modes Of Operations, AES.

UNIT II

Public-Key Cryptography : Principles Of Public-Key Cryptography, RSA Algorithm, Diffie-Hellman Key Exchange, Elgamal Cryptographic System, Elliptic Curve Arithmetic, Elliptic Curve Cryptography

Cryptographic Hash Functions: Applications Of Cryptographic Hash Functions, Requirements And Security, Hash Functions Based On Cipher Block Chaining, Secure Hash Algorithm (SHA).

UNIT III

Message Authentication Codes: Message Authentication Requirements, Message Authentication Functions, Requirements For Message Authentication Codes, Security Of Macs, HMAC, Macs Based On Block Ciphers, Authenticated Encryption.

Digital Signatures and Authentication Protocols: Digital Signatures, Authentication Protocols.

UNIT IV

Key Management And Distribution: Symmetric Key Distribution Using Symmetric Encryption, Symmetric Key Distribution Using Asymmetric, Distribution Of Public Keys, X.509 Certificates, Public Key Infrastructure.

Electronic Mail Security: Pretty Good Privacy (PGP), S/MIME

UNIT V

Security At The Transport Layer(SSL And TLS) : SSL Architecture, Four Protocols, SSL Message Formats, Transport Layer Security, HTTPS, SSH

Security At The Network Layer (Ipsec): Two Modes, Two Security Protocols, Security Association, Security Policy, Internet Key Exchange.

Intruders: Intruders, Intrusion Detection, Password Management, Firewalls, Viruses and Worms.

Text Books :

1. Cryptography and Network Security: Principals and Practice, William Stallings, Fifth Edition, Pearson Education.
2. Cryptography and Network Security, Behrouz A. Frouzan and Debdeep Mukhopadhyay, 2nd edition, Mc Graw Hill Education

Reference Books :

1. Network Security and Cryptography, Bernard Menezes , Cengage Learning.
2. Cryptography and Security, C.K. Shymala, N. Harini and Dr. T.R. Padmanabhan, Wiley-India.
3. Applied Cryptography, Bruce Schiener, 2nd edition, John Wiley & Sons.
4. Cryptography and Network Security, Atul Kahate, TMH.
5. Introduction to Cryptography, Buchmann, Springer.
6. Number Theory in the Spirit of Ramanujan, Bruce C.Berndt, University Press
7. Introduction to Analytic Number Theory, Tom M.Apostol, University Press

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M.Tech II semester (CSE & CS)

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(17D58205) NOSQL DATABASES
Elective-III

Course Objectives:

- Understand the basic difference between traditional relational databases and NoSQL
- Explore the fundamentals of NoSQL Databases
- Understanding the storage architecture
- Learn various NoSQL systems and their features
- To understand variety of NoSQL database tools

Course Outcomes:

Students who complete this course will be able to

- Examine issues on data storing , accessing from MongoDB, Redis, HBase and query processing and can develop suitable solutions.
- Able to apply the features of NoSQL tand analyze the datasets
- Compare and Contrast NoSQL databases with Relational Database Systems
- Critically analyze and evaluate variety of NoSQL databases
- Able to design and implement advanced queries using MangoDB, Redis, and HBase

UNIT I:

NOSQL: WHAT IT IS AND WHY YOU NEED IT: Big Data ,Scalability, Sorted Ordered Column-Oriented Stores: Key/Value Stores, Document Databases Graph Databases Examples,

INTERFACING AND INTERACTING WITH NOSQL: Storing and Accessing Data, Storing Data In and Accessing Data from MongoDB, Querying MongoDB, Storing Data In and Accessing Data from Redis Querying Redis, Storing Data In and Accessing Data from HBase, Querying HBase Storing Data In and Accessing Data from Apache Cassandra, Querying Apache Cassandra,

UNIT II:

Language Bindings for NoSQL Data Stores: Language Bindings for Java Language Bindings for Python, Language Bindings for Ruby, Language Bindings for PHP

UNDERSTANDING THE STORAGE ARCHITECTURE: Working with Column-Oriented Databases, Contrasting Column Databases with RDBMS, Column Databases as Nested Maps of Key/Value Pairs, Laying out the Web table, HBase Distributed Storage Architecture Document Store Internals , Storing Data in Memory-Mapped Files, Guidelines for Using Collections and Indexes in MongoDB, MongoDB Reliability and Durability ,Horizontal Scaling, Understanding Key/Value Stores in Memcached and Redis Under the Hood of Memcached Redis Internals , Eventually Consistent Non-relational Databases Consistent Hashing Object Versioning, Gossip-Based Membership and Hinted Handoff

UNIT III:

PERFORMING CRUD OPERATIONS: Creating Records, Creating Records in a Document-Centric Database, Using the Create Operation in Column-Oriented Databases, Using the Create Operation in Key/Value Maps Accessing Data, Accessing Documents from MongoDB, Accessing Data from HBase, Querying Redis, Updating and Deleting Data , Updating and Modifying Data in MongoDB, HBase, and Redis, Limited Atomicity and Transactional Integrity

QUERYING NOSQL STORES: Similarities between SQL and MongoDB Query Features, Map Reduce in MongoDB, Accessing Data from Column-Oriented Databases like HBase, Querying Redis Data Stores, Changing Document Databases, Schema-less Flexibility, Exporting and Importing Data from and into MongoDB, Schema Evolution in Column-Oriented Databases, HBase Data Import and Export, Data Evolution in Key/Value Stores

UNIT IV:

INDEXING AND ORDERING DATA SETS: Essential Concepts Behind a Database Index, Indexing and Ordering in MongoDB, Creating and Using Indexes in MongoDB, Indexing and Ordering in CouchDB, Indexing in Apache Cassandra.

MANAGING TRANSACTIONS AND DATA INTEGRITY: RDBMS and ACID, Upholding CAP, Consistency Implementations in a Few NoSQL Products

UNIT V:

USING NOSQL IN THE CLOUD: Google App Engine Data Store, Amazon SimpleDB

SCALABLE PARALLEL PROCESSING WITH MAP REDUCE: Understanding MapReduce, MapReduce with Hbase, MapReduce Possibilities and Apache Mahout.

ANALYZING BIG DATA WITH HIVE: Hive Basics, Back to Movie Ratings, Good Old SQL, JOIN(s) in Hive QL,

SPEECH ENHACEMENT: Nature of inter fearing sounds, Speech enhancement techniques, Spectral subtraction, Enhancement by re-synthesis.

TEXT BOOKS:

1. Sashank Thiwari, Professional NoSQL**, Wiley-** August 2011

REFERENCE BOOKS:

1. Dan MC Creary and Ann Kelly, Making Sense of NoSQL: A guide for Managers and the Rest of Us, Dreamtech Press, 2013
2. David Hows, Peter Membrey, Eelco Plugge, Tim Hawkins, The Definitive Guide: A Complete Guide to Dealing with Big Data Using MongoDB to MongoDB, Second Edition, Apress, 2013.
3. Guy Harrison, Next Generation Databases: NoSQL, NewSQL, and Big Data, Apress, 2015.
4. Adam Fowler, "Nosql for Dummies", Wiley.

M.Tech II semester (CSE & CS)

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4	0	0	4

(17D58206) MACHINE LEARNING
Elective-IV

Objectives:

- To understand the basic theory underlying machine learning.
- To be able to formulate machine learning problems corresponding to different applications.
- To understand a range of machine learning algorithms along with their strengths and weaknesses.
- To be able to apply machine learning algorithms to solve problems of moderate complexity.

Course Outcomes:

- Ability to understand what is learning and why it is essential to the design of intelligent machines.
- Ability to design and implement various machine learning algorithms in a wide range of real-world applications.
- Acquire knowledge deep learning and be able to implement deep learning models for language, vision, speech, decision making, and more

UNIT I INTRODUCTION

Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

UNIT II NEURAL NETWORKS AND GENETIC ALGORITHMS

Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evalution and Learning.

UNIT III BAYESIAN AND COMPUTATIONAL LEARNING

Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

UNIT IV INSTANCE BASED LEARNING

K- Nearest Neighbour Learning – Locally weighted Regression – Radial Bases Functions – Case Based Learning.

UNIT V ADVANCED LEARNING

Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning

TEXT BOOKS:

1. Machine Learning – Tom M. Mitchell, - MGH

REFERENCE BOOKS

1. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis

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M.Tech II semester (CSE & CS)

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(17D58207) CLOUD COMPUTING
Elective-IV

Objectives

- To introduce the basis of Cloud Computing
- To educate the cloud working function
- To allow computer system resources to be used in an efficient manner
- Makes the environment to the cloud.

Outcomes

On successful completion of the course, students will be able to:

- Understand the concepts of cloud computing and its related techniques.
- Provide a pleasant and effective user interface.

UNIT-I

Introduction to cloud computing – The Evolution of cloud computing – Hardware Evolution-Internet Software Evolution – Server Virtualization – Web Services Deliver from the cloud–Communication-as-a-service–Infrastructure-as-a-service–Monitoring-as-a-service–Platform-as-a-Service - Software-as-a-service – Building Cloud Network.

UNIT-II

Federation in the cloud – presence in the cloud – Privacy and its Relation to cloud-Based Information Systems– Security in the cloud – Common Standards in the cloud-End-User Access to the cloud Computing.

UNIT-III

Introduction – Advancing towards a Utility Model – Evolving IT infrastructure – Evolving Software Applications – Continuum of Utilities- Standards and Working Groups- Standards Bodies and Working Groups- Service Oriented Architecture- Business Process Execution Language- Interoperability Standards for Data Center Management – Utility Computing Technology- Virtualization – Hyper Threading – Blade Servers- Automated Provisioning-Policy Based Automation- Application Management – Evaluating Utility Management Technology – Virtual Test and development Environment – Data Center Challenges and Solutions – Automating the Data Center.

UNIT-IV

Software Utility Application Architecture – Characteristics of a SaaS – Software Utility Applications – Cost Versus Value – Software Application Services Framework – Common Enablers – Conceptual view to Reality – Business profits – Implementing Database System for Multitenant Architecture.

UNIT-V

Other Design Consideration – Design of a Web Services Metering Interface – Application Monitoring Implementation – A Design for an update and Notification Policy – Transforming to Software as a Service – Application Transformation Program – Business Model Scenarios – Virtual Services for Organizations – The Future.

Text Books:

1. Guy Bunker and Darren Thomson, Delivering utiliy Computing, John Wiley & Sons Ltd, 2012.

References Books:

1. John W. Rittinghouse and Ames F. Ransome, Cloud Computing Implementation , Management and security, CRC press & Francis Group, Boca Raton London New York. 2010.

2. Alfredo Mendroza, Utility Computing Technologies, Standards, and Strategies Artech House INC, 2007.

M.Tech II semester (CSE & CS)

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(17D25207) SOFTWARE CONFIGURATION MANAGEMENT

Elective-IV

Course Objectives:

- To learn the changing nature of software and need for change management.
- To study the different phases involved in software configuration management.
- To learn about the SCM plans, audits and reviews
- To study the various SCM tools and implementation techniques
- To study the SCM different scenarios and future directions

Course Outcomes:

- Identifying items that need to be controlled for changes.
- Systematically controlling changes to them.
- Establishing & maintaining integrity of these items and providing accurate status of items to relevant stakeholders (like developers, end users, and customers) throughout the Software Development Lifecycle.

UNIT I

OVERVIEW THE SOFTWARE CONFIGURATION MANAGEMENT

SCM: Concepts and definitions – SCM Plan – Software development life cycle models – SDLC Phases – Need and importance of Software configuration management – Increased complexity and demand – Changing nature of software and need for change management – Lower maintenance costs and better quality assurance – Faster problem identification and bug fixes - SCM: Basic concepts – Baselines – Check-in and Check-out- Versions and Variants – System Building – Releases.

UNIT II

DIFFERENT PHASES OF SOFTWARE CONFIGURATION MANAGEMENT

Different Phases Of Scm – SCM System design - SCM Plan preparation – SCM Team organization – SCM Infrastructure organization – SCM Team training – Project team training – Configuration identification – Configuration Control –Configuration status accounting – Configuration audits.

UNIT III

CONFIGURATION AUDITS AND MANAGEMENT PLANS

When, what and who of auditing - Functional Configuration audit – Physical Configuration audit – Auditing the SCM System – Role of SCM Team in configuration audits – SCM plan and the incremental approach – SCM Plan and SCM Tools – SCM Organization.

UNIT IV

SOFTWARE CONFIGURATION MANAGEMENT TOOLS AND IMPLEMENTATION

Advantages of SCM tools – Reasons for the increasing popularity of SCM tools – SCM Tools and SCM Functions – SCM tool selection – Role of Technology –Selection criteria – Tool implementation – SCM implementation plan –implementation strategy – SCM Implementation team.

UNIT V

TRENDS IN SCM: FUTURE DIRECTIONS

SCM in different scenarios – SCM and project size – SCM in integrated development environments – SCM In distributed environments – SCM and CASE Tools - Trends in SCM - Hardware and Software Management – Better integration with IDE'S and CASE environments – Customization – Better decision making capabilities – Reduction in SCM Team size – Market snapshot.

REFERENCES

1. Jessica Keyes, Software Configuration Management, Auerbach Publications, 2008.

2. Alexis Leon, Software Configuration Management Handbook, Artech Print on Demand; 2 edition, 2009.

3. Robert Aiello and Leslie Sachs Configuration Management Best Practices: Practical Methods that work in Real World, , Addison-Wesley Professional; 1 edition, 2010.

4. Stephen P. Berczuk, Brad Appleton and Kyle Brown , "Software Configuration Management Patterns: Effective Teamwork and Practical Integration", Addison-Wesley , 2003

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M.Tech II semester (CSE & CS)

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(17D58208) NATURAL LANGUAGE PROCESSING
Elective-IV

Objectives
Upon completion, students will be able to explain and apply fundamental algorithms and techniques in the area of natural language processing (NLP). In particular, students will:

- Understand current methods for statistical approaches to machine translation.
- Understand language modeling.
- Understand machine learning techniques used in NLP.

Outcomes:
- Apply fundamental algorithms and techniques in the area of natural language processing (NLP)
- Describe approaches to syntax and semantics in NLP.

UNIT – I

Introduction to Natural Language, Applications of NLP, Corpora and Corpus Analysis, Lexicon and Morphology , Syntax and Semantics.

UNIT II

Language Modeling: Introduction, n-gram models, Smoothing: Interpolation and Backoff.

UNIT III

Introduction to Machine Translation: History, Rule Based MT, Direct Transfer & INTERLINGUA Approaches, MT Evaluation.

UNIT IV

Statistical MT: Parallel Corpus and Alignment, Lexical Translation Model, Decoding Algorithms.

UNIT V

Applications: Automatic Text Categorization, Text Summarization, Information Extraction, Sentiment Analysis.

Text Books:

1. “Natural Language Processing: An Information Access Perspective”, Ess Ess Publications, Kavi Narayana Murthy, 2006.

2. “Foundations of Statistical Natural Language Processing”, Christopher Manning, MIT Press, 1999.

Reference Books:

1. James A.. Natural language Understanding 2e, Pearson Education, 1994
2. Bharati A., Sangal R., Chaitanya V.. Natural language processing: a Paninian perspective, PHI, 2000
3. Siddiqui T., Tiwary U. S.. Natural language processing and Information retrieval, OUP, 2008

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M.Tech II semester (CSE & CS)

L	T	P	C
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(17D25209) ADVANCES IN SOFTWARE TESTING LAB

Course Objectives:

To learn to use the following (or Similar) automated testing tools to automate testing:

- Win Runner/QTP for functional testing.
- Load Runner for Load/Stress testing.
- Test Director for test management.
- JUnit, HTMLUnit, CPPUnit.

- To study state-of-art tools for software testing and Middleware technologies

Course Outcomes:

- Test the software applications using standard tools available in the market

1. Write programs in C Language to demonstrate the working of the following constructs:

   i) do...while ii) while….do iii) if…else iv) switch v) for

2. A program written in C language for Matrix Multiplication fails. Introspect the causes for its failure and write down the possible reasons for its failure.

3. Consider ATM System and Study its system specifications and report the various bugs.

4. Write the test cases for Banking application.

5. Create test plan document for Library Management System.

6. Create test cases for Railway Reservation.
7. Create test plan document for Online Shopping.

Working with Tool's:

Understand the Automation Testing Approach, Benefits, Workflow, Commands and Perform Testing on one application using the following Tool's.

1. Win runner Tool for Testing.
2. Load runner Tool for Performance Testing.
3. Selenium Tool for Web Testing.
4. Bugzilla Tool for Bug Tracking.
5. Test Director Tool for Test Management.
6. Test Link Tool for Open Source Testing.

References:

1. M G Limaye, "Software Testing – Principles, Techniques and Tools", Tata McGraw Hill, 2009.
2. Edward Kit, "Software Testing in the Real World - Improving the Process", Pearson Education, 2004.
3. William E. Perry, "Effective methods for software testing", 2nd Edition, John Wiley, 2000.

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M.Tech II semester (CSE & CS)

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(17D58209) MAP REDUCE PROGRAMMING LAB

Objectives:

1. Getting familiar with Hadoop distributions, configure Hadoop and perform File Management Tasks
2. To understand Map Reduce in Hadoop works
3. To implement Map Reduce programs
4. Understanding Map Reduce support for debugging
5. Understanding new approaches for building Hadoop Map Reduce programs for real-time applications

Outcomes:

1. Configure Hadoop and perform File Management Tasks
2. Applying Map Reduce programs to real time issues like word count, weather dataset and sales of a company
3. Critically analyze huge data set using hadoop distributed file systems and mapreduce programs

1. Install Apache Hadoop
2. Write a map reduce program to calculate the frequency of a given word in a given file?
3. Write a Map Reduce program to find the maximum temperature in each year?
4. Write a Map Reduce program to find the grades of student's?
5. Write a map reduce program to implement Matrix Multiplication?
6. Write a map reduce to find the maximum electrical consumption in each year given electrical consumption for each month in each year?
7. Write a map reduce to analyze weather data set and print whether the day is shinny or cool day?
8. Write a map reduce program to find the number of products sold in each country by considering sales data containing fields like

Transaction_ date	Product	Price	Payment_ Type	Name	City	State	Country	Account_ Created	Last_ Login	Latitude	Longitude

9. Write a map reduce program to find the tags associated with each movie by analyzing movielens data?

10. XYZ.com is an online music website where users listen to various tracks, the data gets collected like shown below.

The data is coming in log files and looks like as shown below.

UserId	TrackId	Shared	Radio	Skip
111115	222	0	1	0
111113	225	1	0	0
111117	223	0	1	1
111115	225	1	0	0

Write a map reduce program to get the following

- Number of unique listeners
- Number of times the track was shared with others
- Number of times the track was listened to on the radio
- Number of times the track was listened to in total
- Number of times the track was skipped on the radio

11. Write a map reduce program to find the frequency of books published each year and find in which year maximum number of books were published using the following data?

Title	Author	Published year	Author country	Language	No of pages

12. Write a map reduce program to analyze Titanic data and to find

The average age of the people (both male and female) who died in the tragedy

How many persons survived – traveling class wise.

The titanic data will be..

Column 1 : PassengerId Column 2 : Survived (survived=0 & died=1)

Column 3 : Pclass Column 4 : Name Column 5 : Sex

Column 6 : Age Column 7 : SibSp Column 8 : Parch

Column 9 : Ticket Column 10 : Fare Column 11 : Cabin

Column 12 : Embarked

13. Write a map reduce program to analyze Uber data set to find the **days on which each basement has more trips using the following dataset**

The Uber dataset consists of four columns they are dispatching_base_number, date, active_vehicles and trips.

Reference:

1. Srinath Perera and Thilina Gunarathne Hadoop MapReduce Cookbook, Packt publishing, 2003.
2. Bill Franks, Taming the big Data tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics, John Wiley & sons, 2012.
3. Glenn J. Myatt, Making Sense of Data , John Wiley & Sons, 2007 Pete Warden, Big Data Glossary, O'Reilly, 2011.
4. Jiawei Han, MichelineKamber, Data Mining Concepts and Techniques, Second Edition.
5. Elsevier, Reprinted 2008. Da Ruan, Guoquing Chen, Etienne E.Kerre, Geert Wets, Intelligent Data Mining, Springer, 2007.

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M.Tech II semester (CSE & CS)

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(17D58210) MOBILE APPLICATION DEVELOPMENT LAB

Course Objective:

- In this lab, a student is expected to design, implement, document and present a mobile client/server system using standard Java and Java 2 Micro Edition (J2ME) platform.
- Specifically it is required to design and implement a system that consists mainly of a mobile client (MC) and a Proxy Server (PS).
- MC will be written in J2ME, MIDP 2.0, while PS will be written in standard Java. It is necessary to use a mobile phone emulator to develop and demonstrate the experiments.
- It may be necessary to use other components or existing resources (servers) as needed. For instance a database local to PS or a web service available on the Internet that can be invoked by the PS.

Course Outcomes:

- Demonstrate J2ME 2.5.2 Wireless Toolkit/Android studio and Layout Managers.
- Design Graphical primitives in J2ME 2.5.2 Wireless Toolkit/Android studio.
- Implement Multi-threading and GPS location information.
- Deploy applications to hand-held devices.

Using Wireless Markup language develop the APP using Android OS

1. Design and develop an Mobile App for smart phones The Easy Unit Converter using Android. This application should have approximately 20 categories to be used in your daily life. It includes following units: Acceleration, Angle, Area, Circle, Capacitor, Cooking, Data Size, Density, Data Transfer rate, Electric Current, Energy, Flow Rate, and Force.
2. Design and develop an Mobile App for smart phones Currency Converter. .This applications should synchronize online as you run it and sends you back the latest and most reliable exchange rates possible.

This application should support following conversions:

EUR->Euro
GBP->British Pound
USD->United States Dollar
AUD->Australian Dollar
CAD->Canadian Dollar
CHF->Swiss Franc
CNY->Chinese Yuan
HKD->Hong Kong Dollar
IDR->Indonesian Rupiah
INR->Indian Rupee
JPY->Japanese Yen
THB->Thai Bah

3. Design and develop an Mobile App game for smart phones The Tic Tac Toe using Android.
4. Design and develop an Mobile App for smart phones ,The Health Monitoring System using Android. This App should record Biochemistry Lab Parameters and if abnormal shold send an SMS to doctor for Medications.

5. Design and develop an Mobile App for smart phones The Expense Manager using Android. This is an application for managing your expenses and incomes: Tracking expenses and incomes by week, month and year as well as by categories, Multiple accounts in multiple currencies, Schedule the payments and recurring payments, Take a picture of receipt, Payment alerts, Budget by day, week, month and year, Search and reports, Import and export account activities in CSV for desktop software, Customize expense categories, payer/payer, payment methods, date format, white or black background, button style etc, Account transfer, Convenient tools such calculator, currency converter, tip calculator, sales and tax calculator and credit card calculator.

References:

1. Mobile Computing: (technologies and Applications- N. N. Jani S chand

2. B.M.Hirwani- Android programming Pearson publications-2013

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