ACHARYA NAGARJUNA UNIVERSITY: NAGARJUNA NAGAR

SCHEME OF EXAMINATION AND INSTRUCTION FOR I / II M.TECH.

M.TECH (COMPUTER SCIENCE & TECHNOLOGY) :: FIRST SEMESTER

Si No	Code No & Subject	Hours/Week		Credits	Evaluation of Marks			
		Lecture	Practical		Internal	External		Total
						Theory	Practical	
1	CST-511: Advanced Computer Architecture	4	--	4	40	60	--	100
2	CST-512: Data Structures	4	--	4	40	60	--	100
3	CST-513 Data Base Management Systems	4	--	4	40	60	--	100
4	Elective Subject-1	4	--	4	40	60	--	100
5	Elective Subject-2	4	--	4	40	60	--	100
6	Elective Subject-3	4	--	4	40	60	--	100
7	CST-551–DataStructures LAB	--	6	2	40	--	60	100
8	CST-552– DBMS LAB	--	6	2	40	--	60	100
TOTAL		24		28				800

SCHEME OF EXAMINATION AND INSTRUCTION FOR I / II M.TECH.

M.TECH (COMPUTER SCIENCE & TECHNOLOGY) :: SECOND SEMESTER

Si No	Code No & Subject	Hours/Week		Credits	Evaluation of Marks			
		Lecture	Practical		Internal	External		Total
						Theory	Practical	
1	CST -514 : Computer Networks	4	--	4	40	60	--	100
2	CST-515: Data Engineering	4	--	4	40	60	--	100
3	CST-516: Web Technology	4	--	4	40	60	--	100
4	Elective Subject-4	4	--	4	40	60	--	100
5	Elective Subject-5	4	--	4	40	60	--	100
6	Elective Subject-6	4	--	4	40	60	--	100
7	CST-553–Data Engineering Lab	--	6	2	40	--	60	100
8	CST-554-Web Technology Lab	--	6	2	40	--	60	100
TOTAL		24		28				800

ACHARYA NAGARJUNA UNIVERSITY: NAGARJUNA NAGAR

SCHEME OF EXAMINATION AND INSTRUCTION FOR II/II M.TECH.

M.TECH (COMPUTER SCIENCE & TECHNOLOGY) :: THIRD SEMESTER

Si No	Code No & Subject	Hours/Week		Credits	Evaluation of Marks		
		Lecture	Practical		Internal	External	Total
1	CST -711 Internship	---	6	2	100	--	100
2	CST -712 Project Seminar	--	---	6	100	--	100

ACHARYA NAGARJUNA UNIVERSITY: NAGARJUNA NAGAR

SCHEME OF EXAMINATION AND INSTRUCTION FOR II/II M.TECH.

M.TECH (COMPUTER SCIENCE & TECHNOLOGY) :: FOURTH SEMESTER

Si No	Code No & Subject	Hours/Week		Credits	Evaluation of Marks		
		Lecture	Practical		Internal	External	Total
1	CST -713 Project Viva	--	24	16	50	150	200

LIST OF SUBJECTS

ELECTIVE SUBJECTS:

Subject Code	Subject Title
CST -611 E	Software Engineering
CST -612 E	Digital Image Processing
CST -613 E	Automata Theory And Formal Language
CST -614 E	Embedded Systems
CST -615 E	Advanced Unix Programming
CST -616 E	Design and Analysis of Algorithms
CST -617 E	Cloud Computing
CST -618 E	Multimedia Systems
CST -619 E	Object Oriented Analysis and Design
CST -620 E	Compiler Design
CST -621 E	Real Time Systems
CST -622 E	Network Programming
CST -623 E	Natural Language Processing
CST -624 E	Wireless Networks
CST -625 E	Distributed Operating Systems
CST -626 E	Network & Internet Security
CST -627 E	Software Testing Methodologies
CST -628 E	Mobile Computing

LAB COURSES:

CST -551	:	Data Structures Lab
CST -552	:	Data Base Management Systems Lab
CST -553	:	Data Engineering Lab
CST -554	:	Web Technology Lab

- 24 credits have to be achieved from Core Subjects.
- 24 credits have to be achieved from Elective Subjects.
- 8 credits have to be achieved from Labs.
- 2 credits have to be achieved from internship.
- 22 credits have to be achieved from Project.
- Total 80 credits required for Awarding the M.Tech Degree.

CORE SUBJECT

CST511:: ADVANCED COMPUTER ARCHITECTURE

M.Tech. (CST): First Semester

Lectures / Tutorials	*: 4 Periods / week*	*Sessional Marks*	*: 40*
University Exam.	*: 3 hrs.*	*University Exam. Marks*	*: 60*

UNIT- 1 **(18 periods)**

Basic structure of computers: Computer types, Functional unit, Basic operational concepts, Bus structures, Performance, multiprocessors and multi computers

Machine instructions and programs : Numbers, Arithmetic operations and characters, Memory location and addresses , Memory operations, Instructions and instruction sequencing ,Addressing modes, Basic Input and Output operations, Stacks and Queues, Subroutines, Additional instructions ,Encoding of machine instructions.

Basic processing unit: Some fundamental concepts, Execution of complete instruction, multiple bus organization, Hard wired control, Micro programmed control.

UNIT- 2 **(18 periods)**

Arithmetic: Addition and subtraction of signed numbers, Design of fast adders, Multiplication of positive numbers, Signed operand multiplication, Fast multiplication, Integer division, Floating point numbers and operations.

Parallel Computer Models: The state of computing, Classification of parallel computers, Multiprocessors and Multicomputer, Multi vector and SIMD computers.

Program and network properties: Conditions of parallelism, Data and resource Dependences, Hardware and Software parallelism.

UNIT – 3 **(15 Periods)**

Program and network properties: Program partitioning and scheduling, Grain Size and latency, Program flow mechanisms, Control flow versus data flow, Data flow Architecture, Demand driven mechanisms, Comparisons of flow mechanisms.

Pipelining: Linear pipeline processor, nonlinear pipeline processor, Instruction pipeline Design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch Handling techniques, branch prediction, Arithmetic Pipeline Design, Computer Arithmetic principles, Static Arithmetic pipeline, Multifunctional arithmetic pipelines.

UNIT – 4 **(15Periods)**

MULTI Processors: Multiprocessor System Interconnect, Cache Coherence and Synchronization Mechanisms, Message-passing Mechanism, Latency-Hiding Techniques.

TEXT BOOK:

1. *Computer Organization - Carl Hamacher, ZvonkoVranesic, SafwatZaky, Fifth Edition, McGraw Hill.*
2. Kai Hwang, "Advanced Computer Architecture"; TMH.

Reference Books:

1.D.A. Patterson and J.L.Hennessey, "Computer organization and Design", Morgan Kaufmann, 2nd Edition.

2. V.Rajaram&C.S.R.Murthy, "Parallel Computer", PHI.

CORE SUBJECT

CST 512:: Data Structures

M.Tech. (CST): First Semester

Lectures / Tutorials	*: 4 Periods / week*	*Sessional Marks*	*: 40*
University Exam.	*: 3 hrs.*	*University Exam. Marks*	*: 60*

UNIT- I (18 periods)

Algorithm Analysis: Mathematical Back Ground, Model, What to Analyze, Running Time Calculations. Lists: Abstract Data Types, the List ADT, Singly Linked List ADT, Doubly Linked List ADT, Circular Linked List ADT, Polynomial ADT.

UNIT- II (17 periods)

Stacks: The Stack ADT implementations using Arrays and Linked Lists, Stack applications such as infix to postfix expression conversions, Evaluation of Postfix expressions, Delimiter Matching. Queues: The Queue ADT implementations using Arrays and Linked Lists, The Circular Queue ADT.

UNIT- III (15 periods)

Searching: Linear and binary searching. Hashing-Hash functions, separate chaining, Open Addressing. Internal Sorting: Preliminaries, Bubble sort, Selection sort, Insertion sort, Shell sort, Merge sort, Quicksort, Comparison of searching and sorting in terms of time complexities.

UNIT- IV (15 periods)

Trees: Preliminaries - Binary Trees - Expression trees, Binary tree traversals, the search tree ADT-Binary search trees, implementation, Heap-building Heap, Heap Sorting, AVL trees-single Rotations, and Double Rotations. Graphs: Definitions, representations, graph traversals.

TEXT BOOK: 1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education.

REFERENCE BOOKS: 1. Y.Langsam, M.J.Augeustein and A.M.Tenenbaum, "Data Structures Using C", Pearson Education Asia, 2004. 2. E.Horowitz and Sahani, "Fundamentals of Data Structures" 3. Debasis Samantha, “Classical Data Structures", and PHI 4. Jean Paul Trembly and P.G

CORE SUBJECT

CST 513::DATABASE MANAGEMENT SYSTEMS

M.Tech. (CST): First Semester

Lectures / Tutorials : 4 Periods / week *Sessional Marks : 40*
University Exam. : 3 hrs. *University Exam. Marks : 60*

Unit - I: **(15 periods)**

Database System Concepts and Architecture, the Relational Data Model and Relational Database Constraints, Basic SQL

Unit - II: **(15 periods)**

The Relational Algebra and Relational Calculus, Data Modeling Using the Entity-Relationship (ER) Model, the Enhanced Entity-Relationship (EER) Model.

Unit - III: **(18 Periods)**

Basics of Functional Dependencies and Normalization for Relational Databases, Relational Database Design Algorithms and Further Dependencies, Algorithms for Query Processing and Optimization.

Unit - IV: **(15 periods)**

Introduction to Transaction Processing Concepts and Theory, Concurrency Control Techniques, Distributed Databases

Text books:

1. RamezElmasri, ShamkantNavathe, "Fundamentals of Database Systems" ,Pearson Education, 6th edition.

References:

1. Raghurama Krishnan, Johannes Gehrke, "Data base Management Systems", TATA McGraw Hill 3rd Edition
2. Stefano Ceri, Giuseppe Pelagatti, "Distributed Database Principles & Systems", McGraw-Hill.

CORE SUBJECT

CST514::COMPUTER NETWORKS

M.Tech. (CST): Second Semester

Lectures / Tutorials	*: 4 Periods / week*	*Sessional Marks*	*: 40*
University Exam.	*: 3 hrs.*	*University Exam. Marks*	*: 60*

Unit - I **(16 periods)**

Introduction: Uses of Computer Networks, Network Hardware, Network Software, Reference Models, Example Networks.

Network Layer: Network Layer Design Issues, Routing Algorithms: The Optimality Principle, Shortest Path, Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing, Routing for Mobile Hosts.

Unit - II **(16 periods)**

Network Layer (Continued): Congestion Control Algorithms, Quality of Service, Internetworking, The Network Layer in the Internet.

Unit - III **(15 periods)**

The Transport Layer: The Transport Service, Elements of Transport Protocols, Simple transport Protocol, The Internet Transport Protocol (UDP), The Internet Transport Protocols (TCP).

Unit - IV **(13 periods)**

Application Layer: The Domain Name System (DNS): The DNS Name Space, Resource Records, Name Servers. Electronic Mail: Architecture & Services, the User Agent, Message Formats, Message Transfer, Final Delivery.

The World Wide Web: Architectural Overview, Static Web Documents, Dynamic Web Documents.

Multimedia: Introduction to Digital Audio, Audio Compression, Streaming Audio, Internet Radio, Voice over IP, Introduction to Video, Video Compression, Video on Demand, The MBone – The Multicast Backbone.

Text book:

1. Tanenbaum, "Computer Networks", 4th Edition, (Pearson Education / PHI).

References:

1. Kurose & Ross, "Computer Networks – A Top-down approach featuring the Internet", Pearson Education.
2. Leon-Gartia, IndraWidjaja, "Communication Networks Fundamental Concepts and Key Architectures", TMH.
3. Nader F.Mir, "Computer and Communication Networks", PHI

CORE SUBJECT

CST515 :: DATA ENGINEERING

M.Tech. (CST): Second Semester

Lectures / Tutorials	*: 4 Periods / week*	*Sessional Marks*	*: 40*
University Exam.	*: 3 hrs.*	*University Exam. Marks*	*: 60*

Unit - I: (15 periods)

Introduction to Data Warehouse, Data Warehouse architecture: System Processes, Process Architecture, Hardware Architecture.

Data Warehouse Design: Data Warehouse Schema, Partitioning strategy, Aggregations, Data Mart, Meta data, System & Process managers.

Unit - II (18 Periods)

Introduction to Data Mining, Data Mining Techniques: Statistics, Similarity Measures, Decision Trees, Neural Networks, Genetic Algorithms.

Classification: Statistical–based, Distance-based, Decision Tree- based, NN –based and Rule based.

Unit - III (18 Periods)

Algorithms for Clustering: - Hierarchical Algorithms, Partitional Algorithms, Clustering large Databases, Clustering with categorical Attributes.

Associate Rules:- Basic Algorithms, Parallel and Distributed algorithms, Comparative study, Incremental Rules, Advanced Association Rule Technique.

Unit - IV (15 periods)

Web Mining: - Web Content mining, Structure Mining, Usage Mining.

Spatial Mining: - Spatial Data Overview, Primitives, Generalization and Specialization.

Temporal Mining: - Modelling Temporal Events, Time Series, and Pattern Detection.

Text books:

1. Sam Anahory& Murray, "Data Warehousing in the Real World", Pearson Education publishers, 2009.
2. Margaret H. Dunham, "Data Mining – Introductory & Advanced Topics", Pearson Education publishers, 2008.

References:

1. Han and Kamber, "Data Mining – Concepts and Techniques",3rd Edition, 2011, Morgan Kaufmann Publishers
2. Junjie.Wu, "Advances in K-Means Clustering, A Data Mining Thinking", Springer Computer Science.
3. Thomas A. Runkler, "Data Analytics: Models and Algorithms for Intelligent Data Analysis"

CORE SUBJECT

CST 516:: Web Technologies

M.Tech. (CST): Second Semester

Lectures / Tutorials	*: 4 Periods / week*	*Sessional Marks*	*: 40*
University Exam.	*: 3 hrs.*	*University Exam. Marks*	*: 60*

Unit - I: **(15 periods)**

Introduction to XHTML, Cascading Style Sheets (CSS), JavaScript: Introduction to Scripting Control Statements, Functions, Arrays, Objects.

Unit - II: **(18 Periods)**

Dynamic HTML: Object Model and Collections, Dynamic HTML: Event Model.
XML: Introduction, DTD, Schema, And XSL, Web Servers: IIS and Apache

Unit - III: **(18 Periods)**

Servlets :Overview, Servlet Implementation, Servlet Configuration, Servlet Lifecycle, Servlet request, Servlet response, Session Tracking, Cookies.
Ajax-Enabled Rich Internet Applications: Introduction, Traditional Web Applications vs Ajax Application, XMLHttpRequest Object, Creating Ajax Application.

Unit - IV: **(15 periods)**

JSP: Jsp Directives, Scripting Elements, Standard Actions, Implicit Objects, Scope.
Web Services: Java Web Services Basics, Creating & Publishing Web service, Consuming Web Service, SOAP.

Text books:

1. Harvey M. Deitel and Paul J. Deitel, **"**Internet & World Wide Web How to Program**",** 4/e**,** Pearson Education.
2. SubrahmanyamAllamraju et.al "Professional Java Server Programming", a Press.

References:

1. Jason Cranford Teague "Visual Quick Start Guide CSS, DHTML & AJAX**",** 4e, Pearson Education.
2. Tom NerinoDoli smith **"**JavaScript & AJAX for the web**"** Pearson Education2007.
3. Joshua Elchorn**"**Understanding AJAX**"** Prentice Hall 2006.
4. James McGovern & Rahim Aditya "J2EE 1.4 Bible" Wiley publications.
5. Jim Keogh "The complete Reference J2EE" Tata McGraw Hill.

ELECTIVE SUBJECT

CST 611 E:: Software Engineering

I Year M.Tech. (CST)

Lectures / Tutorials	*: 4 Periods / week*	*Sessional Marks*	*: 40*
University Exam.	*: 3 hrs.*	*University Exam. Marks*	*: 60*

Unit - I: **(15 periods)**

Introduction to Software Engineering, A Generic View of process, An Agile View of Process.

Unit - II: **(15 periods)**

Software Requirements, Requirements Engineering Process, System Models.

Unit - III: **(18 Periods)**

Design Engineering, Creating an Architectural Design, Object Oriented Design, Performing User Interface Design.

Unit - IV: **(18 Periods)**

Testing Strategies, Product Metrics, Plans for Testing.

Text books:

1. Roger S.Pressman, 'Software Engineering - A Practitioner's Approach', Sixth Edition, McGraw- Hill International.
2. Ian Somerville, "Software Engineering", 7th Edition, Pearson Education.

References:

1. K.K.Agarwal&Yogesh Singh, 'Software Engineering', New Age International Publishers.
2. James F.Peters, WitoldPedrycz, "Software Engineering, an Engineering Approach", John Wiley.
3. ShelyCashman Rosenblatt, "Systems Analysis and Design", Thomson Publications.
4. Waman S Jawadekar," Software Engineering Principles and Practice", TMH.

ELECTIVE SUBJECT

CST-612 E :: DIGITAL IMAGE PROCESSING

I Year M.Tech. (CST)

Lectures / Tutorials	*: 4 Periods / week*	*Sessional Marks*	*: 40*
University Exam.	*: 3 hrs.*	*University Exam. Marks*	*: 60*

UNIT - I (10 periods)

Introduction: Digital Image Processing, Fundamental Steps in Digital Image Processing, Components of an Image Processing System.

Digital Image Fundamentals: Elements of Visual Perception, Image Sensing and Acquisition, Image Sampling and Quantization, Some basic Relationships between Pixels.

UNIT - II (18 periods)

Image Enhancement in the Spatial Domain: Some Basic Gray Level Transformation, Histogram Processing, Enhancement Using Arithmetic/Logic Operations, Basics of Spatial Filtering, Smoothing spatial Filters, Sharpening spatial Filters.

Image Enhancement in the Frequency Domain: Introduction to the Fourier Transform and the Frequency Domain, Smoothing frequency domain Filters, Sharpening frequency-domain Filters, Holomorphic Filtering, Implementation.

UNIT - III (20 periods)

Image Restoration: A Model of the Image Degradation/Restoration Process, Linear, Position-Invariant Degradations, Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering, Constrained Least Squares Filtering.

Image Compression: Image Compression Models, Error-free Compression, Lossy Compression, Image Compression Standards.

UNIT - IV (13 periods)

Morphological Image Processing: Dilation and Erosion, The Hit-or-Miss Transformation, Some basic Morphological Algorithms, Extension to Gray-Scale Images.

Image Segmentation: Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region-Based Segmentation.

LEARNING RESOURCES

TEXT BOOK:

1. Rafael C. Gonzalez, Richard E. Woods, 'Digital Image Processing' Addison Wesley Pubs (Second Edition).

REFERENCE BOOKS:

1. Milan Sonka, Vaclav Hlavac, Roger Boyle Image Processing. Analysis, and Machine Vision (Second Edition).

2. A.K.Jain, 'Fundamentals of Digital Image Processing' PHI.

B.Tech./I.T./2012-13 163

R.V.R. & J.C. College of Engineering (Autonomous), Guntur-522019, A.P. R-12

WEB REFERENCES:

_ *http://www.imageprocessingbasics.com/*

_ *www.imageprocessingplace.com/root_files_V3/tutorials.htm*

_ *www.library.cornell.edu/preservation/tutorial/intro/intro-01.html*

_ *www.olympusmicro.com/primer/digitalimaging/javaindex.html*

ELECTIVE SUBJECT

CST-613 E:: Automata Theory And Formal Languages

I Year M.Tech. (CST)

Lectures / Tutorials	*: 4 Periods / week*	*Sessional Marks*	*: 40*
University Exam.	*: 3 hrs.*	*University Exam. Marks*	*: 60*

Unit - I **(18 periods)**

Automata: Introduction to Automata, The central concepts of automata theory - Alphabets, Strings, Languages.

Finite Automata: Introduction, Deterministic finite automata (DFA), Non deterministic finite automata (NFA), Equivalence of DFA and NFA.

Automata with $\in$ transitions: Use of $\in$ - transition, notation for an $\in$ - NFA, Epsilon closures, extended transitions and languages, Applications.

Unit - II **(15 periods)**

Regular Expressions and Languages: Regular expressions, finite automata and regular expressions, Algebraic laws of regular expressions.

Properties of Regular Languages: Proving languages are not regular – Pumping lemma for regular languages, Applications of the pumping lemma, Closure Properties of Regular Languages, Equivalence and minimization of automata – Minimization of DFA.

Unit - III **(18 periods)**

(Construction based treatment & proofs are excluded)

Context Free Grammars: Context Free Grammars, Parse Trees, Constructing parse trees, derivations and parse trees, ambiguous grammars.

Pushdown Automata: Definition of the Pushdown automata, the languages of PDA, Equivalences of PDA's and CFG's.

Context free languages: Normal form's for context- Free grammars, the pumping lemma for context free languages.

Unit - IV **(15 periods)**

Properties of Context free languages: closure properties for context free languages, Decision properties for CFL's.

Introduction to Turing Machines: The Turing Machine, programming techniques for Turing machines.

Undesirability: a language that is not recursively enumerable, an undecidable problem that is RE, Undecidability problems about TM, Post's Correspondence problem.

Text books:

1. John.E.Hopcroft, R.Motwani, & Jeffery.D Ullman, "Introduction to Automata Theory, Languages and Computations", Second Edition, Pearson Education, 2003

References:

1. Daniel I.A.Cohen, 'Introduction to Computer Theory', Willey
2. KLP Mishra &N.Chandrasekharan, 'Theory of Computation', PHI.
3. H.R.Lewis, C.H.Papadimitriou, "Elements of The theory of Computation", Second Edition, Pearson Education, 2003.
4. J.Martin, "Introduction to Languages and the Theory of Computation", Third Edition, Tata McGraw Hill, 2003.
5. MichealSipser, "Introduction of the Theory and Computation", Thomson Brokecole, 1997.
6. Ragade, "Automata and Theoretical Computer Science", First Edition, Pearson Education, 2004.
7. John E Hopcroft& Jeffery D Ullman' 'Introduction to Automata Theory & Languages and Computation', Narosa Publishing House.

ELECTIVE SUBJECT

CST 614 E :: Embedded Systems

I Year M.Tech. (CST)

Lectures / Tutorials: 4 Periods / week *Sessional Marks: 40*
University Exam. : 3 hrs. *University Exam. Marks: 60*

Unit - I: (15 periods)

Introduction: Challenges of Embedded Systems – fundamental components – examples of embedded systems – hardware fundamentals – gates – timing diagrams – memory – direct memory access – buses – interrupts – schematics – build process of embedded systems.

Unit - II: (18 Periods)

Management and Interrupts: Memory access procedure – types of memory – memory management methods – Pointer related issues – polling versus interrupts – types of interrupts – interrupt latency – reentrancy – interrupt priority – programmable interrupt controllers – interrupt service routines.

Unit - III: (18 Periods)

Real-Time Operating Systems – RTOS: Desktop Operating Systems versus RTOS – need for Board Support Packages – task management – race conditions – priority inversion – scheduling – inter task communication – timers – sémaphores – queues.

Unit - IV: (15 periods)

Embedded System Design and Implementation: Requirements of an embedded system – architecture styles and patterns – design practices – implementation aspects and choices.

Embedded Software Development Tools: Host and target machines – cross compilers – linker and locators for embedded software – address resolution – locating program components – initialized data and constant strings – PROM programmers – ROM emulators – Flash memory.

Text books:

1. SriramV.Iyer, Pankaj Gupta, "Embedded Real-time Systems Programming", Tata McGraw Hill publishers, 2004.
2. David E.Simon, "An Embedded Software Primer", Pearson Education publishers, 1999.

References:

1. Raj Kamal, "Embedded Systems" Tata McGraw Hill.
2. Frank Vahid and Tony Givargis, "A unified Hardware/Software Introduction, Embedded System Design "John Wiley & Sons publishers, 2002.

ELECTIVE SUBJECT

CST 615 E :: Advanced Unix Programming

I Year M.Tech. (CST)

Lectures / Tutorials : 4 Periods / week *Sessional Marks : 40*

University Exam. : 3 hrs. *University Exam. Marks : 60*

Unit - I: (15 Periods)

Introduction to UNIX: UNIX architecture, Features of UNIX, vi editor.

Unix utilities- pwd, mkdir, ls, cd , rmdir, cp, mv, rm, ln, unlink, lp, cat, more, pg, head, tail, sort ,nl, grep, egrep, fgrep, cut, paste, join, tee, w ,chgrp, chmod, chown,find, cmp, diff, uniq, tr**,** du, df, mount, unmount, umask, ulimit,tar, cpio, dump , who, mail, compress, uncompress, gzip, gunzip, crypt, sed, tty, finger, telnet, rlogin, ftp,write, wall,awk.

Unit - II (15 Periods)

File I/O: Introduction, File Descriptors, system calls, open ,creat ,close ,lseek , read, write Functions, I/O Efficiency, File Sharing, Atomic Operations,. dup and dup2 Functions, sync, fsync, and fdatasync Functions, fcntl ,ioctl Functions.

Files and Directories: Introduction, stat, fstat, and lstat Functions, File Types, Set-User-ID and Set-Group-ID, File Access Permissions, Ownership of New Files and Directories. access, umask, chmod, fchmodFunctions,Sticky Bit, chown, fchown, and lchown Functions, File Size, link, unlink, remove, and rename Functions, Symbolic Links, mkdir and rmdir Functions, Reading Directories, chdir, fchdir, and getcwd Functions, Device Special Files.

Unit - III (15 Periods)

Process Control: Introduction, Process Identifiers, fork, vfork , exit, wait and waitpid, waitid , wait3 and wait4 Functions, Race Conditions, exec Functions, Changing User IDs and Group Ids, Interpreter Files, system Function, Process Accounting, User Identification, Process Times.

Signals: Introduction. Signal Concepts, signal Function, Unreliable Signals, Interrupted System Calls, Reentrant Functions, SIGCLD Semantics, Reliable-Signal Terminology and Semantics, kill and raise Functions, alarm and pause Functions, Signal Sets, sigprocmask, spending , sigaction , sigsetjmp, siglongjmp, sigsuspend , abort , system , sleep Functions, Job-Control Signals.

Unix Internals: Kernel Basics, File System, Process Management, memory management.

Unit - IV (17 Periods)

Inter process communication: Introduction, Pipes, FIFOs,Message Queues, Semaphores, Shared Memory, Sockets.

Text books:

1. Graham Glass, King Ables,"Unix for programmers and users",3rd edition pearson education .
2. w- Richard Stevens, "Advanced programming in the unix environment", 2nd Edition Pearson education

References:

1. w- Richard Stevens, "Unix network programming", 2nd Edition.
2. Sumitabha Das, "Your unix the ultimate guide", TMH 2nd edition.
3. Marc J. Rochkind, "Advanced unix programming",2nd edition Pearson Education.

ELECTIVE SUBJECT

CST 616 E :: Design and Analysis of Algorithms

I Year M.Tech. (CST)

Lectures / Tutorials	*: 4 Periods / week*	*Sessional Marks*	*: 40*
University Exam.	*: 3 hrs.*	*University Exam. Marks*	*: 60*

UNIT-I (19 periods)

Introduction- Algorithm, Algorithm specification, performance analysis Divide and Conquer- Finding Maximum and Minimum, Merge sort, quick sort, Strassen's matrix multiplication

The Greedy Method: The general method, Knapsack Problem, Tree vertex splitting, Job sequencing, Minimum-cost spanning trees, Single source shortest paths.

UNIT-II (13 periods)

Dynamic Programming : The General method, Multistage graph, All pairs shortest path, Single-source shortest path, Optimal Binary search trees, String Editing, 0/1 Knapsack, Reliability design, The traveling salesman problem.

UNIT-III (14 periods)

Basic traversal & search techniques: Techniques for binary trees, techniques for graphs, connected components & spanning trees, Biconnected components.

Back tracking: The General Method, The 8-Queens Problem, Sum of subsets, Graph coloring, Hamiltonian cycle, and Knapsack problem.

UNIT-IV (14 periods)

Branch and Bound: The general method, 0/1 Knapsack problem, Traveling salesperson.

NP hard and NP Complete Problems: Basic concepts, Cook's Theorem Statement.

LEARNING RESOURCES

TEXT BOOK:

1. L Ellis Horwitz, Sartaj Sahni, 'Fundamentals of Computer Algorithms', Galgotia Publications.

REFERENCE BOOKS:

1. Alfred.V.Aho, John.E.Hopcroft & Jeffry.D.Ullman, 'The Design and Analysis of Computer Algorithms', Addison Wesley.

2. Thomas H.Corman et al, 'Introduction to Algorithms', PHI.

WEB REFERENCES:

_ www.nprcet.org/e%20content/cse/DAA.pdf

_ www.cse.iitd.ernet.in/~ssen/csl356/notes/root.pdf

_ www.personal.kent.edu/~rmuhamma/Algorithms/algorithm.html

_ www.freebookzone.com/fetch.php?bkcls=cs_ds&bkidx=13

ELECTIVE SUBJECT

CST 617 E:: Cloud Computing

I Year M.Tech. (CST)

Lectures / Tutorials	*: 4 Periods / week*	*Sessional Marks*	*: 40*
University Exam.	*: 3 hrs.*	*University Exam. Marks*	*: 60*

Unit - I: **(15 periods)**

Where We Are, How We Got Here, and How to Fix It, Reaching for the Clouds, Defining the Clouds for the Enterprise, Making the Business Case for Clouds.

Unit - II: **(15 periods)**

Working from Your Data to the Clouds, Working from Your Services to the Clouds, Working from Your Processes to the Clouds.

Unit - III: **(18 Periods)**

Testing from SOA to the Clouds, Defining Candidate Data, Services, and Processes for the Clouds, Making the Move to Cloud Computing.

Unit - IV: **(18 Periods)**

Virtualization, Cloud Architecture, Selected Cloud Offerings.

Text books:

1. David S. Linthicum,"Cloud Computing and SOA Convergence in your enterprise, A Step-by-Step Guide", Addision-Wesley Information Technology Series, 2010.
2. Christian Baun l Marcel Kunze l Jens Nimis Stefan Tai, "Cloud Computing, Web-Based Dynamic IT Services", Springer, 2011

References:

1. RajkumarBuyya, James Broberg, and Andrej Goscinski ,"Cloud Computing: Principles and Paradigms",John Wiley & Sons, Inc.,

ELECTIVE SUBJECT

CST 618 E:: Multimedia Systems

I Year M.Tech. (CST)

Lectures / Tutorials	*: 4 Periods / week*	*Sessional Marks*	*: 40*
University Exam.	*: 3 hrs.*	*University Exam. Marks*	*: 60*

Unit - I: **(15 periods)**

Multimedia Communications, Multimedia Information Representation, Text and Image Compression, Audio and Video Compression

Unit - II: **(15 periods)**

Standards for Multimedia Communications, Circuit-switched networks, Enterprise Networks, The Internet.

Unit - III: **(18 Periods)**

Broadband ATM Networks, Entertainment Networks and High-Speed Modems, Transport Protocols, Internet Applications & WWW.

Unit - IV: **(18 Periods)**

Qualityofservice(QoS) Provision, General QoS Mapping Framework, Packet-Forwarding Mechanism with Static QoS Mapping, Dynamic QoS Mapping Control for CM Streaming.

Text books:

1. Fred Halsall, "Multimedia Communications: Applications, Networks, Protocols and Standards", Addison-Wesley , 2001.
2. Jitae Shin, Daniel C. Lee, C.C. Jay Kuo, "Quality of Service for Internet Multimedia",Prentice Hall, 2004.

References:

1. Fluckiger, "Understanding Networked Multimedia", Prentice Hall, 1996.
2. Damien Stolarz, "Mastering Internet Video: A Guide to Streaming and On-Demand Video", Addison-Wesley, 2005.
3. Aura GanzZviGanz, KittiWongthavarawat, "Multimedia Wireless Networks: Technologies, Standards and QOS", Prentice Hall, 2004.
4. Colin Perkins, "RTP: Audio and Video for the Internet", Addison-Wesley, 2003.

ELECTIVE SUBJECT

CST 619 E :: Object Oriented Analysis And Design

I Year M.Tech. (CST)

Lectures / Tutorials	*: 4 Periods / week*	*Sessional Marks*	*: 40*
University Exam.	*: 3 hrs.*	*University Exam. Marks*	*: 60*

Unit - I: **(18 Periods)**

What is UML? What is the Unified Process? The requirements workflow, Use case modeling, Advanced use case modeling, The analysis workflow.

Unit - II: **(15 periods)**

Objects and classes, Finding analysis classes, Relationships, Inheritance and polymorphism, Analysis packages, Use case realization.

Unit - III: **(15 periods)**

Advanced use case realization, Activity diagrams, Advanced activity diagrams, The design workflow, Design classes, Refining analysis relationships.

Unit - IV: **(18 Periods)**

Interfaces and components, Use case realization-design, State machines, Advanced state machines, The implementation workflow, Deployment

Text book:

1. Jim Arlow, IlaNeustadt, "UML 2 and the Unified Process**:** Practical Object-Oriented Analysis and Design", 2/E, Pearson India

References:

1. Grady Booch, "The Unified Modeling Language User Guide", 2/E, Pearson India
2. Philippe Kruchten, "The Rational Unified Process: An Introduction",3/E, Pearson India

ELECTIVE SUBJECT

CST 620 E :: Compiler Design

I Year M.Tech. (CST)

Lectures / Tutorials	*: 4 Periods / week*	*Sessional Marks*	*: 40*
University Exam.	*: 3 hrs.*	*University Exam. Marks*	*: 60*

Unit - I: (18 Periods)

Introduction to compiling: Compilers, The Phases of a compiler, Compiler - construction tools.
Simple one-pass compiler: Overview, syntax definition, syntax direct translation, parsing, a translator for simple expressions.
Lexical Analysis: The role of the lexical analyzer, input buffering, simplification of tokens, Recognition of tokens, Finite Automata – Regular expression to Finite Automation. Implementing transition diagrams, a language for specifying lexical analyzers.

Unit - II (15 periods)

Syntax Analysis: Role of a Parser, Top down parsing - Recursive descent parsing, Predictive parsers, Bottom up parsing - Shift Reduce parsing, LR Parsers – Construction of SLR and LALR parsing, Parser
Generators.
Syntax – Directed Translation: Syntax Directed definition, construction of syntax trees, Bottom-up evaluation of S – attributed definitions-attributed definitions.

Unit - III (15 periods)

Runtime Environment: Source language issues, Storage organization, Storage-allocation strategies, Access to nonlocal names, Parameter passing..
Symbol Tables: Symbol table entries, Data structures to symbol tables, representing scope information.

Unit - IV (17 periods)

Intermediate code Generation: Intermediate languages, Declarations, Assignment statements, Boolean expressions, Flow Control statements, Back patching.
Code Generation- Issues in the design of code generator, Next use information, the target machines, Basic blocks and flow graphs, Next use information, a Simple code generator, DAG Representation of Basic Blocks, Peephole optimization, Code generation from DAG.

Text books:

1. Alfred V.Aho, Ravi Sethi, JD Ullman, 'Compilers Principles, Techniques and Tools', Addison-Wesley Publishing Company.
2. Dick Grune, Henry E. Bal, Cariel T. H. Jacobs, , "Modern Compiler Design", Wiley dreamtech

References:

1. Alfred V.Aho, Jeffrey D. Ullman, 'Principles of Compiler Design', Narosa publishing.
2. Lex&Yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly.
3. Andrew N. Appel, "Modern Compiler Implementation in C" ,Cambridge University Press.
4. Cooper & Linda, "Engineering a Compiler", Elsevier

ELECTIVE SUBJECT

CST 621 E :: Real Time Systems

I Year M.Tech. (CST)

Lectures / Tutorials	*: 4 Periods / week*	*Sessional Marks*	*: 40*
University Exam.	*: 3 hrs.*	*University Exam. Marks*	*: 60*

UNIT – I **(15 periods)**

Typical Real-Time applications, Hard versus Soft Real-Time systems, A reference model of Real-Time Systems.

UNIT – II **(15 periods)**

Commonly used approaches to Real-Time scheduling, Clock-Driven scheduling, Pros and Cons of Clock-driven scheduling.

UNIT – III **(15 periods)**

Priority-Driven scheduling of Periodic tasks: static assumption, Fixed-Priority versus Dynamic-Priority algorithms, Optimality of the RM and DM algorithms, A schedulability test for Fixed-Priority tasks with short response times and arbitrary response times, sufficient schedulability conditions for the RM and DM algorithms; Scheduling Aperiodic and Sporadic jobs in priority-Driven systems: Deferrable Servers, Sporadic Servers, Constant Utilization, Total Bandwidth and weighted Fair-Queuing Servers, Scheduling of sporadic Jobs.

UNIT – IV **(15 periods)**

Resources and Resources Access Control, Scheduling Flexible computations and tasks with temporal distance constraints.

Text book:

1. Jane W.S.Liu, 'Real-Time Systems', Pearson Education Asia.

Reference books:

1. C.M.Krishna and Shin, 'Real-Time Systems', Tata McGraw Hill Co. Inc., 1997.

ELECTIVE SUBJECT

CST 622 E :: Network Programming

I Year M.Tech. (CST)

Lectures / Tutorials	*: 4 Periods / week*	*Sessional Marks*	*: 40*
University Exam.	*: 3 hrs.*	*University Exam. Marks*	*: 60*

UNIT-I **(15 periods)**

Introduction:

Data in client , Protocol independence, Error Handling, Data in Server, Client Server examples, OSI model, Text networks and hosts, Unix Standards, 64 bit architectures.

The Transport Layer, Sockets Introduction, Elementary TCP Sockets.

UNIT-II **(15 periods)**

TCP Client-Server Example, TCP Echo Server, TCP Echo Client, I/O Multiplexing, Elementary UDP Sockets, UDP Echo Server, UDP Echo Client.

UNIT-III **(15 periods)**

Name and Address Conversions, Daemon Processes and the inetd Superserver, Advanced UDP Sockets.

UNIT-IV **(15 periods)**

Out-of-Band Data, Signal-Driven I/O, Threads, Multexes, Client/Server Design Alternatives, Streams.

Text book:

1. W.Richard Stevens, Bill Fenner, Andrew M. Rudoff, Unix Network Programming. The Sockets Networking API, Volume 1 , 3rd edition - 2004

References:

1. Douglas E.Comer, David L.Stevens, Internetworking With TCP/IP: Design, Implementation and Internals
2. Rochkind, Advanced Unix Programming, 2nd edition

Web references:

1. http://www.pearsoned.co.in/wrichardstevens
2. http://www.iana.org

ELECTIVE SUBJECT

CST 623 E :: Natural Language Processing

I Year M.Tech. (CST)

Lectures / Tutorials	*: 4 Periods / week*	*Sessional Marks*	*: 40*
University Exam.	*: 3 hrs.*	*University Exam. Marks*	*: 60*

Unit - I **(12 periods)**

Introduction to Natural Language Understanding, Grammars and Parsing

Unit - II **(20 periods)**

Features and Augmented Grammars, Toward Efficient Parsing, Ambiguity Resolution: Statistical Methods: Probabilistic Context-Free Grammars, Best-First Parsing.

Unit –III **(15 periods)**

Linking Syntax and Semantics, Ambiguity Resolution, other Strategies for Semantic Interpretation.

Unit -IV **(15 periods)**

Using World Knowledge, Discourse Structure, Defining a Conversational Agent.

TEXT BOOK:

1. James Allen, "Natural Language Understanding", Second Edition, Pearson Education.

REFERENCE BOOKS:

1. Daniel Jurafsky, James H.Martin, "Speech and Language Processing", Second Edition, Pearson Education.
2. ChristopherManning,HinrichSchutze, "Foundations of Statistical Natural Language Processing", MIT Press.
3. Elaine Rich and Kevin Knight, "Artificial Intelligence", Second Edition, TataMcGraw Hill.

ELECTIVE SUBJECT

CST 624 E :: Wireless Networks

I Year M.Tech. (CST)

Lectures / Tutorials	*: 4 Periods / week*	*Sessional Marks*	*: 40*
University Exam.	*: 3 hrs.*	*University Exam. Marks*	*: 60*

Unit - I: (15 periods)

Introduction – Applications – A Short History of Wireless Communications – A Market for Mobile Communications – A Simplified Reference Model.

Wireless Transmission – Frequencies – Signals – Antennas – Signal Propagation – Multiplexing –Modulation – Spread Spectrum.

Medium Access Control – Motivation for a Specialized MAC – SDMA – FDMA – TDMA – CDMA –Comparison.

Unit - II (15 Periods)

Telecommunication Systems – GSM, DECT, TETRA, UMTS and IMT-2000

Satellite Systems – History, Applications, Basics (GEO, LEO, MEO), Routing, Localization, Handover.

Broadcast Systems – Overview, Cyclic Repetition of Data, Digital Audio Broadcasting – Digital Video Broadcasting.

Unit - III (18 Periods)

Wireless LAN – Infrared Vs. Radio Transmission – Infrastructure and Ad Hoc Networks – IEEE, 802.11 – HIPERLAN – Bluetooth.

Mobile Network Layer –Mobile IP – Dynamic Host Configuration – Ad Hoc Networks.

Unit - IV (18 Periods)

Mobile Transport Layer – Traditional TCP – Indirect TCP – Snooping TCP – Mobile TCP – Fast Retransmit / Fast Recovery – Transmission / Time-Out Freezing – Selective Retransmission –Transaction Oriented TCP.

Wireless Application Protocol – Architecture – Wireless Datagram Protocol – Wireless Transport Layer Security – Wireless Transaction Protocol – Wireless Session protocol – Wireless

Application Environment – Wireless Markup Language – WML Script – Wireless Telephony Application – Example Stacks with WAP.

Text book:

1. J.Schiller, "*Mobile communications*", Addison-Wesley, 2003

References:

1. William Stallings, "*Wireless Communication Networks*".
2. UWE Hansmann, LotherMerk, Martin S.Nicklous, Thomas Stober, "*Principles of Mobile Computing*", 2nd Edition.

ELECTIVE SUBJECT

CST 625 E :: Distributed Operating Systems

I Year M.Tech. (CST)

Lectures / Tutorials	*: 4 Periods / week*	*Sessional Marks*	*: 40*
University Exam.	*: 3 hrs.*	*University Exam. Marks*	*: 60*

UNIT I: (17 periods)

Operating System Introduction, Structures - Simple Batch, Multi programmed, time-shared, Personal Computer, Parallel, Distributed Systems ,Real-Time Systems , System components, Operating-System services, System Calls, Virtual Machines.

Process and CPU Scheduling - Process concepts and scheduling, Operation on processes, Cooperating Processes, Threads, and Interposes Communication Scheduling Criteria, Scheduling Algorithms.

UNIT II (17 periods)

Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Deadlocks - System Model, Dead locks Characterization, Methods for Handling Dead locks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock.

UNIT III (18 periods)

Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging. Demand Paging, Performance of Demanding Paging, Page Replacement algorithms, Thrashing.

Introduction to Distributed systems: Goals of distributed system, hardware and software concepts, design issues. Communication in Distributed systems: Layered protocols, ATM networks, the Client – Server model, remote procedure call and group communication.

UNIT IV: (18 periods)

Synchronization in Distributed systems: Clock synchronization, Mutual exclusion, E-tech algorithms, the Bully algorithm, a ring algorithm, atomic transactions. Deadlocks: deadlock in distributed systems, Distributed deadlock prevention, and distributed dead lock detection.

TEXT BOOKS:

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne,"Operating System Principles", 7th Edition, John Wiley
2. Andrew. S. Tanenbaum, "Distributed Operating System", PHI

REFERENCE BOOKS:

1. Crowley, "Operating System A Design Approach", TMH.
2. Stallings, "Operating Systems – Internals and Design Principles", Fifth Edition–2005, Pearson Education.
3. Andrew S Tanenbaum, "Modern Operating Systems", 2nd edition Pearson..

ELECTIVE SUBJECT

CST 626 E :: Network & Internet Security

I Year M.Tech. (CST)

Lectures / Tutorials	*: 4 Periods / week*	*Sessional Marks*	*: 40*
University Exam.	*: 3 hrs.*	*University Exam. Marks*	*: 60*

Unit - I:

(18 Periods)

Security in Network, Model for Security, Elementary Cryptography, Classical Encryption Technique.

Unit - II

(18 Periods)

Public Key Encryption and HASH Function, Firewalls, Filtering Services, DNS Cache Poisoning.

Unit - III

(18 Periods)

Web Security, Intrusion detection systems, Electronic Mail Security, Pretty Good Privacy (PGP), S/MIME (Secure Multipurpose Mail Extension).

Unit - IV

(15 periods)

Wireless Application Protocol Security (WAP), Secure Socket Layer (SSL), Wireless Application Protocol Security (WAP), IP Security.

Text Books:

1. William Stallings, *Cryptography and Network Security: Principles and practices*. Third Edition.
2. At Kahate. Cryptography and Network Security
3. Bragg, Rhodes-Ousley, The complete Reference Network Security.
4. William R. Cheswick, Steven M. Bellovin, Aviel D. Rubin, Firewalls and Internet Security.
5. C. P. Pfleeger, and S. L. Pfleeger, *Security in Computing*. Pearson Education.

References:

1. Matt Bishop**,** *Computer Security: Art and Science.*, Pearson Education
2. Kaufman, Perlman, Speciner, *Network Security*.
3. Eric Maiwald, *Network Security : A Beginner.s Guide*., TMH
4. Bruce Schneier, *Applied Cryptography.*,John Wiley.
5. Macro Pistoia, *Java Network Security* ., Pearson Education

ELECTIVE SUBJECT

CST-627 E :: Software Testing Methodologies

I Year M.Tech. (CST)

ctures / Tutorials : 4 Periods / week *Sessional Marks : 40*

University Exam. : 3 hrs. *University Exam. Marks : 60*

UNIT- I (16 Periods)

Principles of Testing; Software Development Life Cycle Models – Phases of Software Project - Quality, Quality Assurance and Quality Control -Testing, Verification and Validation - Process Model to Represent Different Phases

White Box Testing: Static Testing - Structural Testing – Challenges **Black Box Testing:** What, Why, When, How.

UNIT- II (16 Periods)

Integration Testing: Integration Testing as a Type of Testing – Integration Testing as a Phase of Testing - Scenario Testing - Defect Bash.

System and Acceptance Testing: Overview - Functional Versus Non-Functional - Functional System Testing & Non-Functional – Acceptance Testing.

Performance Testing: Introduction - Factors, Methodology, Tools &Process.

Regression Testing: Introduction -Types - When to do Regression Testing - How to do Regression Testing - Best Practices in Regression Testing.

UNIT- III (16 Periods)

Ad hoc Testing: Overview - Buddy Testing - Pair Testing – Exploratory Testing - Iterative - Agile and Extreme Testing - Defect Seeding.

Usability and Accessibility Testing: Approach to Usability - When to do Usability - How to achieve Usability - Quality Factors for Usability -Aesthetics Testing - Accessibility Testing - Tools for Usability - Usability Lab Setup - Test Roles for Usability.

Common People Issues: Perceptions and Misconceptions About Testing- Comparison between Testing and Development Functions – Providing Career Paths for Testing Professionals - Role of the Ecosystem and a Call for Action.

Organization Structures for Testing Teams: Dimensions of Organization Structures - Structures in Single-Product Companies, Multiproduct Companies - Effects of Globalization and Geographically Distributed Teams on Product Testing - Testing Services Organizations - Success Factors for Testing Organizations.

UNIT- IV (16 Periods)

Test Planning, Management, Execution and Reporting: Introduction - Planning - Management - Process - Reporting - Best Practices.

Software Test Automation: Terms used in Automation - Skills needed for Automation - What to Automate, Scope of Automation - Design and Architecture for Automation - Generic Requirements for Test Tools - Process Model for Automation - Selecting a Test Tool - Automation for Extreme Programming Model - Challenges.

Test Metrics and Measurements: Metrics & Measurements - Types -Project - Progress - Productivity - Release.

LEARNING RESOURCES

TEXT BOOK:

1. Srinivasa Desikan & Gopalaswamy Ramesh, "Software Testing - Principles and Practices", Pearson Education, 2007.

REFERENCE BOOKS:

1. Software Testing techniques - Baris Beizer, Dreamtech, second edition.

2. The craft of software testing - Brian Marick, Pearson Education.

ELECTIVE SUBJECT

CST-628 E :: Mobile Computing

I Year M.Tech. (CST)

Lectures / Tutorials	*: 4 Periods / week*	*Sessional Marks*	*: 40*
University Exam.	*: 3 hrs.*	*University Exam. Marks*	*: 60*

UNIT- I (**15 periods)**

Introduction: History of Cellular Systems, Characteristics of Cellular Systems, Cellular System Infrastructure, Satellite Systems, Network Protocols, AdHoc and Sensor Networks, Wireless MANs, LANs and Pans.

Mobile Radio Propagation: Introduction, Types of Radiowaves,Propagation Mechanisms, Free Space Propagation, Land Propagation, Path Loss, Slow Fading, Fast Fading, Doppler Effect, Inter symbol Interference, Coherence Bandwidth, Cochannel Interference.

Channel Coding and Error Control - Introduction, Linear Block Codes, Cyclic Codes, CRC, Convolutional Codes, Interleaver, Turbo Codes.

UNIT- II **(15 periods)**

Cellular Concept: Introduction, Cell Area, Signal Strength and Cell Parameters, Capacity of a Cell, Frequency Reuse, How to Form a Cluster?, Cochannel Interference, Cell Splitting, Cell Sectoring.

Multiple Radio Access: Introduction, Multiple Radio Access Protocols, Contention-Based Protocols.

Multiple Division Techniques: Introduction, Concepts and Models for Multiple Divisions, Modulation Techniques.

Channel Allocation: Introduction, Static Allocation versus Dynamic Allocation, Fixed Channel Allocation, Allocation in Specialized System Structure, System Modeling.

UNIT- III **(15 periods)**

Telecommunication Systems: GSM, UMTS and IMT-2000.Wireless LAN - Infrared vs. Radio Transmission, Infrastructure and Adhoc Network, IEEE 802.11, Bluetooth.

UNIT- IV **(15 periods)**

Mobile Network Layer: Mobile IP, DHCP, Mobile Ad-hoc Networks.

Mobile Transport Layer: Traditional TCP, Classical TCP Improvements, TCP over 2.5G/3G Wireless Networks

WAP: Architecture, Wireless Application Environment, WML, Wireless Telephony Application, Push/Pull Services, WAP 2.0.

LEARNING RESOURCES

TEXT BOOKS:

1. Dharma Prakash Agarwal, Qing-An Zend, Introduction to Wireless and Mobile Systems, 2nd Edition, Cengage Learning, 2006. (UNITS- I, II).

2. Jochen Schiller, Mobile Communications, 2nd Edition, Pearson Education, 2009.

(UNITS - III, IV).

LAB COURSE

CST-551 :: Data Structures Lab

M.Tech. (CST)First Semester

Practical's	*: 6 Periods / week*	*Sessional Marks*	*: 40*
University Exam.	*: 3 hrs.*	*University Exam. Marks*	*: 60*

Sample programs

1. Write C programs to perform the following ADT operations on singly linked list and double linked list.
   a) Creation b) insert at begin
   c) insert at end d) insert after specified position
   e) Deletion f) display
   g) Search an element h) sorting the list
   i) Reversing the list j) concatenation of two linked lists.
2. If L1 and L2 are two sorted singly linked lists, Write a C program to perform the following operations
   a) L1 U L2 b) L1 ∩ L2
3. Write a C program to perform insertion and deletion operations on single circular linked list.
4. Write a C program to perform polynomials addition and multiplication using linked lists.
5. Write a C program that reads two lists of elements, prints the lists, reverses the lists, prints the reverse lists, sorts the lists, prints the sorted lists, merges the lists and prints the merged list.
6. Write a C program to implement stack using arrays and linked lists.
7. Write a C program to convert infix expression to postfix expression and evaluation of postfix expression.
8. Write C programs to implement Queues using arrays and linked list.
9. Write a C program that reads postfix arithmetic expression, builds an Expression tree and perform tree traversals on it.
10. Write a C program to construct Binary search tree and to perform the following operations.
    a) Insertion c) Deletion
    b) Find_min d) Find_max
    e) Searching f) Sorting
11. Write c programs to implement Hashing Techniques.
12. Implement the following searching and sorting techniques
    a) Binary search b) Shell Sort
    c) Heap Sort d) Merge Sort
    e) Quick Sort

LAB COURSE

CST 552 :: DBMS Lab

M.Tech. (CST) First Semester

Practicals	*: 6 Periods / week*	*Sessional Marks*	*: 40*
University Exam.	*: 3 hrs.*	*University Exam. Marks*	*: 60*

Implementing Database concepts using SQL and PL/SQL

1. Simple and Complex Queries in SQL.
2. Sub Queries in SQL.
3. Indexes, Clusters, GRANT and REVOKE in SQL
4. DDL statements using Schema Builder.
5. Report Generation Using Query Builder
6. Data Base Interaction through form Builder.
7. Simple Programs in PL/SQL.
8. Cursors in PL/SQL.
9. Database Triggers in PL/SQL.
10. Sub Programs in PL/SQL.

LAB COURSE

CST-553:: Data Engineering Lab

M.Tech. (CST) Second Semester

Practicals	*: 6 Periods / week*	*Sessional Marks*	*: 40*
University Exam.	*: 3 hrs.*	*University Exam. Marks*	*: 60*

Implementing issues related to Data Warehouse and data mining -

1. **Computation of data cuboids.**

Consider the following fragments of database from All electronics sales application and implement the following database cube with dimensions TIME, LOCATION, ITEM and BRANCH tables and the fact table SALES.

DIMENSION TABLES:

TIME (Time key, Day, Day-of-week, month, qtr, year);

ITEM (Item key, Item name, Brand, type, Supplier type);

BRANCH (Branch key, Branch name, Branch type);

LOCATION (Location key, Street, City, State, Country);

FACT TABLE:

SALES (Time_key, Item_key, Branch_key, Location_key, Units_sold, Price);

Compute all the possible cuboids for the above Data warehouse schema.

2. **Creating Star Schema/snowflake Schema / Fact constellation Schema using Schema builder**
   a) All Electronics sales application.
   b) Banking business requirement document
3. Analyzing business data with multi-dimensional ROLLUP and CUBE.
4. C/JAVA program for checking the redundancy between Attributes A and B in data preprocessing.
5. C/JAVA programs for data normalization in data preprocessing.
6. Implementing Apriori Association rule mining algorithm in C/JAVA.
7. Implementing K-Means and K-Medoids clustering algorithms in C/JAVA.
8. Implementing DWH data flows to populate data for any application using various Transformations with CLEMENTINE/INFOSPHERE/INFORMATICA Tools.
9. Implementing Classification methods in WEKA TOOL.
10. Implementing Association rule mining methods in WEKA TOOL.

CST- 554:: Web Technology Lab

M.Tech. (CST) :: Second Semester

Practicals	*: 6 Periods / week*	*Sessional Marks*	*: 40*
University Exam.	*: 3 hrs.*	*University Exam. Marks*	*: 60*

1. Write codes different types of styles in CSS.
2. Write java scripts covering Arrays and Objects, Function, recursive functions.
3. Implement All, Child and anchor collection objects.
4. Implement Mouse events, Form events.
5. Implement event bubbling and keyboard events
6. Write well-formed and valid XML documents.
7. Write code for displaying XML using XSL.
8. Programs on Ruby & Ruby on Rail.
9. Develop google suggests using Ajax technology with XHR object.
10. Write a program to demonstrate Generic & HTTP Servlets.
11. Write a program to demonstrate cookies and Session.
12. Write server side programs using JSP tags.
13. Implement a simple Web Service.

CST-711:: INTERNSHIP

M.Tech. (CST) :: Third Semester

Practicals	*: 6 Periods / week*	*Sessional Marks*	*: 100*

Internal assessment is done based on Internship certificate for a period of minimum 4 weeks and presentation.

CST-712 :: Project Seminar

M.Tech. (CST) :: Third Semester

Practicals	*: ---*	*Sessional Marks*	*: 100*

Internal assessment is done based on the minimum six seminar presentations of their project.

CST 713 :: Project Viva

M.Tech. (CST) :: Fourth Semester

Practicals	*: 24 Periods / week*	*Sessional Marks*	*: 50*
University Exam.	*: 3 hrs.*	*University Exam. Marks*	*: 150*

Assessment is done based on the seminar presentations and Project viva-voce examination.