

M.Tech Information Technology

Course Structure and Scheme of Valuation w.e.f. 2015-16

I SEMESTER

Code	Name of the subject	Periods/week		Max. Marks		Total	Credits
		Theory	Lab	Ext.	Int.		
MTCST1.1	Mathematical Foundations of Computer Science	3	-	70	30	100	4
MTCST1.2	Data Structures & Algorithms	3	-	70	30	100	4
MTCST1.3	AdvData Base Management Systems	3	-	70	30	100	4
MTCST1.4	Advanced Operating Systems	3	-	70	30	100	4
MTCST1.5	Elective-I	3	-	70	30	100	4
MTCST1.6	Elective-II	3	-	70	30	100	4
MTCST1.7	Data Structures & Programming Lab	-	3	50	50	100	2
MTCST1.8	Database Management Systems Lab	-	3	50	50	100	2
Total		18	6	520`	280	800	28

Elective-I : Computer Organization & Architecture/ E-commerce/Embedded systems

Elective II: Computer Networks/Cloud Computing/ Grid Computing/ Computer Graphics & Visual Computing

II SEMESTER

Code	Name of the subject	Periods/week		Max. Marks		Total	Credits
		Theory	Lab	Ext.	Int.		
MTIT2.1	Web Systems & Technologies	3	-	70	30	100	4
MTCST2.2	Object Oriented Software Engineering	3	-	70	30	100	4
MTIT2.3	Information Security & Cryptography	3	-	70	30	100	4
MTIT2.4	Wireless & Mobile Networks	3	-	70	30	100	4
MTIT2.5	Elective III	3	-	70	30	100	4
MTCST2.6	Elective IV	3	-	70	30	100	4
MTIT 2.7	Network Programming & Web Programming Lab	-	3	50	50	100	2
MTCST 2.8	OOSE Lab	-	3	50	50	100	2
MTCST2.9	Seminar	-	-	-	100	100	2
Total		18	6	520`	380	900	30

Elective III: Mathematics of Internet Systems & Control/IT Infrastructure Planning & Management/Geo-Informatics/Data Base Security /Business Intelligence/ Big Data Analysis

Elective IV: Mobile Computing/Soft Computing/ Cluster Computing/ Pervasive Computing

III SEMESTER

M. Tech (CST, IT, CSTAIR, CSTBI, CST CN)

Code Credits	Name of the subject	Periods/week				Max. Marks	Total
		Theory	Lab	Ext.	Int.		
MTCST3.2	Thesis Work Part 1		Grade		Grade	10	

1. Candidates can do their thesis work within the department or in any industry/research organization for two semesters (i.e. 3rd and 4th semesters). In case of thesis done in an industry/research organization, one advisor (Guide) should be from the department and one advisor(CO-Guide) should be from the industry/research organization.
2. Thesis part I should be submitted at the end of 3rd semester and it will be evaluated by a committee consisting of Chairman Board of Studies, Head of the Department and thesis guide.
3. Although credits are allotted for the thesis work they will not be taken for the calculation of CGPA.

IV SEMESTER

Code	Name of the subject	Periods/week	Max. Marks			Total	Credits
			Theory	Lab	Ext.		
MTCST3.2	Thesis Work Part 2		Grade		Grade	14	

1. A publication of a paper on the thesis work in a National/International Conference proceedings with presentation certificate or a paper on the thesis work be communicated to a National/International Journal & accepted for publication for the submission of thesis at the end of 4th semester is mandatory.
2. Final Thesis with Part I & Part II should be submitted at the end of 4th semester and it will be evaluated by a committee consisting of Chairman Board of Studies, Head of the Department, External Examiner and thesis guide.
3. The candidate has to defend his thesis in a Viva-voce examination to be conducted by the above committee. The committee should submit a report, with signatures of all the members, candidate wise, with grade A-Excellent/ Grade B-Good/Grade C- fair/ Grade D-Reappear.
4. The external examiner shall be nominated by the Hon'ble Vice Chancellor as per the norms of the University.
5. Although credits are allotted for the thesis work they will not be taken for the calculation of CGPA.

Detailed Syllabus for M.Tech(information Technology) First Semester

MTCST 1.1 MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

Common for M. Tech (CST, IT, CSTAIR, CSTBI, CSTCN, BTMTSE)

Instruction: 3 Periods/week

Time: 3 Hours

Credits: 4

Internal: 30 Marks

External: 70 Marks

Total: 100 Marks

1. Mathematical notions of sets, sequences and tuples, functions and relations, Primitive recursive functions, computable functions, examples, graphs, strings and languages,
2. Boolean logic – properties and representation, theorems and types of proofs, deductive, inductive, by construction, contradiction and counter-examples.
3. Introduction to Number theory, Divisibility, modular arithmetic (addition modulo and multiplication modulo); Statements and applications of Euler and Fermat Theorems, Primitive Roots, Discrete Logarithms, Primality Test, Finding Large primes, Definition of Elliptic Curves and their applications to Cryptography.
4. Introduction To Finite Automata: Alphabets and languages- Deterministic Finite Automata – Non- deterministic Finite Automata – Equivalence of Deterministic and Non-Finite Automata – Languages Accepted by Finite Automata – Finite Automata and Regular Expressions – Properties of Regular sets &Regular Languages and their applications.
5. Context Free Languages: Context –Free Grammar – Regular Languages and Context-Free Grammar – Pushdown Automata – Pushdown Automata and Context-Free Grammar – Properties of Context-Free Languages – pushdown automata and Equivalence with Context Free Grammars.
6. Turing Machines: The Definition of Turing Machine – Computing with Turing Machines – Combining Turing Machines, , programming techniques for Turing Machines,
7. Variants of Turing Machines, Restricted Turing Machines Universal Turing Machines. The Halting Problem, Decidable & undecidable problems- Post Correspondence Problems

Text books:

1. Introduction to Automata Theory, Languages and Computations – J.E. Hopcroft, & J.D. Ullman , Pearson Education Asia.
2. Cryptography and Network Security, William Stallings.(Second Edition)Pearson Education Asia.

Reference books:

1. Introduction to languages and theory of computation – John C. Martin (MGH)
2. Discrete Mathematical structures with application to Computer Science – J.P. Tremblay and R. Manohar
3. Introduction to Theory of Computation – Michael Sipser (Thomson Nrools/Cole)
4. Cryptanalysis of number theoretic Cyphers, Samuel S. Wagstaff Jr. Champan & Hall/CRC Press 2003.
5. Network Security: The Complete Reference by Roberta Bragg, Mark Phodes –Ousley, Keith Strassberg Tata McGraw-Hill.

MTCST 1.2 DATA STRUCTURES AND ALGORITHMS

Common with M.Tech (CST, IT, CSTAIR, CSTBI, CSTCN)

Instruction: 3 Periods/week

Time: 3 Hours

Credits: 4

Internal: 30 Marks

External: 70 Marks

Total: 100 Marks

1. ALGORITHM ANALYSIS:

Overview of C++ classes, pointers, parameters passing, templates, using Matrices
Basics of time complexity estimates, General norms for running time calculation

2. LISTS, STACKS & QUEUES:

Abstract Data Types, Representation & implementation of ADT list, Doubly linked list, Circular linked lists, Representation, Implementation and applications of ADT stack and Queue.

3. TREES:

Implementation and traversal of trees, Binary Trees and Binary search trees in C++, Concepts of AVL Trees, Splay Trees and B-Trees.

4. HASHING:

Hash Function, Separate chains, Open addressing, rehashing, Extendible Hashing.

5. INTERNAL SORTING ALGORITHMS:

Sorting like insertion Sort, shell Sort, Heap Sort, Merge Sort, Quick Sort and Simple external Sorting algorithm.

6. DISJOINT SET:

Equivalence Relations, Find and Union algorithms an dynamic sets, Path compression and Union-by-Rank algorithm analysis.

7. GRAPH ALGORITHMS:

Representation of graph Topological Sort, shortest-path Algorithm, Network flow problem, Minimum spanning tree algorithm, Applications of Depth – First search, Introduction to NP-Completeness.

Text Book:

Data Structures & Algorithm Analysis in C++, Mark Allen Weiss. Second edition, Pearson Edition. Asia.

Reference Books:

1. Data Structures & Algorithm in C++, Adam Drozdek. Vikas publication House.
2. Data Structure, Algorithm and OOP, Gregory L. Heileman (Tata Mc Graw Hill Edition).
3. Data Structures, Algorithms and Applications in C++,Sartaj Sahni,Mc Graw-Hill International Edition.

MTCST 1.3 ADVANCED DATABASE MANAGEMENT SYSTEMS

Common for M.Tech (CST, IT, CSTAIR, CSTBI, CST CN)

Instruction: 3 Periods/week

Credits:4

Time: 3 Hours

Internal: 30 Marks

External: 70 Marks

Total: 100 Marks

- 1. Database Systems:** Introduction to the Database Systems, Concepts of Relational Models and Relational Algebra. SQL: Introduction to SQL Queries, Integrity Constraints, Joins, Views, Intermediate and Advanced SQL features and Triggers.
- 2. Database Design:** Overview of the Design process, E-R Models, Functional dependencies and other kinds of dependencies, Normal forms, Normalization and Schema Refinement.
- 3. Database Application Design and Development:** User Interfaces and Tools, Embedded SQL, Dynamic SQL, Cursors and Stored procedures, JDBC, Security and Authorization in SQL, Internet Applications.
- 4. Query Evaluation:** Overview, Query processing, Query optimization, Performance Tuning.
- 5. Database System Architectures:** Centralized and Client-Server Architecture, Server system Architecture, Parallel and Distributed database, Object based databases and XML. Advanced data types in databases. Cloud based data storage systems.
- 6. Transaction Management:** Overview of Transaction Management, Transactions, Concurrency control, Recovery systems, Advanced Transaction Processing.
- 7. Case Studies:** Postgre SQL, Oracle, IBM DB2 Universal Database, Microsoft SQL Server.

Text Books:

1. Database System Concepts, Avi Silberschatz , Henry F. Korth , S. Sudarshan McGraw-Hill, Sixth Edition, ISBN 0-07-352332-1.

References:

1. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, McGraw-Hill.

MTCST 1.4 **ADVANCED OPERATING SYSTEMS**

Common for M.Tech (CST, IT)

Instruction: 3 Periods/week

Time: 3 Hours

Credits: 4

Internal: 30 Marks

External: 70 Marks

Total: 100 Marks

1. Introduction To Operating Systems, Types Of Operating Systems, Operating System Structures. Operating-System Services, System Calls, Virtual Machines, Operating System Design and Implementation.
2. **Process Management:** Process Concepts, Operations On Processes, Cooperating Processes, Threads, Inter Process Communication, Process Scheduling, Scheduling Algorithms, Multiple -Processor Scheduling. Thread Scheduling.
3. **Process Synchronization & Deadlocks:** The Critical Section Problem, Semaphores, And Classical Problems Of Synchronization, Critical Regions, Monitors, Deadlocks,-System Model, Deadlocks Characterization, Methods For Handling Deadlocks, Deadlock- Prevention, Avoidance, Detection,& Recovery from Deadlocks.
4. **Memory Management & File System Implementation:** Logical Versus Physical Address Space, Paging And Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Thrashing, File System Implementation -Access Methods, Directory Structure, Protection, File System Structure, Allocation Methods, Free Space Management, Directory Management, Device Drivers
5. **Distributed Operating Systems:** Distributed System Goals, Types Of Distributed Systems, and Styles & Architecture Of Distributed Systems, Threads, Virtualization, Clients, Servers, Code Migration, and Communication in Distributed Systems.
6. **Distributed Systems & Synchronization:** Clock Synchronization, Logical Clocks, Mutual Exclusion, Global Positioning Of Nodes, Data-Centric Consistency Models, Client-Centric Consistency Models, Consistency Protocols.
7. **Fault Tolerance, Security:** Introduction To Fault Tolerance, Process Resilience,, Reliable Client-Server Communication, Reliable Group Communication, Distributed Commit, Recovery, Secure Channels, Access Control, Security Management

Text Books:

- 1) Silberschatz & Galvin, 'Operating System Concepts', Wiley.
- 2) "DISTRIBUTED SYSTEMS", Second edition, Andrew S.Tanenbaum, Maarten Van teen.

References:

- 1) William Stallings-"Operating Systems"- 5th Edition - PHI
- 2) Charles Crowley, 'Operating Systems: A Design-Oriented Approach', Tata Hill Co.,1998 edition.
- 3) Andrew S.Tanenbaum, 'Modern Operating Systems', 2nd edition, 1995, PHI.

MTCST 1.5 Elective I COMPUTER ORGANIZATION AND ARCHITECTURE

Common for M.Tech (CST, IT, CSTAIR, CSTBI, CSTCN)

Instruction: 3 Periods/week

Time: 3 Hours

Credits: 4

Internal: 30 Marks

External: 70 Marks

Total: 100 Marks

1. Register Transfer and Micro operations:

Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro operations, Logic Micro operations, Shift Micro operations, Arithmetic Logic Shift Unit.

2. Basic Computer Organization and Design:

Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output and Interrupt, Complete Computer Description, Design of Basic Computer, Design of Accumulator Logic.

3. Micro programmed Control:

Control Memory, Address Sequencing, Micro program Example, Design of Control Unit.

4. Central Processing Unit:

Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer(RISC)

5. Input/output Organization:

Peripheral Devices, I/O interface, Asynchronous data transfer, Modes of transfer, priority Interrupt, Direct memory access, Input-Output Processor (IOP), Serial Communication.

6. Memory Organization:

Memory Hierarchy, Main memory, Auxiliary memory, Associate Memory, Cache Memory, and Virtual memory, Memory Management Hardware.

7. Overview of Computer Architecture:

Evolution of Computer Systems, Parallelism in Uni- processor System, Parallel Computer Structures, Architectural Classification Schemes, Parallel Processing Applications.

Text Book:

1. Computer System Architecture, M. Morris Mano, Prentice Hall of India Pvt. Ltd., Third Edition, Sept. 2008 .
2. Computer Architecture and Parallel Processing, Kai Hwang and Faye A. Briggs, McGraw Hill, International Edition 1985.

Reference Book:

1. Computer Architecture and Organization, William Stallings, PHI Pvt. Ltd., Eastern Economy Edition, Sixth Edition, 2003.
2. “Computer System Architecture”, John. P. Hayes.
3. Computer Architecture A quantitative approach 3rd edition John L. Hennessy & David A. Patterson Morgan Kufmann (An Imprint of Elsevier).

MTCST 1.5 Elective I E-COMMERCE
Common for M.Tech (CST, IT, CSTAIR, CSTBI)

Instruction: 3 Periods/week
Internal: 30 Marks

Time: 3 Hours
External: 70 Marks

Credits: 4
Total: 100 Marks

1. **Introduction:** Electronic Commerce-Frame Work, Anatomy of E-Commerce Applications, E-Commerce Consumer Applications, E-Commerce Organization Applications. Consumer Oriented Electronic Commerce - Mercantile Process Models, Digital Economy and e-business Models
2. **Electronic Payment Systems** – Types of Electronic Payment Systems, Digital Token-Based, Smart Cards, Credit Cards, Risks in Electronic Payment Systems, Designing Electronic Payment Systems Electronic Data Inter Change, Inter Organizational Commerce - EDI, EDI Implementation, Value Added Networks.
3. **Intra Organizational Commerce**, Macro Forces and Internal Commerce, Work Flow Automation and Coordination, Customization and Internal Commerce, Supply Chain Management. Business Cases for Document Library, Digital Document Types, Corporate Data Ware-Houses.
4. **Advertising And Marketing:** Information Based Marketing, Advertising On Internet, Online Marketing Process, Market Research. Consumer Search and Resource Discovery, Information Search and Retrieval, Commerce Catalogues, Information Filtering.
5. **Multimedia-Key Multimedia Concepts**, Digital Video and Electronic Commerce, Desktop Video Processing, Desktop Video Conferencing.
6. **Business to consumer e-commerce:** On line Marketing and Selling, Information Goods, Electronic Markets and Auctions on the Internet
7. **E-Business Intelligence:** Data Mining, Web Merchandising and Recommender Systems, Intelligent Agents in e-commerce, Business-to-Business e-commerce and Supply Chain Management
8. **Security of Internet** Hosts and Networks, Public Key Infrastructure, Safety of e-commerce Applications

Text Books:

Frontiers of Electronic Commerce, Kalakata and Whinston, Pearson.

References

1. E-Commerce fundamentals and Applications, Hendry Chan, Raymond Lee, Tharam Dillon, Ellizabeth Chang, John Wiley.
2. E-Commerce, S.Jaiswal, Galgotia.
3. E-Commerce, Efrain Turbon, Jae Lee, David King, H.Michael Chang.
4. E-Commerce - Business, Technology and Society, Kenneth C.Taudon, Carol Guyerico Traver.

MTCST 1.5 Elective I EMBEDDED SYSTEMS

Common for M.Tech (CST, IT, CSTAIR, CSTBI)

Instruction: 3 Periods/week
Internal: 30 Marks

Time: 3 Hours
External: 70 Marks

Credits: 4
Total: 100 Marks

1. **Examples of Embedded Systems** – Typical Hardware – Memory – Microprocessors – Busses – Direct Memory Access – Introduction to 8051 Microcontroller – Architecture- Instruction set – Programming.
2. **Microprocessor Architecture** – Interrupt Basics – The Shared-Data problem – Interrupt Latency.
3. **Round–Robin Architecture** - Round–Robin with Interrupts Architecture - Function-Queue- Scheduling Architecture – Real-Time Operating Systems Architecture – Selection of Architecture.
4. **Tasks and Task States** – Tasks and Data – Semaphores and Shared Data – Semaphore Problems – Semaphore variants.
5. **Message Queues** – Mailboxes – Pipes – Timer Functions – Events – Memory Management – Interrupt Routines in RTOS Environment.
6. **RTOS design** – Principles – Encapsulation Semaphores and Queues – Hard Real-Time Scheduling Considerations – Saving Memory Space – Saving Power.
7. **Host and Target Machines** – Linker/Locator for Embedded Software- Getting Embedded Software into the Target System.
8. **Testing on your Host Machine** – Instruction Set Simulators – Laboratory Tools used for Debugging.

Text Book:

1. The 8051 Microcontroller Architecture, Programming & Applications, Kenneth J. Ayala, Penram International.
2. An Embedded Software Primer, David E. Simon, Pearson Education , 2005.

Reference Book:

Embedded Systems: Architecture , Programming and Design, Raj Kamal, Tata McGraw-Hill Education, 2008

MTCST1.6 Elective II COMPUTER NETWORKS

Common for M.Tech (CST, IT)

Instruction: 3 Periods/week

Time: 3 Hours

Credits: 4

Internal: 30 Marks

External: 70 Marks

Total: 100

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1. **Introduction to Computer Networks:** Introduction, Network Hardware, Network Software, Reference Models, Data Communication Services & Network Examples, Internet Based Applications.
 2. **Data Communications:** Transmission Media, Wireless Transmission, Multiplexing, Switching, Transmission in ISDN, **Broad** Band ISDN , ATM Networks,
 3. Data Link Control, Error Detection & Correction, Sliding Window Protocols, LANs & MANs: IEEE Standards for LANs & MANs-IEEE Standards 802.2, 802.3, 802.4, 802.5, 802.6, High Speed LANs.
 4. **Design Issues in Networks:** Routing Algorithms, Congestion Control Algorithms, Network Layer in the Internet, IP Protocol, IP Address, Subnets, and Internetworking.
 5. **Internet Transport Protocols:** TRANSPORT Service, Elements of Transport Protocols, TCP and UDP Protocols, Quality of Service Model, Best Effort Model, Network Performance Issues.
 6. Over View of DNS, SNMP, Electronic Mail, FTP, TFTP, BOOTP, HTTP Protocols, World Wide Web, Firewalls.
 7. **Network Devices:** Over View of Repeaters, Bridges, Routers, Gateways, Multiprotocol Routers, Brouters, Hubs, Switches, Modems, Channel Service Unit CSU, Data Service Units DSU, NIC, Wireless Access Points, Transceivers, Firewalls, Proxies.
 8. **Advanced Concepts in Networks:** Over View of Cellular Networks, Adhoc Networks, Mobile Adhoc Networks, Sensor Networks, Virtual Private Networks .Delay Tolerant Networks DTN, Ipv6,.

Text Book:

1. Computer Networks, Andrews S Tanenbaum,, Edition 5, PHI, ISBN:-81-203-1165-5

References:

1. Data Communications and Networking , Behrouz A Forouzan , Tata McGraw-Hill Co Ltd, Second Edition,
2. Computer networks, Mayank Dave, CENGAGE.
3. Computer networks, A System Approach, 5th ed, Larry L Peterson and Bruce S Davie, Elsevier.
4. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
5. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson.

MTCST1.6 Elective II CLOUD COMPUTING

Common for M.Tech (CST, IT, CSTCN)

Instruction: 3 Periods/week
Internal: 30 Marks

Time: 3 Hours
External: 70 Marks

Credits: 4
Total: 100 Marks

1. **Cloud Computing Basics** - Cloud Computing Overview, Applications, Intranets and the Cloud, First Movers in the Cloud. The Business Case for Going to the Cloud - Cloud Computing Services, Business Applications, Deleting Your Datacenter, Salesforce.com, Thomson Reuters.
2. **Organization and Cloud Computing** - When You Can Use Cloud Computing, Benefits, Limitations, Security Concerns, Regulatory Issues, Cloud Computing with the Titans - Google, EMC, NetApp, Microsoft, Amazon, Salesforce.com, IBM Partnerships.
3. **Hardware and Infrastructure** - Clients, Security, Network, Services. Accessing the Cloud - Platforms, Web Applications, Web APIs, Web Browsers. Cloud Storage - Overview, Cloud Storage Providers, Standards - Application, Client, Infrastructure, Service.
4. **Software as a Service** - Overview, Driving Forces, Company Offerings, Industries Software plus Services - Overview, Mobile Device Integration, Providers, Microsoft Online.
5. **Developing Applications** - Google, Microsoft, Intuit QuickBase, Cast Iron Cloud, Bungee Connect, Development, Troubleshooting, Application Management.
6. **Local Clouds and Thin Clients** - Virtualization in Your Organization, Server Solutions, Thin Clients, Case Study: McNeilus Steel.
7. **Migrating to the Cloud** - Cloud Services for Individuals, Cloud Services Aimed at the Mid-Market, Enterprise-Class Cloud Offerings, Migration, Best Practices and the Future of Cloud Computing - Analyze Your Service, Best Practices, How Cloud Computing Might Evolve.

Text Books:

1. Cloud Computing-A Practical Approach, Anthony T. Velte, Toby J. Velte, Robert Elsenpeter. McGrawHill.

MTCST1.6 Elective II GRID COMPUTING

Common with M.Tech (CST, IT)

Instruction: 3 Periods/week

Time: 3 Hours

Credits: 4

Internal: 30 Marks

External: 70 Marks

Total: 100 Marks

1. **Introduction:** Introduction to Parallel, Distributed Computing, Cluster Computing and Grid Computing, Characterization of Grids, Organizations and their Roles, Grid Computing Road Maps.
2. **Architecture:** Architecture of Grid and Grid Computing, Review of Web Services-OGSA-WSRF.
3. **Grid Monitoring:** Grid Monitoring Architecture (GMA) - An Overview of Grid Monitoring Systems- GridICE - JAMM -MDS-Network Weather Service-R-GMA- Other Monitoring Systems- Ganglia and GridM
4. **Grid Middleware:** List of globally available Middlewares - Case Studies-Recent version of Globus Toolkit and gLite - Architecture, Components and Features.
5. **Data Management And Grid Portals:** Data Management, Categories and Origins of Structured Data, Data Management Challenges, Architectural Approaches, Collective Data Management Services, Federation Services, Grid Portals, First-Generation Grid Portals, Second Generation Grid Portals.
6. **Semantic Grid and Autonomic Computing:** Meta data and Ontology in the Semantic Web, Semantic Web services, Layered structure of the Semantic Grid, Semantic Grid activities, Autonomic Computing
7. **Grid Security and Resource Management:** Grid Security, A Brief Security Primer, PKI-X509 Certificates, Grid Security, Scheduling and Resource Management, Scheduling Paradigms, Working principles of Scheduling, A Review of Condor, SGE, PBS and LSF-Grid Scheduling with QoS.

Text Books:

1. Grid Computing, Joshy Joseph and Craig Fellenstein, Pearson Education 2004.
2. The Grid Core Technologies, Maozhen Li, Mark Baker, John Wiley and Sons , 2005.

Reference Books:

3. The Grid 2 - Blueprint for a New Computing Infrastructure, Ian Foster and Carl Kesselman, Morgan Kaufman - 2004.
4. Grid Computing: Making the Global Infrastructure a reality, Fran Berman, Geoffrey Fox, Anthony J.G. Hey, John Wiley and sons

MTCST1.6 Elective II Computer Graphics & Visual Computing

Common for M.Tech (CST, IT, CSTAIR, CSTBI)

Instruction: 3 Periods/week
Internal: 30 Marks

Time: 3 Hours
External: 70 Marks

Credits: 4
Total: 100 Marks

- 1. Introduction:** Computer Graphics and their applications, Computer Aided Design- Computer Art, Entertainment, Education and Training Graphical User Interfaces; Over view of Graphics systems: Video Display Devices, Raster Scan systems, random scan systems, Graphics monitors and workstations, Input devices, hard copy devices, GUI and Interactive Input Methods, Windows and Icons , Virtual Reality Environments, Graphics software
- 2. Output primitives:** Points and Lines, , Line and Curve Attributes-Color and Gray scale levels Line Drawing Algorithms, Loading the Frame buffer, Line function, Circle Generating Algorithms, Ellipse Generating Algorithms, Other Curves, Parallel Curve Algorithms, Curve Functions , Pixel Addressing, Area Fill Attributes, Filled Area Primitives, Filled Area Functions, Cell Array, Character Generation, Character Attributes, Bundled Attributes, Inquiry Functions ,Antialiasing
- 3. Three Dimensional Concepts and Object representations:** 3D display methods- 3D Graphics, Polygon Surfaces, Curved Lines and Surfaces, Quadratic Surfaces, Super Quadrics, Blobby Objects, Spline Representations , Cubic Spline methods, Bézier Curves and Surfaces, B Spline Curves and Surfaces,
- 4. Two & Three Dimensional Transformations:** Two Dimensional Transformations: Basic Transformations, Matrix Representations, Homogeneous Coordinates, Composite Transformations, Other Transformations, Transformations between Coordinate Systems, Affine Transformations -, Transformation Functions-, Raster methods for Transformation **Three Dimensional Transformations:** Translation-, Rotation, scaling, Other Transformations, Composite Transformations , 3D Transformation Functions , Modeling and Coordinate Transformations,
- 5. Viewing Pipeline and structures :** Viewing Coordinates, Projections , View Volumes, General Projection Transformations , Clipping-, Hardware Implementations , Concepts of Structures and Basic models, Editing , Hierarchical Modeling with Structures,
- 6. Visualization:** Three Dimensional Viewing, Visualization- Image Processing- The viewing Pipeline, Viewing Coordinate Reference Frame, Window-to-Viewport Coordinate Transformation, Two Dimensional Viewing Functions , Clipping Operations, Point Clipping Line Clipping Polygon Clipping-Curve Clipping Text and Exterior Clipping.
- 7. Visual Computing:** Computational and mathematical methods for creating, capturing, analyzing and manipulating digital photographs, Introductory Topics on computer graphics, computer vision, and machine learning, Programming assignments intended to give hands-on experience with creating graphical user interfaces, and with implementing programs for synthesizing and manipulating photographs.

8. **Visual Transformation & Projection:** Graphics pipeline, perception and color models, camera models, transformations and projection, projections, lighting, shading, global illumination, texturing, sampling theorem, Fourier transforms, image representations, convolution, linear filtering, diffusion, nonlinear filtering, edge detection, optical flow, image and video compression, Creation of Visual Effects Optical Flow Video Compression, Radon Transform Texture

Text Book:

1. Computer Graphics C Version, Donald Hearn & M. Pauline Baker , Pearson Education, New Delhi, 2004
2. D. Forsyth and J. Ponce, *Computer Vision: A Modern Approach*, Prentice Hall Inc., 2003

Reference Books:

3. Procedural Elements for Computer Graphics,___David F. Rogers, Tata McGraw Hill Book Company, New Delhi, 2003
4. Computer Graphics: Principles & Practice in C, J. D. Foley, S. K Feiner, A VanDam F. H John Pearson Education, 2004
5. Computer Graphics using Open GL, Francis S Hill Jr, Pearson Education, 2004.
6. *Computer Vision and Image Processing: A Practical Approach using CVIPtools*, S. E. Umbaugh,, Prentice Hall, 1998

MTCST 1.7 DATA STRUCTURES& PROGRAMMING LAB

Common with M.Tech (CST, IT, CSTAIR, CSTBI, CSTCN)

Instruction: 3 Periods/week

Time: 3 Hours

Credits: 2

Internal: 50 Marks

External: 50 Marks

Total: 100 Marks

Implementation of Data Structures and Algorithms using C++

1. To perform various operations such as insertion, deletion, display on single linked lists.
2. To implement
 - (i) Stacks using linked list. (ii) Queues using linked list.
3. To perform different types of searching techniques on a given list
 - (i) Sequential search (ii) Binary search (iii) Fibonacci search
5. To perform different types of sortings on a given list
 - (i) Bubble sort (ii) Insertion sort (iii) Selection sort(iv) Merge sort
6. To perform different types of sortings on a given list
 - (i) Quick sort (ii) Shell sort (iii) Radix sort
7. To perform the following
 - (i) To convert the given infix expression to postfix expression
 - (ii) To evaluate the given postfix expression.
8. To perform various operations on graphs
 - (i) Vertex insertion. (ii) Vertex deletion.
 - (iii) Edge insertion. (iv) Edge deletion.
 - (v) Breadth First traversal. (vi) Depth First traversal.
9. To implement dictionaries using hashing technique
10. To perform various operations on binary heap.
11. To perform various operations on Binary search tree.
12. To perform operations on AVL trees.
13. To perform various operations on B-tree.

MTCST 1.8

DATA BASE MANAGEMENT LAB

Common with M.Tech (CST, IT)

Instruction: 3 Periods/week
Internal: 50 Marks

Time: 3 Hours
External: 50marks

Credits: 2
Total: 100Marks

1. **Accessing the Database:** The first laboratory exercise is to connect to a database, populate it with data, and run very simple SQL queries. (Data Definition, Table Creation, Constraints, Insert, Select Commands, Update & Delete Commands.)
2. **Basic SQL:** This lab covers simple SQL queries. (Inbuilt functions in RDBMS.)
3. **Intermediate SQL:** This lab covers more complex SQL queries. (Nested Queries & Join Queries, Control structures)
4. **Advanced SQL:** This lab covers even more complex SQL queries. (Procedures and Functions, .PL/SQL, Cursors and Triggers)
5. **Database Access from a Programming Language:** This lab introduces you to database access from a programming language such as Java or C#. Although phrased using Java/JDBC, the exercise can be done using other languages, ODBC or ADO.NET APIs.
6. **Building Web Applications:** This lab introduces you to construction of Web applications. Although phrased using the Java Servlet API, the exercise can be done using other languages such as C# or PHP.
7. **Project:** Each student is assigned with a problem. The student is to develop a logical and physical database design for the problem and develop Forms, Menu design and Reports.

A. The logical design performs the following tasks:

1. Map the ER/EER diagrams to a relational schema. Be sure to underline all primary keys, include all necessary foreign keys and indicate referential integrity constraints.
2. Identify the functional dependencies in each relation
3. Normalize to the highest normal form possible

B. Perform physical design based above logical design using Oracle/MSSQL on Windows platform and MySQL/PostgreSQL on Linux platform.

Sample Term Projects

1. Retailer database
2. Automobile sales database
3. Electronics vendor database
4. Package delivery database
5. Real estate database

References:

- 1) Database System Concepts, Avi Silberschatz , Henry F. Korth , S. Sudarshan ,McGraw-Hill, Sixth Edition, ISBN 0-07-352332-1.
- 2) ORACLE PL/SQL by example. Benjamin Rosenzweig, Elena Silvestrova, Pearson Education 3rd Edition
- 3) ORACLE Database Log PL/SQL Programming Scott Urman, TMG Hill.
- 4) SQL & PL/SQL for Oracle 10g, Black Book, Dr.P.S. Deshpande.
- 5) Oracle PL/SQL Programming, Steven Feuerstein, O'Reilly Publishers.

Detailed Syllabus for M. Tech (IT) Second Semester

MTIT 2.1

Web Systems & Technologies

Instruction: 3 Periods/week

Time: 3 Hours

Credits: 4

Internal: 30 Marks

External: 70 Marks

Total: 100 Marks

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1. **Introduction:** History of the Internet and world wide web and HTML, Basic Internet Protocols-HTTP, SMTP, Pop3, Mime, IMAP, Introduction to scripting Languages-Java Scripts, Object based Scripting for the web structures, functions, arrays and Objects, Dynamic HTML with Java Script
 2. **Dynamic HTML:** Introduction to Object references, Dynamic Style, Dynamic Position, Frames, Navigators, Event Models, On Check, On load, Mouse operations, Adding Shaddows, Creating Images, Creating Gradients, Creating Motion with Blur, Data binding, Sorting Table data, Binding of Images And Table.
 3. **Introduction to PHP Programming:** Introduction, Database Access with PHP, PHP Interpreters, Security Issues, File Handling with PHP, Working with HTML and DHTML, PHP User Authentication
 4. **Java Beans:** Introduction to Java Beans, Advantages of Java Beans, BDk; Introspection, Using Bound properties, Bean Info Interface, Constrained properties; Persistence, Customizes, Java Beans API, Introduction to EJB's
 5. **Multimedia: Audio** and Video Speech, Synthesis and Recognition, E-Business Models, Online Payments and Security, Web Servers, Client and Server side Scripting, Accessing Web servers, Apache Web Server.
 6. **Database, ASP and XML:** RDBMS Models, Overview of SQL, , ASP-Working of ASP, objects, Session Tracking and Cookies, ADO, Accessing Data Base with ASP, Serverside Active, X Components, Web resources, XML- Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX, Syntax of AJAX, Application Development using XML and AJAX
 7. **Servlets and JSP:** Introduction to Servelets: Servlet Overview Architecture, HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues, Multitier architecture, JSP Overview, , JSP Processing. JSP Application Design with MVC Setting Up and JSP Environment:
 8. **JSP Application Development:** Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing, Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Date between Pages, Sharing Session and Application Data – Memory Usage Considerations

TEXT BOOKS :

1. Web Programming, building internet applications, 2/e, Chris Bates, Wiley Dreamtech
2. The complete Reference Java 2 ,5/e, Patrick Naughton , Herbert Schildt. TMH
3. Programming world wide web-Sebesta, PEA

REFERENCE BOOKS :

1. Internet , World Wide Web , How to program, Dietel , Nieto, PHI/PEA
2. Jakarta Struts Cookbook , Bill Siggelkow, S P D O'Reilly
3. Web Tehnologies, 2/e, Godbole, kahate, TMH,202,
4. An Introduction to web Design , Programming ,Wang,Thomson
5. Web Applications Technologies Concepts-Knuckles, John Wiley

MTCST2.2 Object Oriented Software Engineering

Common for M.Tech (CST, IT)

Instruction: 3 Periods/week
Internal: 30 Marks

Time: 3 Hours
External: 70 Marks

Credits: 4
Total: 100 Marks

1. Introduction to Object Oriented Software Engineering

Nature Of The Software, Types Of Software , Software Engineering Projects, Software Engineering Activities, Software Quality, Introduction To Object Orientation, Concepts Of Data Abstraction, Inheritance & Polymorphism, Software Process Models-Waterfall Model, The Opportunistic Model , The Phased Released Model, The Spiral Model, Evolutionary Model, The Concurrent Engineering Model

2. **Requirements Engineering:** Domain Analysis, Problem Definition And Scope, Requirements Definition, Types Of Requirements, Techniques For Gathering And Analyzing Requirements, Requirement Documents, Reviewing, Managing Change In Requirements.

3. **Unified Modeling Language & Use Case Modeling:** Introduction To UML, Modeling Concepts, Types Of UML Diagrams With Examples; User-Centred Design, Characteristics Of Users, Developing Use Case Models Of Systems, Use Case Diagram, Use Case Descriptions, The Basics Of User Interface Design, Usability Principles, User Interfaces.

4. **Class Design and Class Diagrams:** Essentials Of UML Class Diagrams, Associations And Multiplicity, Other Relationships, Generalization, Instance Diagrams, Advanced Features Of Class Diagrams, Interaction And Behavioural Diagrams: Interaction Diagrams, State Diagrams, Activity Diagrams, Component And Deployment Diagrams.

5. Software Design And Architecture

The Process Of Design, Principles Leading To Good Design, Techniques For Making Good Design Decisions, Writing A Good Design Document., Pattern Introduction, Design Patterns: The Abstraction-Occurrence Pattern, General Hierarchical Pattern, The Play-Role Pattern, The Singleton Pattern, The Observer Pattern, The Delegation Pattern, The Adaptor Pattern, The Façade Pattern, The Immutable Pattern, The Read-Only Interface Pattern And The Proxy Pattern; Software Architecture Contents Of An Architecture Model, Architectural Patterns: The Multilayer, Client-Server, Broker, Transaction Processing, Pipe & Filter And MVC Architectural Patterns

6. Software Testing

Overview Of Testing, Testing Concepts, Testing Activities, Testing Strategies, Unit Testing, Integration Testing, Function Testing, Structural Testing, Class Based Testing Strategies, Use Case/Scenario Based Testing, Regression Testing, Performance Testing, System Testing, Acceptance Testing, Installation Testing, OO Test Design Issues, Test Case Design, Quality Assurance, Root Cause Analysis, Post-Mortem Analysis.

7. Software Project Management

Introduction To Software Project Management, Activities Of Software Project Management, Structure Of Project Plan, Software Engineering Teams, Software Cost Estimation, Project Scheduling, Tracking And Monitoring.

8. CASE STUDY

- 1.** Simple Chat Instant Messaging System
- 2.** GPS Based Automobile Navigation System
- 3.** Waste Management Inspection Tracking System (WMITS)
- 4.** Geographical Information System

Text Book:

1. Object-Oriented Software Engineering Practical software development using UML and Java by Timothy C. Lethbridge & Robert, Langanieri McGraw-Hill

References

2. Object-Oriented Software Engineering: Using UML, Patterns and Java, Bernd Bruegge and Allen H. Dutoit, 2nd Edition, Pearson Education Asia.
3. Software Engineering: A Practitioner's Approach, Roger S Pressman.
4. A Practical Guide to Testing Object-Oriented Software, John D. McGregor; David A. Sykes, Addison-Wesley Professional.

MTIT 2.3 Information Security and Cryptography

Instruction: 3 Periods/week

Time: 3 Hours

Credits: 4

Internal: 30 Marks

External: 70 Marks

Total: 100 Marks

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1. **Introduction:** Introduction to Security, Security Approaches, Principles of Security; Security Services and Mechanism-confidentiality, Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability; Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC.
 2. **Network Security:** A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, Introduction to TCP/IP TCP , fire walls, session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks, Virtual Private Networks, Brief Study on Cryptography and Security
 3. **User Authentication Mechanisms:** Introduction, Authentication Basics, Passwords authentication tokens, Certificate based authentications, Biometrics based authentication , Kerberos, X.509 Directory Authentication Service, SSO Approaches
 4. **Public Key Infrastructure:** Public key cryptography principles and algorithms, digital signatures, digital Certificates, Certificate Authority and key management, Public Key Cryptography Standards, Private Key Management, The PRIX Model, XML,PKI and Security,
 5. **Symmetric Key Cryptographic Algorithms:** Overview of symmetric Key Cryptography Algorithm types and modes; DES, IDEA, RC5, BLOWFISH, AES Algorithms; Differential and Linear Cryptanalysis.
 6. **Asymmetric Key Cryptographic Algorithms:** Overview of Asymmetric Key cryptography, RSA Algorithm, Symmetric and Asymmetric Key Cryptography Together, Digital Signature, Knap sack Algorithm and other Algorithms.
 7. **IP Security and Fire walls:** IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management, Firewall Design principles, Trusted Systems, Intrusion Detection Systems.
 8. **Practical Implementation of Cryptography & Security:** Cryptographic Solutions using Java, Cryptographic Solutions Using Microsoft, Cryptographic Tool Kit, Security and Operating Systems Pretty Good Privacy (PGP) and S/MIME.

Text Book:

1. Network Security Essentials :Applications and Standards, William Stallings PEA.
2. Cryptography and Network Security, Atul Kahate, Tata McGraw Hill

Reference:

3. Hack Proofing your network, Ryan Russell, Dan Kaminsky, Rain Forest Puppy, Joe Grand, David Ahmad, Hal Flynn Ido Dubrawsky, Steve W.Manzuik, Ryan Permeh, Wiley Dreamtech,
4. Fundamentals of Network Security, Eric Maiwald (Dreamtech press)
5. Network Security - Private Communication in a Public World, Charlie Kaufman, Radia Perlman, Mike Speciner, PEA/PHI.
6. Principles of Information Security, Whitman, Thomson.
7. Cryptography and network Security, Third edition, Stallings, PHI/PEA
8. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH
9. Introduction to Cryptography, Buchmann, Springer.

MTIT 2.4

Wireless & Mobile Networks

Instruction: 3 Periods/week

Time: 3 Hours

Credits: 4

Internal: 30 Marks

External: 70 Marks

Total: 100 Marks

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1. **Introduction:** Introduction to Wireless Networks, Various Generations of Wireless Networks, Virtual Private Networks- Wireless Data Services, Common Channel Signaling, Various Networks for Connecting to the Internet, Blue tooth Technology, Wifi-WiMax- Radio Propagation mechanism , Pathloss Modeling and Signal Coverage
 2. **Wireless Local Area Networks:** Introduction-WLAN topologies-IEEE 802.11 Standards , MAC Protocols,Comparison of 802.11 a,b,g and n Standards, HIPER LAN , ZigBee 802.15.4, Wireless Local Loop
 3. **Wireless Adhoc Networks:** Basics of Wireless Networks, Infrastructured Versus Infrastructureless Networks – Properties of Wireless, AD hoc Networks, Types of Ad Hoc Networks, Challenges in AD Hoc Networks –Applications of Wireless AD Hoc Networks ,
 4. **Routing Protcols for Ad Hoc Networks:**Introduction-Proactive Routing Protocols- Reactive Routing protocols-Hybrid Routing Protocols-QoS Metrics-Energy impact issues in Routing.
 5. **Other Wireless Technologies:** Introduction, IEEE 802.15.4 and Zigbee, General Architecture, Physical Layer, MAC layer, Zigbee, WiMAX and IEEE 802.16, Layers and Architecture, Physical Layer, OFDM Physical layer.
 6. **Mobile Communications:** Introduction to cellular concept, Frequency Reuse, Handoff, GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services, Introduction to mobile computing, novel applications, limitations, and architecture.
 7. **Mobile Data Networks:** Location/mobility management, Mobile IP, Dynamic routing protocols, Location-based protocols, Emerging topics: sensor networking, Data-Oriented CDPD network, GPRS and higher data rates, Short messaging service in GSM.
 8. **Security in Ad Hoc Networks:** Introduction- Security Attacks, Intrusion Detection System, Intrusion Prevention system, Intrusion Response system, Wired Equivalent Privacy(WEP) -A Security Protocol for Wireless Local Area Networks (WLANs), Security in MANETs.

Text Books:

1. Principles of Wireless Networks , Kaveth Pahlavan, K. Prasanth Krishnamurthy, Pearson Publications, Asia, 2002
2. Mobile Cellular Communications, G.Sasibhusan Rao, Pearson Publications.

References:

3. Guide to Wireless Ad Hoc Networks: Series: **Computer Communications and Networks**, Misra, Sudip; Woungang, Isaac; Misra, Subhas Chandra, 2009, Springer

MTIT2.5

Elective III

Mathematics of Internet Systems & Control

Instruction: 3 Periods/week

Time: 3 Hours

Credits: 4

Internal: 30 Marks

External: 70 Marks

Total: 100 Marks

1. **Introduction** : Basics of Networks & Graphs: Random growth of graphs, adjacency matrix and power laws, The Internet Graph, The Web Graph, Graph Communities and the Web, Basics of Probability and algorithms: Computational Complexity, Exponential problems, decidability, compressing & hashing, Randomized algorithms, randomness and humans, Resource sharing between elastic & inelastic users
2. **Design and Control of communication networks**: Randomly fluctuating demands and failures by adapting rates, rerouting of network traffic & reallocating resources
3. **Rate Control algorithms for Internet**: Stability & fairness, economic issues, scalable models for simulation, Concepts in Congestion avoidance & Control, Maximizing throughput of network & Minimizing packet-loss ratio for Networks
4. **Linear Analysis with Delay**: Primal Controllers-High Throughput TCP and AVQ, Dual Algorithm, Primal Dual Algorithm, Exponentially smoothed rate feedback, Proportionally-fair controller
5. **Congestion Control Algorithms for Internet**: Algorithms for single link and single flow- Window Flow Control ,Random early detection (RED), explicit congestion notification(ECN), High throughput TCP, stochastic and deterministic models in congestion control, Resource allocation for congestion control
6. **Anatomy of Internet Search Engine**: Basic Data Structure, Crawling the Web, Page Relevance and Ranking, Answering the user queries, Role of distributed & parallel computing internet Browsers and search engines: Caching web pages, browsers and search engines, DNS tree, File sharing on internet
7. **Parallel and distributed Computation**: Basic rules of cooperation, logical problems on working in parallel, distributed world, routing methods
8. **Real-time Sources and Distributed Control**: Probing & Distributed Admission Control, Queuing Model at Link Buffer, Diffusion Approximation-Brownian Motion Through a Queue.

Text Books

1. Mathematical and Algorithmic Foundations of the Internet, Fabrizio Luccio, Linda Pagli and Graham Steel, Chapman & Hall, 2011
2. The Mathematics of Internet Congestion Control (Systems and Control: foundations and Applications), Birkhauser Boston, 2003

References

1. Linked: The New Science of Networks, Barabasi A.L,Perseus Publishing,Cambridge, 2002

MTIT 2.5 Elective III

IT Infrastructure Planning and Management

Instruction: 3 Periods/week

Time: 3 Hours

Credits: 4

Internal: 30 Marks

External: 70 Marks

Total: 100 Marks

1. **Introduction to Infrastructure Planning and Management:** Computer Basics, Network and Internet, Computing Resources, Information Technology, IT Infrastructure Management, Challenges in IT Infrastructure Management
2. **Design Issues:** Design Issues of IT organizations and IT Infrastructure, Determining Customer Requirements, IT system Management Process, IT Services Management Process, Information System Design Process, Patterns for IT Systems Managements, IT infrastructure Library
3. **Virtualization:** Desktop Virtualization Applications, Remote Desktop Services, Terminal Services, Server Virtualization, Selecting the right Virtualization Technology, Dynamic Datacenter
4. **System Center:** System Center Service Manager, System Center Data Protection Manager, System Center Virtual Machine Manager, System Center Operations Manager, System Center Configuration Manager, Dynamic Datacenter
5. **Storage Management:** Introduction to Storage, Backup and Storage, Archive and Retrieve, Disaster Recovery, Space Management, Database and Application Protection, Bare Machine Recovery, Data Retention, Microsoft SQL Server/Database Server
6. **Desktop Scenarios:** Windows Optimized Desktop Scenarios, Communication & Collaboration Exchange Server, SharePoint Server
7. **Security:** Computer Security, Internet Security, Physical Security, Malware Response, Forefront Identity Manager, Forefront Unified Access Gateway, Selecting the Right NAP Architecture
8. **Case Study:** Any Case Study Consisting of (Eg. Asset Network Incorporation)- IT Service Continuity Management, Capacity Management, Availability Management, Configuration Management, Incident Management, Problem Management, Storage Management, Identity Management

Text Books:

1. IT Infrastructure & Its Management, Guptha, TMH

References:

2. Infrastructure planning and design-microsoft
3. Selecting the right virtualization Technology by-Microsoft inc
4. IPD in the Technet Library
5. IPD in the Microsoft Partner Network
6. Microsoft Solution Accelerators

MTIT2.5 Elective III Geo Informatics

Instruction: 3 Periods/week

Time: 3 Hours

Credits: 4

Internal: 30 Marks

External: 70 Marks

Total: 100 Marks

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1. **Introduction:** Definition of GIS and Related Terminology-Evolution of GIS-Components of GIS- Approaches to study of GIS Maps and GIS: Map Scale- Classes of maps-The mapping Process-Plane coordinate systems and Transformations- Geographic Coordinate System of Earth- Map Projection- Establishing a spatial framework for mapping Locations on Earth- Geo-referencing- Acquisition of Spatial Data for the terrain- Topographic Mapping-Attribute Data for Thematic Mapping
 2. **Digital Representation of Geographic Data:** Technical Issues Pertaining to Digital Representation of Geographic Data-Database creation and management-Raster Geographic and Vector data representation-Object oriented Geographic Data representation-Relationship between Data representation and Data Analysis in GIS Data Quality and Data Standards: Concepts and Definitions of Data Quality-Components of Geographic Data Quality-Assessment of Data Quality- Managing Spatial Data Errors-Geographic Data Standards- Geographic Data Standards And GIS Development
 3. **Raster and Vector-Based GIS Data Processing:** Acquiring and Handling Raster Data Processing Cartographic Modeling- Characteristics of Vector- Based GIS Data Processing Vector Data Input Functions Non-topological GIS Analysis Functions Feature-Based Topological Functions Layer-Based Topological Functions Vector-Based Output Functions Application Programming
 4. **Visualization of Geographic Information and Generation:** Cartography in the Context of GIS-Human-Computer Interaction and GIS- Visualization of Geographic Information Principles of Cartographic Design in GIS-Generation of Information Products
 5. **Remote Sensing and GIS Integration:** Principles of Electromagnetic Remote Sensing System Classifications-Imaging Characteristics of Remote Sensing Systems-Extraction of Metric Information from Remotely Sensed Images-Extraction of Thematic Information from Remotely Sensed Images- Integration of Remote Sensing and GIS
 6. **Digital Terrain Modeling:** Definitions and Terminology Approaches to Digital Terrain-Data Sampling- Acquisition of Digital Terrain Data-Data Processing, Analysis, and Visualization- Applications of Digital Terrain Models.
 7. **Spatial Analysis and Modeling:** Descriptive Statistics-Spatial Auto Correlation- Quadratic Counts and Nearest- Neighbor Analysis-Trend Surface Analysis-Gravity Models-Network Analysis-GIS Modeling
 8. **GIS Implementation and Project Management:** Software Engineering as Applied to GIS-GIS Project Planning-Systems Analysis and User Requirements-Geographic Database Design Methodology-GIS Application Software Design Methodology-Systems Implementation and Technology Rollout-Systems Maintenance and Technical Support, GIS Issues and Prospects: Issues of Implementing GIS-The Trend of GIS-Development Frontiers of GIS Research.

Text Book:

Concepts and Techniques of Geographic Information Systems, by C. P. Lo & Albert K. W. Yeung, Prentice Hall of India Ltd

Reference Books:

- 1) An Introduction to Geographical Information Systems, by Ian Heywood, Sarah Cornelium & Steve Carver, Pearson Education
- 2) Introduction to Geographic Information Systems, by Kang-rsung Chang, Tata McGraw Hill Publishing Company Limited

MTIT2.5

Elective III Data Base Security

common for M.Tech(CST,IT,CSTAIR, CSTBI)

Instruction: 3 Periods/week

Time: 3 Hours

Credits: 4

Internal: 30 Marks

External: 70 Marks

Total: 100 Marks

1. **Introduction To Database Security:** Fundamental Data Security Requirements, Data Security Concerns, Compliance Mandates, Security Risks, Developing Enterprise Security Policy, Defining a Security Policy, Implementing a Security Policy, Techniques to Enforce Security
2. **Database Access Control:** User Authentication, Protecting Passwords, Creating Fixed Database Links, Encrypting Database Link Passwords, Using Database Links Without Credentials, Using Database Links And Changing Passwords, Auditing With Database Links, Restricting A Database Link With Views, Trust Management & Negotiation,
3. **Database Security Issues:** Database Security Basics, Security Checklist, Reducing Administrative Effort, Applying Security Patches, Default Security Settings, Secure Password Support, Enforcing Password Management, Protecting The Data Dictionary, System and Object Privileges, Secure Data Outsourcing, Security in Advanced Database Systems, Security in Data Warehousing and OLAP Systems, Managing Enterprise User Security
4. **Framework For Database Security,:** Security for Workflow Systems, Secure Semantic Web Services, Spatial Database Security, Security Reengineering, Strong Authentication, Single Sign-On, Public Key Infrastructure (PKI) Tools, Configuring SSL on the Server, Certificates, Using Kerberos for Authentication
5. **Database Security Solutions:** Maintaining Data Integrity, Protecting Data, Controlling Data Access, Combining Optional Security Features, Compliance Scanner, Policy Trends in Database Control, Watermarking: Copyright Protection, Trustworthy Record Retention and Recovery, Privacy-Preserving Data Mining & Data Publishing. Privacy in Location-Based Services
6. **Database Auditing :** Auditing Database Users, User Privileges And Objects: Monitoring for Suspicious Activity, Standard Database Auditing, Setting the AUDIT_TRAIL, Specifying Audit Options, Viewing Auditing Options, Auditing the SYSDBA Users, Audit to XML Files, Value-Based Auditing, Auditing DML Statements, Triggering Audit Events, Maintaining the Audit Trail
7. **Database Privileges And Roles:** Authorization, Privileges, Benefits of Roles, Using Proxy Authentication With Roles, Creating An Enterprise Role, Securing Objects and Application Roles, Data Masking Primitives And Routines, Privacy in Location- Based Services
8. **Data Encryption For Database Security:** Problems Solved by Encryption, Storing the Key in Database, Key Management by User, Application-Based Encryption, Cipher Block Modes , Hash and Message Authentication Code, Transparent Data Encryption (TDE) & File Encryption Methods.

Text Books

1. Database Security, S.Castano, M. Fugini, G. Martella,P. Samarati, Addison-Wesley
2. Database Security By Alfred Basta, Melissa Zgola, Cengage Publication, 2012

References

1. Database Security & Auditing By Hassan A Afyouni, Cengage Delmar Learning India Pvt, 2009
2. Handbook Of Database Security:Applications And Trends,Michael Gertz, Sushil Jajodia, Springer

MTIT 2.5

Elective III Business Intelligence

Instruction: 3 Periods/week

Time: 3 Hours

Credits: 4

Internal: 30 Marks

External: 70 Marks

Total: 100 Marks

- 1. Introduction to Artificial Intelligence:** Artificial Intelligence, AI Problems, AI Techniques, Defining the Problem as a State Space Search, Problem Characteristics , Production Systems, Search: Issues in The Design of Search Programs, Un-Informed Search and Heuristic Search Techniques & Algorithms. AI Applications in Biology, Engineering, Technology and Business
 - 2. Knowledge Representation:** Knowledge General concepts, Representations & Approaches to Knowledge Representation, Forward Vs Backward Reasoning, Symbolic Logic: Computable Functions and Predicates, FOPL Representation of knowledge, Normal Forms, Unification and Resolution, Basic Inference Techniques; Structured Representation of Knowledge: Semantic Nets, Partitioned Semantic Nets, Frames, Conceptual Dependency, Conceptual Graphs, Scripts, CYC
 - 3. AI Techniques & Programming:** Logic Based Programming- AI Programming languages: Overview of LISP & Prolog, Search Strategies in LISP, Production System using Prolog, Fuzzy Logic: Crisp Sets, Fuzzy Sets, Fuzzy Logic Control, Fuzzy Inferences & Fuzzy Systems. Matching Techniques, Partial Matching, Fuzzy Matching Algorithms and RETE Matching Algorithms;, Pattern matching in LISP .
 - 4. Overview Of Business Intelligence:** Managerial, Strategic And Technical Issues Associated With BI , Database Systems And Database Integration, Data Warehousing, Data Marts. Query And Report Generation Technologies, Business Process Modeling & Analysis, Planning: Components of a Planning System, Goal Stack Planning, Hierarchical Planning, Reactive Systems
 - 5. Business Analytics For BI:** Data Ware House Architecture: OLAP, Data Cubes, Reporting Tools, Balance Score card, Dash Board design and Implementations, Data Mining And Analytical Tools, Multidimensional/Hyper Cubes , Enterprise Data – Enterprise Data And Information Flow. Information Management and Regulatory Compliance Case Studies:
 - 6. Experts Systems :** Overview of an Expert System, Structure of an Expert Systems, Different Types of Expert Systems- Rule Based, Model Based, Case Based and Hybrid Expert Systems, Concepts and Practice of DSS Modeling, Knowledge Acquisition and Validation Techniques, Black Board Architecture, Knowledge Building System Tools, Expert System Shells, Expert system Shell in LISP, Fuzzy Expert systems
 - 7. BI Tools and Intelligent Agents:** Overview of Intelligent agents, Design and Implementation of Intelligent Agent system, languages and Tools, Multi-Agent systems; Applications in Adaptive Information Retrieval systems, Decision Support Systems, BI Reporting Tools-BIRT, Pentaho, Integration with mysql server, Knowledge Discovery Systems, Agents in Computational Biology, Smart Systems and Robots.
 - 8. Case Studies in Business Intelligence:** :Business model development from marketing, finance domains- Dimensional modeling, metrics, DataCube creation. Data visualization through BI tools for OLAP operation. Publishing BI reports in Enterprise portals.`
- Text Book:**
1. Artificial Intelligence : A modern Approach, Russell and Norvig, Printice Hall
 2. Decision Support and Business Intelligence Systems, Efraim Turban, Ramesh Sharda, Jay Aronson, David King, , Pearson Education, 2009
- References:**
3. Introduction To Artificial Intelligence & Expert Systems, Patterson, PHI
 4. Multi Agent systems- a modern approach to Distributed Artificial intelligence, Weiss.G, MIT Press.
 5. Artificial Intelligence, Elaine Rich, Mcgraw-Hill Publications
 6. Artificial Intelligence, George F Luger, Pearson Education Publications
 7. The Savy Manager's Guide GettingOnboard with Emerging IT, David Loshin, Morgan Kauffmann Publishers, 2009

MT IT2.5

Elective III Big Data Analytics

Common for M.Tech (CST, IT, CSTAIR, CSTBI)

Instruction: 3 Periods/week

Time: 3 Hours

Credits: 4

Internal: 30 Marks

External: 70 Marks

Total: 100 Marks

1. **Introduction:**, Velocity, Variety, Veracity; Drivers for Big Data, Sophisticated Consumers, Automation, Monetization, Big Data Analytics Applications: Social Media Command Center, Product Knowledge Hub, Infrastructure and Operations Studies, Product Selection, Design and Engineering, Location-Based Services, Online Advertising, Risk Management
2. **Architecture Components:** Massively Parallel Processing (MPP) Platforms, Unstructured Data Analytics and Reporting: Search and Count, Context-Sensitive and Domain-Specific Searches, Categories and Ontology, Qualitative Comparisons, Data Privacy Protection, Real-Time Adaptive Analytics and Decision Engines
3. **Advanced Analytics Platform:** Real-Time Architecture for Conversations, Orchestration and Synthesis Using Analytics Engines, Entity Resolution, Model Management, .Discovery Using Data at Rest, Integration Strategies
4. **Implementation of Big Data Analytics:** Revolutionary, Evolutionary, or Hybrid, Big Data Governance, Integrating Big Data with MDM, Evolving Maturity Levels
5. **Map-Reduce and the New Software Stack:** Distributed File Systems .Physical Organization of Compute Nodes, Large-Scale File-System Organization, Map-Reduce features: Map Tasks, Grouping by Key, Reduce Tasks, Combiners, Map-Reduce Execution, Coping With Node Failures, Algorithms Using Map-Reduce for Matrix multiplication, Relational Algebra operations, Workflow Systems, Recursive Extensions to Map-Reduce,
6. **Communication Cost Models,** Complexity Theory for Map-Reduce, Reducer Size and Replication Rate, Graph Model and Mapping Schemas, Lower Bounds on Replication Rate
7. **Mining Data Streams:** Stream Data Mode 1 and Management Stream Source, Stream Queries, and issues, Sampling Data in a Stream , Filtering Streams, Counting Distinct Elements in a Stream, Estimating Moments, Counting Ones in a Window, Decaying Windows
8. **Link Analysis:** PageRanking in web search engines, Efficient Computation of PageRank using Map-Reduce and other approaches, Topic-Sensitive PageRank , Link Spam, Hubs and Authorities

Text Books:

1. Big Data Analytics:Disruptive Technologies for Changing the Game, *Dr. Arvind Sathi*, First Edition October 2012, IBM Corporation
2. Mining of Massive Datasets, Anand Rajarama, Jure Leskovec, Jeffrey D. Ullman.E-book, 2013

References:

1. Big Data Imperatives, Soumendra Mohanty, Madhu Jagadeesh, Harsha Srivatsa, Apress, e-book of 2012

MTCST2.6

Elective II Mobile Computing

Common with M.Tech (CST, IT, CSTCN)

Instruction: 3 Periods/week

Time: 3 Hours

Credits: 4

Internal: 30 Marks

External: 70 Marks

Total: 100 Marks

1. **Introduction to Mobile Computing**, Overview of Mobile Technologies, Limitations, The Ubiquitous Network, Architecture for Mobile Computing, Three-Tier Architecture, Design Considerations for Mobile Computing, Mobile Computing Through Internet, Mobile Devices and Mobile-Enabled Applications.
2. **Introduction To Wireless Networking**, Various Generations of Wireless Networks, Wireless LANs, Advantages and Disadvantages of WLANs, Fixed Network Transmission Hierarchy, Differences in Wireless and Fixed Telephone Networks, Traffic Routing in Wireless Networks, WAN Link Connection Technologies, Cellular Networks.
3. **WLAN Topologies**, WLAN Standard IEEE 802.11, Comparison Of IEEE 802.11a, B, G and N Standards, Wireless PANs, Hiper LAN, Wireless Local Loop, ATM, Virtual Private Networks, Wireless Data Services, Common Channel Signaling, Various Networks for Connecting to The Internet.
4. **Emerging Technologies**: Introduction - Bluetooth - Radio Frequency Identification (RFID), WIMAX - Mobile IP - Ipv6 - Java Card, TCP/IP in the Mobile Setting, GSM and GPS
5. **Data Management Issues**, Data Replication For Mobile Computers, Adaptive Clustering for Mobile Wireless Networks, File System, Disconnected Operations, Data Services in GPRS -Applications for GPRS - Limitations - Billing and Charging.
6. **Communications Asymmetry**, Classification of New Data Delivery Mechanisms, Push-Based Mechanisms, Pull-Based Mechanisms, Hybrid Mechanisms, Selective Tuning (Indexing) Techniques. CDMA, GSM, Wireless Data, 3G Networks and Applications
7. **Introduction to Mobile IP**, Introduction To Wireless Application Protocol, Application Layer MMS - GPRS Applications, Short Message Service (SMS): Mobile Computing Over SMS - SMS - Value Added Services Through SMS -Accessing the SMS Bearer.

Text Books:

1. Mobile Computing - Technology Applications And Service Creation, Asoke K Talukder and Roopa R.Yavagal, TMH 2006.
2. Mobile Cellular Communication, Gottapu Sasibhushana Rao,, Pearson Education, First Edition, 2013.

Reference Books:

3. Principles Of Computing, Uwe Hansmann, Lothar Merk, Martin S.Nicklous, Thomas Staber, 2nd Ed., Springer International Edition.
4. Mobile Communications, J.Schiller, Addison-Wesley, 2003
5. Stojmenovic And Cacute, "Handbook Of Wireless Networks And Mobile Computing", Wiley, 2002.

MTCST 2.6

Elective IV: SOFT COMPUTING

Common for M.Tech (CST, IT)

Instruction: 3 Periods/week
Internal: 30 Marks

Time: 3 Hours
External: 70 Marks

Credits: 4
Total: 100 Marks

1. **Soft Computing:** Introduction to Fuzzy Computing, Neural Computing, Genetic Algorithms, Associative Memory, Adaptive Resonance Theory, Different Tools and Techniques, Usefulness and Applications.
2. **Fuzzy Sets and Fuzzy Logic:** Introduction, Fuzzy Sets Versus Crisp Sets, Operations on Fuzzy Sets, Extension Principle, Fuzzy Relations and Relation Equations, Fuzzy Numbers, Linguistic Variables, Fuzzy Logic, Linguistic Hedges, Applications,
3. **Interference in fuzzy logic,** fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzifications and Defuzzifications, Fuzzy Controller, Fuzzy Controllers, Fuzzy Pattern Recognition, Fuzzy Image Processing, Fuzzy Database.
4. **Artificial Neural Network:** Introduction, Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, re-current networks. Various learning techniques, perception and convergence rule, Auto-associative and hetro-associative memory , Hebb's Learning, Adaline, Perceptron
5. **Multilayer Feed Forward Network,** Back Propagation Algorithms, Different Issues Regarding Convergence of Multilayer Perceptron, Competitive Learning, Self-Organizing, Feature Maps, Adaptive Resonance Theory, Associative Memories, Applications.
6. **Evolutionary and Stochastic Techniques:** Genetic Algorithm (GA), Genetic Representations, (Encoding) Initialization and Selection, Different Operators of GA, Analysis of Selection Operations, Hypothesis of Building Blocks, Schema Theorem and Convergence of Genetic Algorithm, Simulated Annealing and Stochastic Models, Boltzmann Machine, Applications.
7. **Rough Set:** Introduction, Imprecise Categories Approximations and Rough Sets, Reduction of Knowledge, Decision Tables and Applications.
8. **Hybrid Systems:** Neural-Network-Based Fuzzy Systems, Fuzzy Logic-Based Neural Networks, Genetic Algorithm for Neural Network Design and Learning, Fuzzy Logic and Genetic Algorithm for Optimization, Applications

Text Books:

1. Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications, S. Rajsekaran and G.A. Vijayalakshmi Pai, Prentice Hall of India.
2. Rough Sets, Z.Pawlak, Kluwer Academic Publisher, 1991.
3. Intelligent Hybrid Systems, D. Ruan, Kluwer Academic Publisher, 1997

References:

4. Artificial Intelligence and Intelligent Systems, N.P.Padhy, Oxford University Press.
5. Neural Fuzzy Systems, Chin-Teng Lin & C. S. George Lee, Prentice Hall PTR, Addison-Wesley
6. Learning and Soft Computing, V. Kecman, MIT Press, 2001
7. Fuzzy Sets and Fuzzy Logic, Klir & Yuan, PHI, 1997

MTCST2.6 Elective IV: CLUSTER COMPUTING

Common for M.Tech (CST, IT)

Instruction: 3 Periods/week

Time: 3 Hours

Credits: 4

Internal: 30 Marks

External: 70 Marks

Total: 100 Marks

1. **Introduction:** Overview of Cluster Computing, The Role of Clusters, Definition and Taxonomy of Parallel Computing, Hardware System Structure, Node Software, Resource Management, Distributed Programming, Limitations
2. **Cluster Planning,** Architecture , Node Hardware and Node Software, Design Decisions
3. **Network Hardware:** Internet technologies, Ethernet, cLAN, QsNet, Infiniband, Packet Format, NIC Architecture, hubs & Switches.
4. **Network Software:** TCP/IP, Sockets, Higher Level Protocols, Distributed File systems, Remote Command Execution,
5. **Cluster Setup:** Installation & Configuration, System Access Models, Assigning Names, Installation of Node Software, Basic System Administration
6. **Clusters Management:** Cluster Workload Management Activities, Queuing, scheduling and monitoring, Resource Management and Accounting
7. **Virtualization technologies;** Parallel and Virtual file systems, Introduction, Programming with parallel File systems, Benchmarks

Text Books:

1. Beowulf Cluster Computing with Linux, 2nd Edition, edited by William Gropp, Ewing Lusk, Thomas Sterling, MIT Press, 2003

References

2. In Search of Clusters: The ongoing battle in Lowly Parallel Computing, Gregory F. P Fister, Second Edition, Prentice Hall Publishing Company, 1998.
3. How to Build a Beowulf - A Guide to the Implementation and Application of PC Clusters, Thomas Sterling, John Salmon, Donald J. Becker and Daniel F. Savarese, MIT Press, 1999

MTCST 2.6

Elective IV: Pervasive Computing

Common for M.Tech (CST, IT)

Instruction: 3 Periods/week

Time: 3 Hours

Credits: 4

Internal: 30 Marks

External: 70 Marks

Total: 100 Marks

1. **Pervasive Computing** : Introduction to Ubiquitous Computing (Popularly known as Pervasive Computing), Evolution of Pervasive Computing, Pervasive Computing Principles : Decentralization, Diversification, Connectivity, Simplicity, Pervasive Computing Characteristics, Pervasive Information Technology
2. **Pervasive Architecture:** Background, Scalability and Availability, Pervasive Web Application Architecture, Implementation Issues.
3. **Pervasive Devices** : Device Categories, Device Characteristics, Software Components in the Device, Information Access Devices, Smart Identification, and Embedded Controls, Hand Held Computers, Cellular Phones, Smart Phones, Smart Cards and Smart Appliances
4. Pervasive Connectivity: Protocols, Security, Network Management, Mobile Internet, WAN: Cellular Basics, Major Digital Cellular Systems, Advanced Cellular Radio Standards, Short Range Wireless Communication: DECT, Bluetooth, Irda, Home Networks.
5. **Pervasive Applications** : Home Services: System View, Communications, Home Automation, Energy and Security Services, Remote Home Health Care Services, Business Services, Healthcare Management, Consumer Services: Interactive Advertisement, Loyalty, Shopping, Payment Services
6. **Pervasive Synchronization:** Definition of Synchronization, Models of Synchronization, Challenges In Synchronizing Data, Industry Data Synchronization Standards: Infrared Mobile Communications, WAP, Third Generation Partnership Program, Syncml, Synchronization Solutions
7. **Security Issues in Pervasive Computing** : Importance of Security, Cryptographic Patterns And Methods - Light Weight Cryptography -Light Weight Symmetric and Asymmetric Cryptographic Algorithms, Cryptographic Tools - Hash, MAC, Digital Signatures
8. **Mobile Internet and Web Services:** WAP Architecture, Wireless Application Environment: Wireless Markup Language, WAP Binary XML Content Format, WML Script, XHTML Mobile Profile, I-Mode, Web Services Architecture: WSDL, ADDI, SOAP, Web Services Security, Web Services For Remote Portals

Text Books:

1. Pervasive Computing: The Mobile World By Uwe Hansmann, Lothar Merk
2. Pervasive Computing: Technology And Architecture Of Mobile Internet Applications , Jochen Burkhardt , Horst Henn , Stefan Hepper , Klaus Rindtorff , Thomas Schaeck

MTIT 2.7 Network Programming & Web Programming Lab

Practical: 3 Periods /week

Sessional Marks: 50

Univ-Exam-Marks:50

Credits:2

Total: 100

Part I Networks Lab Experiments

1. Identifying well known ports on a Remote System :By trying to listen to the various well known ports by opening client connections. If the exception does not occur then the remote port is active else the remote port is inactive.
2. Writing a Chat application :
 - i). One-One: By opening socket connection and displaying what is written by one party to the other.
 - ii). Many-Many (Broad cast): Each client opens a socket connection to the chat server and writes to the socket. Whatever is written by one party can be seen by all other parties.
3. Data retrieval from a Remote database: At the remote database a server listens for client connections. This server accepts SQL queries from the client, executes it on the database and sends the response to the client.
4. Mail Client:
 - i). POP Client : Gives the server name , user name and password retrieve the mails and allow manipulation of mail box using POP commands.
 - ii). SMTP Client : Gives the server name, send e-mail to the recipient using SMTP commands-
5. Simulation of Telnet: Provide a user interface to contact well-known ports, so that client-server interaction can be seen by the user.
6. Simple file transfer between two systems (without protocols): By opening socket connection to our server on one system and sending a file from one system to another.
7. TFTP- Client:To develop a TFTP client for file transfer. (Unix Network programming- Stevens.)
8. HTTP-Server: Develop a HTTP server to implement the following commands. GET, POST, HEAD, DELETE. The server must handle multiple clients.

Part II Web Programming Lab Experiments

9. Design of the Web pages using various features of HTML and DHTML
10. Client server programming using servlets, ASP and JSP on the server side and java script on the client side
11. Web enabling of databases
12. Multimedia effects on web pages design using Flash.

References

1. Java Network Programming, Harol, Orielly Publications
2. An Introduction to Computer Networking, Kenneth C. Mansfield Jr and James L. Antonakos, Pearson Education Asia
3. Internet and Web Technologies by Raj Kamal, Tata McGraw-Hill
4. Programming the World Wide Web by Robert W. Sebesta, Pearson Education

MTCST 2.8 OBJECT ORIENTED SOFTWARE ENGINEERING LAB

Common for M.Tech (CST, IT)

Practical: 3 Periods /week
Sessional Marks: 50

Univ-Exam : 3 Hours
Univ-Exam-Marks:50

Credits:2
Total: 100

1. The purpose of the Software Engineering Lab course is to familiarize the students with modern software engineering methods and tools, Rational **Products**. The course is realized as a project-like assignment that can, in principle, be done by a team of three/four students working full time. Typically the assignments have been completed during the semester requiring approximately 60-80 hours from each project team.
2. The goal of the Software Engineering Project is to have a walk through from the requirements, design to implementing and testing. An emphasis is put on proper documentation. Extensive hardware expertise is not necessary, so proportionate attention can be given to the design methodology.
3. Despite its apparent simplicity, the problem allows plenty of alternative solutions and should be a motivating and educating exercise. Demonstration of a properly functioning system and sufficient documentation is proof of a completed assignment
4. Term projects are projects that a group student or might take through from initial specification to implementation. The project deliverables include

Projects

- Documentation including
 - A problem statement
 - A requirements document
- A Requirements Analysis Document.
- A System Requirements Specification.
- A Software Requirements Specification.
- A design document
 - A Software Design Description and a System Design Document.
- A test specification.
- Manuals/guides for
 - Users and associated help frames
 - Programmers
 - Administrators (installation instructions)

- A project plan and schedule setting out milestones, resource usage and estimated costs.
- A quality plan setting out quality assurance procedures
- An implementation.

Reference Books:

1. Project-based software engineering: An Object-oriented approach, Evelyn Stiller, Cathie LeBlanc, Pearson Education
2. Visual Modelling with Rational Rose 2002 and UML, Terry Quatrini, Pearson Education
3. UML2 Toolkit, Hans -Erik Eriksson, etc; Wiley

MTCST 2.9 SEMINAR ON ADVANCED TOPICS

Practical: 3 Periods /week
Credits: 2

Internal Assessment Marks: 100

Purpose:

To enable a student to be familiar with Communication skills
Student is expected to Learn

- a. How to Make a Presentation
 - I. Verbal
 - II. Non Verbal
 - III. LCD based Power Point

- b. How to write a report
 - I. Abstract
 - II. Body
 - III. Conclusions
 - IV. Executive Summary

- c. Group Discussion
 - I. Share the work with a group
 - II. Modularization of the work
 - III. Shareware Development

- d. Communication
 - I. Horizontal
 - II. Vertical

Students will be Given a Topic of Importance and are Expected

- A. To Present the Topic Verbally in 45minutes + Question Answering
- B. To Present the Topic as a Report in 50 Pages

III SEMESTER

Common for final year M. Tech (CST, IT, CSTAIR, CSTBI, CSTCN) and 6 year Integrated courses

Code Credits	Name of the subject	Periods/week				Max. Marks	Total
		Theory	Lab	Ext.	Int.		
MTCST3.1	Thesis Work Part 1		Grade		Grade	10	

1. Candidates can do their thesis work within the department or in any industry/research organization for two semesters. In case of thesis done in an industry/research organization, one advisor (Guide) should be from the department and one advisor (CO-Guide) should be from the industry/research organization.
2. Thesis part I should be submitted at the end of final year 1st semester and it will be evaluated by a committee consisting of Chairman Board of Studies, Head of the Department and thesis guide.
3. Although credits are allotted for the thesis work they will not be taken for the calculation of CGPA.

VI YEAR II SEMESTER

Code Credits	Name of the subject	Periods/week				Max. Marks	Total
		Theory	Lab	Ext.	Int.		
MTCST4.1	Thesis Work Part 2		Grade		Grade	14	

1. A publication of a paper on the thesis work in a National/International Conference proceedings with presentation certificate or a paper on the thesis work be communicated to a National/International Journal & accepted for publication for the submission of thesis at the end of final year is mandatory.
2. Final Thesis with Part I & Part II should be submitted at the end of final year and it will be evaluated by a committee consisting of Chairman Board of Studies, Head of the Department, External Examiner and thesis guide.
3. The candidate has to defend his thesis in a Viva-voce examination to be conducted by the above committee. The committee should submit a report, with signatures of all the members, candidate wise, with grade A-Excellent/ Grade B-Good/Grade C- fair/ Grade D- Reappear.
4. The external examiner shall be nominated by the Hon'ble Vice Chancellor as per the norms of the University.
5. Although credits are allotted for the thesis work they will not be taken for the calculation of CGPA.

GUIDELINES FOR PREPARING THE REPORT OF PROJECT WORK

1. ARRANGEMENT OF CONTENTS:

The sequence in which the project report material should be arranged and bound should be as follows:

1. Cover Page & Title Page
2. Bonafide Certificate
3. Abstract
4. Table of Contents
5. List of Tables
6. List of Figures
7. List of Symbols, Abbreviations and Nomenclature
8. Chapters
9. Appendices
10. References

The tables and figures shall be introduced at appropriate places.

2. PAGE DIMENSION AND BINDING SPECIFICATIONS:

The dimension of the project report should be in A4 size. The project report should be bound using flexible cover of the thick white art paper. The cover should be **printed in black letters** and the text for printing should be identical.

3. PREPARATION FORMAT:

3.1. Cover Page & Title Page – A specimen copy of the Cover page & Title page of the project report are given in **Appendix 1**.

3.2 Bonafide Certificate – The Bonafide Certificate shall be in double line spacing using Font Style Times New Roman and Font Size 14, as per the format in **Appendix 2**. The certificate shall carry the supervisor's signature and shall be followed by the supervisor's name, academic designation (not any other responsibilities of administrative nature), department and full address of the institution where the supervisor has guided the student. The term '**SUPERVISOR**' **must** be typed in capital letters between the supervisor's name and academic designation.

3.3 Abstract – Abstract should be one page synopsis of the project report typed one and half line spacing, Font Style Times New Roman and Font Size 12.

3.4 Table of Contents – The table of contents should list all material following it as well as any material which precedes it. The title page and Bonafide Certificate will not find a place among the items listed in the Table of Contents but the page numbers of which are in lower case Roman letters. One and a half spacing should be adopted for typing the matter under this head. A specimen copy of the Table of Contents of the project report is given in **Appendix 3**.

3.5 List of Tables – The list should use exactly the same captions as they appear above the tables in the text. One and a half spacing should be adopted for typing the matter under this head.

3.6 List of Figures – The list should use exactly the same captions as they appear below the figures in the text. One and a half spacing should be adopted for typing the matter under this head.

3.7 List of Symbols, Abbreviations and Nomenclature – One and a half spacing should be adopted or typing the matter under this head. Standard symbols, abbreviations etc. should be used.

3.8 Chapters – The chapters may be broadly divided into 3 parts (i) Introductory chapter, (ii) Chapters developing the main theme of the project work (iii) and Conclusion. The main text will be divided in to several chapters and each chapter may be further divided into several divisions and sub-divisions.

- Each chapter should be given an appropriate title.
- Tables and figures in a chapter should be placed in the immediate vicinity of the reference where they are cited.
- Footnotes should be used sparingly. They should be typed single space and placed directly underneath in the very same page, which refers to the material they annotate.

3.9 Appendices –

- Appendices are provided to give supplementary information, which is included in the main text may serve as a distraction and cloud the central theme.
- Appendices should be numbered using Arabic numerals, e.g. Appendix 1, Appendix 2, etc.
- Appendices, Tables and References appearing in appendices should be numbered and referred to at appropriate places just as in the case of chapters.
- Appendices shall carry the title of the work reported and the same title shall be made in the contents page also.

3.10 List of References –The listing of references should be typed 4 spaces below the heading “REFERENCES” in alphabetical order in single spacing left – justified. The reference material should be listed in the alphabetical order of the first author. The name of the author/authors should be immediately followed by the year and other details .A typical illustrative list given below relates to the citation example quoted above.

REFERENCES:

1. Barnard, R.W. and Kellogg, C. (1980) Applications of Convolution Operators to Problems in Univalent Function Theory, Michigan Mach, J., Vol.27, pp.81–94.
2. Shin, K.G. and Mckay, N.D. (1984) Open Loop Minimum Time Control of Mechanical Manipulations and its Applications, Proc. Amer.Contr.Conf., San Diego, CA, pp. 1231-1236.

4. TYPING INSTRUCTIONS:

The impression on the typed copies should be black in color. One and a half spacing should be used for typing the general text. The general text shall be typed in the Font style Times New Roman and Font size 12.