

M.Tech Computer Science & Technology with Specialization in Computer Networks

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 | AdvDatabase Management Systems | 3 | - | 70 | 30 | 100 | 4 |
| MTCSTCN1.4 | Computer Networks | 3 | - | 70 | 30 | 100 | 4 |
| MTCST1.5 | Elective-I | 3 | - | 70 | 30 | 100 | 4 |
| MTCSTCN1.6 | Elective-II | 3 | - | 70 | 30 | 100 | 4 |
| MTCST1.7 | Data Structures & Programming Lab | - | 3 | 50 | 50 | 100 | 2 |
| MTCSTCN1.8 | Computer networks Lab | - | 3 | 50 | 50 | 100 | 2 |
| Total | | 18 | 6 | 520` | 280 | 800 | 28 |

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

Elective II: Advanced Operating System/Cloud Computing/ ATM Networks /Network Security & Cyber Forensics

II SEMESTER

| Code | Name of the subject | Periods/week | | Max. Marks | | Total | Credits |
|--------------|--------------------------|--------------|----------|-------------|------------|------------|-----------|
| | | Theory | Lab | Ext. | Int. | | |
| MTCSTCN2.1 | Internet Technologies | 3 | - | 70 | 30 | 100 | 4 |
| MTCSCNT2.2 | Mobile Ad-hoc Networks | 3 | - | 70 | 30 | 100 | 4 |
| MTCSTCN2.3 | Sensor Networks | 3 | - | 70 | 30 | 100 | 4 |
| MTCSTCN2.4 | TCP/IP | 3 | - | 70 | 30 | 100 | 4 |
| MTCSTCN2.5 | Elective III | 3 | - | 70 | 30 | 100 | 4 |
| MTCSTCN2.6 | Elective IV | 3 | - | 70 | 30 | 100 | 4 |
| MTCSTCN2.7 | Wireless Networks Lab | - | 3 | 50 | 50 | 100 | 2 |
| MTCSTCN2.8 | Protocol Development Lab | - | 3 | 50 | 50 | 100 | 2 |
| MTCSTCN 2.9 | Seminar | - | - | - | 100 | 100 | 2 |
| Total | | 18 | 6 | 520` | 380 | 800 | 30 |

Elective III: Multi Media Networks/ Performance Analysis of Network Architecture/Network

Elective IV: Mobile Computing/ Network Management Systems//Internet of Things/Virtual Private Networks

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 Credits | Name of the subject | Periods/week | | | | Max. Marks | Total |
|-----------------|---------------------|--------------|-------|------|-------|------------|-------|
| | | Theory | Lab | Ext. | Int. | | |
| 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 First Semester

MTCST 1.1 MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

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. 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 with 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.

MTCSTCN1.4

COMPUTER NETWORKS

Instruction: 3 Periods/week

Time: 3 Hours

Credits: 4

Internal: 30 Marks

External: 70 Marks

Total: 100

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, Net work 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.

MTCST 1.5 Elective I COMPUTER ORGANIZATION AND ARCHITECTURE

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. 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).

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|--|---------------------------|-------------------------|
| MTCST 1.5 | Elective I | E-COMMERCE |
| Common with 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:** 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:

1. 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 with M.Tech (CST, IT, CSTAIR,CSTBI)

Instruction: 3 Periods/week

Time: 3 Hours

Credits: 4

Internal: 30 Marks

External: 70 Marks Total: 100 Marks

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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:

The 8051 Microcontroller Architecture, Programming & Applications, Kenneth J. Ayala, Penram International.

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

MTCSTCN 1.6 Elective II**ADVANCED OPERATING SYSTEMS****Common for M.Tech (CSTAIR, CSTBI, CSTCN)****Instruction: 3 Periods/week****Time: 3 Hours****Credits: 4****Internal: 30 Marks****External: 70 Marks****Total: 100 Mark**

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, 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.

MTCSTCN1.6 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, IBMPartnerships.
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.

MTCSTCN 1.6 ELECTIVE II ATM NETWORKS

Credits:4

Instruction: 3 Periods & 1 Tut/week

Sessional Marks: 30

Univ. Exam: 3 Hours

Univ-Exam-Marks:70

1. Transfer Modes :

Overview of ATM, Introduction, Circuit switching, Routing, virtual circuit Switching, Comparison of transfer modes. Motivation for ATM, Basic properties.

2. ATM Reference Model:

Core aspects, ATM Networks, Architecture and interfaces, Internetworking, Applications, BISDN and ATM, ATM Standardisation.

3. ATM Physical Layer:

TC sub layer, PMD sub layer, DS1 interface, DS3 interface, E1 Interface, E3 interface, SONET/SDH based interface.

4. ATM Layer and AAL:

ATM Layer and AAL, ATM cell header at UNI and NNI, ATM layer function, AAL1, AAL2, AAL3/4.

5. ATM traffic and traffic management:

ATM traffic and traffic management. Traffic parameters, Service parameters, QOS Parameters, Service categories, Traffic management, Traffic contact management.

6. ATM Switching:

Introduction, Component, Performance, Measurements, Switching issues, Shared Memory Architecture, Shared medium architecture, Space division architecture, Switching in ATM.

7. ATM Addressing, Signaling and Routing, Security:

AISA format, Group addressing, ATM signal protocol stack, SAAL, Routing, PNNI Protocol, PNNI hierarchy, PNNI topology, ATM Network Management and Security

Text Book

1. Rainer Handel, Huber, "ATM Network" , Adison Wesley

MTCSTCN1.6 Elective II Network Security and Cyber Forensics

Instruction: 3 Periods & 1 Tut/week

Sessional Marks: 30

Univ. Exam: 3 Hours

Univ-Exam-Marks:70

1.Introduction to Network Security: 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. A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, Introduction to TCP/IPTCP , 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

2.User Authentication Mechanisms and Public Key Infrastructure: Introduction, Authentication Basics, Passwords authentication tokens, Certificate based authentications, Biometrics based authentication , Kerberos, X.509 Directory Authentication Service, SSO Approaches,Public key cryptography principles and algorithms, digital signatures, digital Certificates, Certificate Authority and key management, Public Key Cryptography Standards, Private Key Management, XML,PKI and Security, non directory based authentication protocols, Attacks on authentication protocols, Authentication protocols in the real world

3.Symmetric and Asymmetric Key Cryptographic Techniques: Overview of symmetric Key Cryptography Algorithm types and modes; DES, IDEA, RC5, BLOWFISH, AES Algorithms; Differential and Linear Cryptanalysis, Overview of Asymmetric Key cryptography, RSA Algorithm, Symmetric and Asymmetric Key Cryptography Together, Digital Signature, Knap sack Algorithm and other Algorithms, provably secure and efficient public key cryptosystems.

4.IP Security, Fire walls and Practical Implementation of Cryptography &Security : 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. Cryptographic Solutions using Java, Cryptographic Solutions Using Microsoft, Cryptographic Tool Kit, Security and Operating Systems Pretty Good Privacy (PGP) and S/MIME.

5.Crptosystems basics: Probability and Information Theory and computational complexity and number theory , formal approaches to security establishment, semantic security and beyond, formal methods for protocol checking and analysis, Zero knowledge protocols.

6. Digital Forensics: Capturing evidence, working on the evidence, documenting and reporting with special emphasis on Internet/Email, network devices and mobile devices

Text Book:

1. Network Security Essentials:Applications and Standards, William Stallings PEA.
2. Cryptography and Network Security, AtulKahate, Tata McGraw Hill
3. Modern Cryptography : Theory and Practices, W. Mao, Pearson Ed
4. Computer Forensics, David Cowen
5. The basics of digital forensics: the primer for getting started in digital forensics, J. Sammons

Reference:

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

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
4. To perform different types of sortings on a given list
 - (i) Bubble sort
 - (ii) Insertion sort
 - (iii) Selection sort
 - (iv) Merge sort
5. To perform different types of sortings on a given list
 - (i) Quick sort
 - (ii) Shell sort
 - (iii) Radix sort
6. To perform the following
 - (i) To convert the given infix expression to postfix expression
 - (ii) To evaluate the given postfix expression.
7. 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.
8. To implement dictionaries using hashing technique
9. To perform various operations on binary heap.
10. To perform various operations on Binary search tree.
11. To perform operations on AVL trees.
12. To perform various operations on B-tree.

Instruction: 3 Periods/week

External Assessment: 100marks

Internal Assessment: 50 Marks

Time: 3 Hours

a) Network Programming

1. Socket Programming
 - a. TCP Sockets
 - b. UDP Sockets
 - c. Applications using Sockets
2. Simulation of Sliding Window Protocol
3. Simulation of Routing Protocols
4. RPC
5. Development of applications such as DNS/ HTTP/ E – mail/ Multi - user Chat

b) Web Programming

1. Design of the Web pages using various features of HTML and DHTML
2. Client server programming using servlets, ASP and JSP on the server side and java script on the client side
3. Web enabling of databases
4. Multimedia effects on web pages design using Flash.

Reference Books:

1. Internet and Web Technologies by Raj Kamal, Tata McGraw-Hill
2. Programming the World Wide Web by Robert W. Sebesta, Pearson Education

Detailed Syllabus for M. Tech CST CN Second Semester

MTCSTCN 2.1

Instruction: 3 Periods/week

Internal: 30 Marks

Internet Technologies

Time: 3 Hours

External: 70 Marks

Credits: 4

Total: 100 Marks

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- 1. Introduction to HTML :** Browsers, Web Servers, Uniform Resource Locators, Multipurpose Internet Mail Extensions, The HyperText Transfer Protocol, The Web Programmer's Toolbox., **Introduction to HTML :** Origins and Evolution of HTML, Standard HTML Document Structure, Basic Text Formatting, Images, Hypertext Links, Lists, Tables, Frames, Forms. **Cascading Style Sheets :** Introduction, Levels of Style Sheets, Style Specification Formats, Style Classes, Properties and Property Values, Colors.
 - 2. The Basics of JavaScript :** Overview of JavaScript, Object Orientation and JavaScript, General Syntactic Characteristics, Primitives, Operations, and Expressions. Screen Output, Control Statements, Object Creation and Modification, Arrays. Functions, Constructors, Pattern Matching, Errors in Scripts. **JavaScript and HTML Documents :** The JavaScript Execution Environment, The Document Object Model, Element Access in JavaScript, Introduction to Events and Event Handling, Events, Attributes, and Tags, Using the load Event, Event Handlers for Button Events, Checking Form Input, The navigator Object, Event Propagation.
 - 3. Dynamic Documents with JavaScript :** Browser Support for Dynamic Documents, Element Positioning, Moving Elements. Element Visibility, Dynamic Colors and Fonts, Dynamic Content, Stacking Elements. Locating the Mouse Cursor, Dragging and Dropping Elements, Slow Movements of Elements.
 - 4. Introduction to XML :** Introduction, The Syntax of XML, XML Document Structure, Data Type Definitions, Namespaces, Displaying Raw XML Documents, Displaying XML Documents with CSS. XML Transformations and Style Sheets, Schemas.
 - 5. Introduction to Perl :** Origins and Uses of Perl, Scalars and Their Operations, Assignment Statements and Simple Input and Output, Control Statements, Fundamentals of Arrays, Hashes, References, Functions, Pattern Matching using Regular Expressions, File Input and Output. **Using Perl for CGI Programming :** The Common Gateway Interface, CGI Linkage, The CGI.pm Module, Form Handling, A Survey Example, Cookies, Animation using CGI.
 - 6. Servers and Servlets :** Web Server Operation, General Server Characteristics, Apache under UNIX, Overview of Servlets, Servlet Details, Storing Information on Clients.
 - 7. Introduction to PHP :** Origins and Uses of PHP, Overview of PHP, General Syntactic Characteristics, Primitives, Operations, and Expressions, Output, Control Statements, Arrays, Functions, Pattern Matching, Form Handling, Files, Cookies, Session Tracking.
 - 8. Database Access through the Web :** Relational Databases, The Structured Query Language, Architectures for Database Access, Using MySQL, Database Access with Perl, Database Access with PHP, Database Access with JDBC.

TEXT BOOK :

- 1. Programming the World Wide Web By Robert W. Sebesta, Pearson Education,2005**
- 2. Internet Technologies, Anne Mary Bradley, Heinemann Publications 2002**

MTCSTCN2.2

Instruction: 3 Periods/week
Internal: 30 Marks

Mobile Ad hoc Networks

Time: 3 Hours
External: 70 Marks

Credits: 4
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, Infrastructure Versus Infrastructure less Networks – Properties of Wireless, AD hoc Networks, Types of Ad Hoc Networks, Challenges in AD Hoc Networks – Applications of Wireless AD Hoc Networks , Routing Protocols for Ad Hoc Networks: Introduction-Proactive Routing Protocols- Reactive Routing protocols-Hybrid Routing Protocols-QoS Metrics-Energy impact issues in Routing.
 4. **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.
 5. **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.
 6. **Mobile Ad Hoc Networks (MANETs):** Overview, Properties of A MANET, Spectrum of MANET Applications, Routing and Various Routing Algorithms.
 7. **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.
 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:

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

MTCSTCN 2.3

Instruction: 3 Periods/week

Internal: 30 Marks

Sensor Networks

Time: 3 Hours

External: 70 Marks

Credits: 4

Total: 100 Marks

1. **Introduction:** The vision of Ambient Intelligence, Application examples, Types of applications, Challenges for Wireless Sensor Networks(WSNs), Sensor networks vs Enabling Technologies for WSNs, **Single node architecture:** Hardware components, Energy consumption of sensor nodes, Some examples of sensor nodes, Operating systems and execution environments
2. **Network architecture:** Sensor network scenarios, Optimization goals and figures of merit, Design principles for WSNs,
3. **Physical layer and transceiver design considerations in WSNs:**
MAC Protocols: Fundamentals of (wireless) MAC protocols, Low duty cycle protocols and wakeup concepts, Contention-based protocols, Schedule-based protocols, The IEEE 802.15.4 MAC protocol, How about IEEE 802.11 and Bluetooth
4. **Link layer protocols:** Fundamentals: tasks and requirements, Error control, Framing, Link management
5. **Naming and addressing:** Fundamentals, Address and name management in wireless sensor networks, Assignment of MAC addresses, Content-based and geographic addressing
6. **Routing protocols:** The many faces of forwarding and routing, Energy-efficient unicast, Broadcast and multicast, Geographic routing.
7. **Data-centric and content-based networking :** Introduction, Data-centric routing, Data aggregation, Data-centric storage
8. **Transport layer and Quality of Service:** The transport layer and QoS in wireless sensor networks, Coverage and deployment, Reliable data transport, Single packet delivery, Block delivery, Congestion control and rate control

TEXT BOOK:

References

1. Protocols and Architectures for Wireless Sensor Networks, Holger Karl, Andreas Willig., John Wiley & Sons Ltd, 2005
2. Network Management Fundamentals, Alexander Clemm CISCI Press 2007

MTCSTCN 2.4

TCP/IP

Instruction: 3 Periods/week
Internal: 30 Marks

Time: 3 Hours
External: 70 Marks

Credits: 4
Total: 100 Marks

1. REVIEW OF IMPORTANT NETWORKING CONCEPTS:TCP/IP Networking and architecture, IP addresses, Data Link Protocols, Address Resolution Protocol (ARP) and RARP,IP Protocol (IP), Introduction to ICMP, PING and Trace route, BOOTP and DHCP, IP Forwarding
2. DYNAMIC ROUTING PROTOCOLS: RIP, OSPF
3. TRANSPORT PROTOCOLS AND UDP:TCP I (Connection Management),TCP II (Flow and Congestion Control),
4. TCP III (Error Control), LAN SWITCHING, NAT, DHCP
5. DOMAIN NAME SYSTEM, IP MULTICASTING, SNMP,IPV6,MPLS,MOBILE IP,TCP/IP SECURITY
6. INTRODUCTION TO FINGER PROTOCOL, WHOIS PROTOCOL,
7. Other Protocols: WAIS, GOPHER, VERONICA, AND TCPDUMP,

TEXT BOOKS:

1. TCP/IP Illustrated, Volume 1: The Protocols, W. Richard Stevens, W. Richard Stevens, Pearson Education Asia, 2002
2. TCP/IP Tutorial and Technical Overview, A.Rodriguez, J. Gatrell, J. Karas, R.Peschke, IBM Redbook (Available on net for free)

REFERENCE BOOKS:

1. Internetworking with TCP/IP Vol.1: Principles, Protocols, and Architecture (4th Edition) by Douglas E. Comer ,Pearson Education Asia,2000
2. Internetworking with TCP/IP, Vol. III: Client-Server Programming and Applications, Linux/Posix Sockets Version , Douglas E. Comer, David L. Stevens, Michael Evangelista , Pearson Education Asia,2000

MTCSTCN 2.5 Elective III MULTI MEDIA NETWORKS

Instruction: 3 Periods/week
Internal: 30 Marks

Time: 3 Hours
External: 70 Marks

Credits: 4
Total: 100 Marks

- 1 INTRODUCTION TO MULTIMEDIA: Basics of multimedia data types; Basics of multimedia compression technologies; JPEG, MPEG, Multimedia communications

- 2 MULTIMEDIA INFORMATION REPRESENTATION: Introduction to Information Theory, information of a source, average information of a discrete memory less source, source coding for memory less sources; Multimedia compression – text, image, audio, video (Standards: JPEG/JPEG-2000, G.723, MPEG-4/H.264L)

- 3 STANDARDS FOR MULTIMEDIA COMMUNICATIONS: Issues in Multimedia Transmissions and protocols; audio and video streams; Packet video in the Network environment;

4. Transport protocols – An Overview of TCP/IP; overview of UDP/IP; RTP and RTCP, RTSP; voice over IP, multicast, video conferencing, anycast, service redirection, QoS; Error resilience.

- 5 An overview of Circuit-switched networks, Enterprise Networks , Broadband ATM Networks

6. Entertainment Networks and High-Speed Modems, Application Support Functions

7. Digital Multimedia Broadcasting: Standards, Moving from DVB-T to DVB-H, T=DMB Mutimedia broadcasting for Portable Devices(chapter 6 of Ref.Book)

TEXT BOOK : Fred Halsall , Multimedia Communications: Applications, Networks, Protocols and Standards, Addison Wesley, 2001

REFERENCE BOOK: Multimedia Networking: From Theory to Practice Jenq-Neng Hwang
Cambridge University Press, 2009

MTCSTCN 2.5 Elective III PERFORMANCE ANALYSIS OF NETWORK ARCHITECTURES

Instruction: 3 Periods/week

Time: 3 Hours

Credits: 4

Internal: 30 Marks

External: 70 Marks

Total: 100 Marks

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1. Introduction: Term Definitions, Parallel System Architecture, Distributed System Architecture, Network Architecture
 2. Characteristics of Network Architectures :Switching Techniques, Traffic Patterns , Wired Network Architectures, Wireless Network Architectures , Network-on-Chip Architectures
 3. Performance Evaluation:Numerical Simulation , Markov Chains , Petri Nets
 4. Model Engineering: Model Development , Complexity Reduction , Automatic Model Generation
 5. Application: Cellular Network, USAIA Framework, Petri Net Model , Model Engineering and Performance
 6. Application: Multistage Interconnection Network: Simulation: Petri Nets ,
 7. Simulation: MINSimulate . Mathematical Model: Complexity Reduction

TEXT BOOK:

Tutsch, Dietmar, Performance Analysis of Network Architectures, Springer, 2006

MTCSTCN2.5

Instruction: 3 Periods/week

Internal: 30 Marks

Elective-III Network Technologies

Time: 3 Hours

External: 70 Marks

Credits: 4

Total: 100 Marks

1. **Layer 3 Switching:** Layer 3 switching approaches, Layering aspects, Relieving Network Congestion, Comparing Routers and switches, Concepts of label switching and its techniques.
2. **Frame relay WAN protocol:** Protocol architecture, Frame relay virtual circuits, Data flow in Frame relay, Frame relay network implementation.
3. **Fast Ethernets:** Gigabit Ethernet, Alternative to high speed transmission, Fiber today UIP tomorrow, Quality of service on Ethernet.
4. **ISDN:** ISDN definition, working principles, internet accessing, ISDN standards, ISDN evolution. **ATM:** Working operations, multicasting in ATMs, ATM signaling and addressing.
5. **Voice Technologies:** SS7, VoIP, Current and future telephony trends.
6. **Future trends in IP technology:** Introduction to SONET and its architecture, IP-Over-SONET,
7. Backbone architecture, Tunneling with Virtual Private Networks.

TEXT BOOK: Network Administration by Steve Wisniewski, Pearson Education Asia, 2001

REFERENCE BOOK: Upgrading and repairing Networks by Scott Mueller, 5th Edition,

Pearson Education Asia, 2005

MTCSTCN2.6 Elective IV Mobile Computing

common for 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, 3GNetworks 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:

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

MTCSTCN 2.6 ELECTIVE-IV

INTERNET OF THINGS

Instruction: 3 Periods/week
Internal: 30 Marks

Time: 3 Hours
External: 70 Marks

Credits: 4
Total: 100 Marks

1) Introduction to the internet of things. IoT Architecture: History of IoT, M2M – Machine to Machine, Web of Things, IoT protocols

The Architecture The Layering concepts , IoT Communication Pattern, IoT protocol Architecture, The 6LoWPAN

2) prototyping connected objects. Open-source prototyping platforms.

3) Integrating internet services. XML and JSON. HTTP APIs for accessing popular Internet services (Facebook, Twitter, and others). Practical activities. IoT Application Development: Application Protocols MQTT, REST/HTTP, CoAP, MySQL

4. Overview of IoT supported Hardware platforms such as: Raspberry pi, ARM Cortex Processors, Arduino and Intel Galileo boards.

5. ubiquitous computing, applications of IOT, Virtualization of network resources and physical devices in IOT.

6. Internet of Things Standardisation M2M Service Layer Standardisation OGC Sensor Web for IoT

TEXT BOOK

1.. Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems

author . MARINA RUGGIERI H, RIVER PUBLISHERS SERIES IN COMMUNICATIONS

MTCSTCN 2.6 Elective-IV NETWORK MANAGEMENT SYSTEM

Instruction: 3 Periods/week
Internal: 30 Marks

Time: 3 Hours
External: 70 Marks

Credits: 4
Total: 100 Marks

1. Data Communication and Network management overview, Review of computer networks technologies
2. Basic foundations: Standards, Models, and language
3. SNMPv1 N/W management: organization and information models, SNMPv1 N/W management: Communication and Functional models
4. SNMP management: SNMPv2, SNMP management: SNMPv3, SNMP management: RMON(Remote Monitoring)
5. Broadband N/W management: ATM N/W, Access N/W,
6. Telecommunication N/W management:
7. N/W management tools and systems
8. N/W management applications, Web based management

TEXTBOOK:

1. Network Management: Principles and Practice, Mani Subramanian, Georgia Institute of Technology, Pearson Education Asia, 2000
2. Network Management Fundamentals, Alexander Clemn CISI Press 2007

VIRTUAL PRIVATE NETWORK**Instruction: 3 Periods/week****Time: 3 Hours****Credits: 4****Internal: 30 Marks****External: 70 Marks****Total: 100 Marks**

1. Introduction and Basics VPN Technologies

Introduction, Security Risks of the Internet , VPNs and Internet Security Issues, VPN Solutions, A Note on IP Address and Domain Name Conventions, Firewall Deployment, Encryption and Authentication , VPN Protocols, Methodologies for Compromising VPNs, Patents and Legal Ramifications

2. Implementing Layer 2 Connections

General WAN, RAS, and VPN Concepts, VPN Versus WAN, VPN Versus RAS, Differences Between PPTP, L2F, and L2TP, How PPTP Works, Features of PPTP

3. Configuring and Testing Layer 2 Connections

Installing and Configuring PPTP on a Windows NT RAS Server, Configuring PPTP for Dial-up Networking on a Windows NT Client, Configuring PPTP for Dial-up Networking on a , Windows 95 or 98 Client, Enabling PPTP on Remote Access Switches , Making the Calls , Troubleshooting Problems, Using PPTP with Other Security Measures

4. Implementing the AltaVista Tunnel 98

Advantages of the AltaVista Tunnel System, AltaVista Tunnel Limitations , working of AltaVista Tunnel Works, VPNs and AltaVista , Installing the AltaVista Tunnel, Configuring the AltaVista Tunnel Extranet and Telecommuter Server, Configuring the AltaVista Telecommuter Client, Troubleshooting Problems

5. Creating a VPN with the Unix Secure Shell

The SSH Software, Building and Installing SSH , SSH Components , Creating a VPN with PPP and SSH, Troubleshooting Problems , A Performance Evaluation

6. The Cisco PIX Firewall

The Cisco PIX Firewall, The PIX in Action , Configuring the PIX as a Gateway, Configuring the Other VPN Capabilities

7. Managing and Maintaining VPN and its Scenario

Choosing an ISP, Solving VPN Problems , Delivering Quality of Service , Security Suggestions , Keeping Yourself Up-to-Date, A VPN Scenario: The Topology , Central Office Large Branch Office, Small Branch Offices, Remote Access Users

Text Book:

1. Virtual Private Networks, Charlie Scott, Paul Wolfe and Mike Erwin , O'Reilly Publisher, Second Edition January 1999

MTCSTCN 2.7

Instruction: 3 Periods/week

Internal: 50 Marks

Wireless Networks LAB.

Time: 3 Hours

External: 50Marks

Credits: 2

Total: 100 Marks

The following Lab experiments are aimed at providing hands-on experience of wireless networking in the real-world such as the Wireless LAN for Indoor Application and Point to point Wireless Connectivity for outdoor application after a brief Introduction to the environment of Wireless Networking Lab. for familiarization of Wireless Networking Hardware/Software Environment

Lab.1: Wireless LAN set-up for Ad-hoc/Infrastructure Mode

Installing and Configuring WLAN Components with Minimum of Three minimally Configured IBM Compatible PCs with Wireless Network Interface Cards(NICs)

Lab.2: Wireless LAN set-up for Access Point/Bridge Mode

Installing and Configuring WLAN Components with Minimum of Three minimally Configured IBM Compatible PCs with Wireless NICs & One Access Point

Lab.3: Experiments based on Wireless Security for Ad-hoc/Infrastructure Mode WLAN

With Minimum of Three minimally Configured IBM Compatible PCs with Wireless NICs

Lab.4: Experiments based on Wireless Security for Access Point/Bridge Mode WLAN

With Minimum of Three minimally Configured IBM Compatible PCs with Wireless NICs and One Access Point

Lab.5: Integration of Ad-hoc mode WLAN with existing Network.

Lab.6: Integration of Access-Pont mode WLAN with existing Network.

Lab.7: Experiment on tuning of output power to increase or decrease the Band width in Ad-hoc mode WLAN

Lab.8: Experiment on tuning of output power to increase or decrease the Band width in Access-Pont mode WLAN

Lab.9: Point to point Wireless Connectivity for outdoor application with Two Wireless Bridges and relevant accessories

Lab.10: Experiments based on Bluetooth Technology with Bluetooth Training system

MTCSTCN 2.8

Instruction: 3 Periods/week

Internal: 50 Marks

PROTOCOL DEVELOPMENT LAB.

Time: 3 Hours

External: 50Marks

Credits: 2

Total: 100 Marks

1. Physical Layer - RS-232 communication, Serial,Canonical,Non-Canonical
 - a. Demonstration of serial communication and to achieve it by enabling or disabling flags.
 - b. Change baud rate, parity bits, stops bits and repeat expt 1.
 - c. To setup canonical processing using the interface by enabling or disabling flags.
 - d. To explore c_iflag and explore them.
 - e. To setup Noncanonical processing using the interface by enabling or disabling flags.
 - f. To explore c_cflag and explore them.

2. Data Link Layer: Error and Flow control, Stop and wait,Sliding window
 - a. Content Error control mechanism.
 - b. Flow integrity error control mechanism

3. Sliding Window
 - a. Content error control mechanism using selective retransmission
 - b. Content error control mechanism using Go-back N.

3. Network Layer – To study the concept of Network Layer
 - a. Error and flow with the ICMP:
 - b. PING Program: The ping program is used to test, measure and manage a network.

4. Transport Layer – To study TCP connection oriented and UDP connectionless protocol.
 - a. TCP Server and client.
 - b. UDP Server and Client.

- 5.Applications Layer - Hyper Text Transfer Protocol (HTTP) Operation

MTCSTCN 2.9 SEMINAR ON ADVANCED TOPICS

Practical: 3 Periods /week

Internal Assessment Marks: 100

Credits:2

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
