COMPUTER SYSTEM SOFTWARE

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTCE- 601

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

Introduction to object oriented programming and object oriented design.

Concepts of Class, Object, abstraction, encapsulation, data hiding and implementation hiding, function overloading.

Inheritance, constructor, destructor, function overriding, virtual functions, templates.

Introduction of UML: class diagram, instance diagram, interaction diagram, sequence diagrams, collaboration diagrams, activity charts, use case diagrams, component diagrams, Deployment diagrams.

Symptoms of Software rot: Rigidity, Fragility, immobility, viscosity, open class principle, Liskov's substitution principle, Interaction segregation, Dependency Inversion principle.

System software design issues. Language translators, assemblers, linkers and loaders. Run-time environment management.

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTCE-603

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

Regular expression and regular sets, nondeterministic and deterministic finite automata, mutual conversion between regular expression and finite automata, equivalence of finite automata, closure properties of regular sets, pumping lemma for regular sets and its applications.

Context free grammar, possible defects in grammar and their removal, ambiguity in grammar, Chomsky and Greibach normal formal form, Push down automata(pda), two types of acceptance by pda, design of push down automata corresponding to a grammar, pda, LL(k) parsing ,bottom up and top down parser design using.

Chomsky classification of languages, introduction to the working of Turing Machine(TM), Linear bound automata (LBA) and Post Machine, Role of TM as language recognizer, computer for integers and enumerator and associated design problems, multitrack and multitape TM, Space and time complexity of TM, binary coding of TM, Universal Turing Machine, Recursive and recursively enumerable languages, halting problem of TM, Decision problems and Rice's Theorem, Post Correspondence Problem.

Refrences:

1. "Introduction to automata theory Language and Computation", J.E. Hopcroft, R. Motwani, J.D. Ullman, Pearson education.
2. "Theory of computer Science: Automata Language and Computation", K.L.P Mishra and Chandrasekaran, Prentice Hall of India.
3. "Introduction to Computer Theory", D.I.A Cohen, Willey India.
4. "Introduction to Languages and the Theory of Computation",John C. Martin, Tata McGraw Hill

SOFTWARE TESTING

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTCE- 605

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

Unit 1 Introduction

Definition pf testing, goals, psychology, model for testing, effective testing, limitations of testing, Importance of Testing.

Unit 2 Testing terminology and Methodology

Definition of Failure, faults or bug, error, incident, test case, test ware, life cycle of bug, bug effects, bug classification, test case design, testing methodology, development of test strategy, verification, validation, testing life cycle model, testing techniques, testing principles,Testing Metrices.

Unit 3 Verification and validation

Verification activities, verification of requirements, verification of HL design, verification of data design, verification of architectural design, verification of UI design, verification of LL design, introduction to validation activities

Unit 4 Black Box testing

Boundary value analysis, equivalence class portioning, state table based testing, decision table based, grappling, error guessing.

Unit 5 White Box testing

Logic coverage criteria, basic path testing, graph matrices, loop testing, data flow testing, mutation testing

Unit 6 Static testing

Types of static testing, technical reviews, inspections, inspection process, structured walk through, walk through process, adv. Of static testing

Unit 7 Validation Testing

Unit testing, drivers , stubs, integration testing, methods, effect of module coupling and cohesion, functional testing, system testing, recovery testing, security testing, stress testing, performance testing, usability testing

Unit 8 Test Automation and debugging

S/w measurement and testing, testing metrics, tools debugging, debugging techniques, design of practical test cases, reducing no. of test cases, Progressive vs. regression

testing and test case mgmt, Regression Testability, Regression Testing Techniques.

Unit 9 Testing Web-based Systems
Web-based System, Web Technology Evolution, Challenges in testing for Web-based Software, testing of Web-based Systems.

Text books:-

1. G.J Myers, The Art of Software Testing, John Wiley & Sons, 1979
2. Naresh Chauhan,Software Testing Principles and Practices,OXFORD University Press.

INFORMATION RETRIEVAL SYSTEMS

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTCE-607(A)

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

Unit 1 Introduction to Information Retrieval

Information retrieval problem, an inverted index, Processing Boolean queries, The extended Boolean model versus ranked retrieval, an inverted index, Bi-word indexes, Positional indexes, Combination schemes

Unit 2 Index construction

Hardware basics, Blocked sort-based indexing, Single-pass in-memory indexing, Distributed indexing, Dynamic indexing, Other types of indexes

Index compression: Statistical properties of terms in information retrieval, Heaps' law: Estimating the number of terms, Zipf's law: Modeling the distribution of terms, Dictionary compression, Dictionary as a string, Blocked storage, Postings file compression.

Unit 3 Scoring, term weighting and the vector space model

Parametric and zone indexes, Weighted zone scoring, Learning weights, The optimal weight, Term frequency and weighting, Inverse document frequency, Tf-idf weighting, The vector space model for scoring, Variant tf-idf functions.

Unit 4 Computing scores in a complete search system

Efficient scoring and ranking, Inexact top *K* document retrieval, Index elimination, Champion lists, Static quality scores and ordering, Impact ordering, Cluster pruning, Components of an information retrieval system, Tiered indexes

Unit 5 Web search basics

Background and history, Web characteristics, The web graph, Spam, Advertising as the economic model, The search user experience, User query needs

Crawling, Crawler architecture, DNS resolution, The URL frontier, Link analysis, The Web as a graph, Anchor text and the web graph, PageRank, Markov chains, The PageRank computation, Topic-specific PageRank

Unit 6 Language models for information retrieval

Language models, Finite automata and language models, Types of language models, Multinomial distributions over words, The query likelihood model, Using query likelihood language models in IR, Estimating the query generation probability, Language modelling versus other approaches in IR

REAL TIME SYSTEMS

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTCE-607(B)

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

Unit I Embedded Systems

What is an embedded system? Categories: Stand-alone, Real-time, Networked appliances, mobile devices. Requirements of Embedded systems, Challenges and issues in Embedded software development. Embedded Software Development Tools: Host and Target machines, Linker/ locators for embedded software, Getting embedded software into target system.

Unit II Real Time Embedded systems

Definition, characteristics, classification, release times, deadlines and timing constraints, temporal parameters of real-time workload, periodic task model, issues involved in real time system design.

Unit III Real Time Operating Systems

Typical structure of an RTOS, Scheduling strategies, priority structures, task management, memory management, code sharing, task co-operation and communication, interrupt routines in an RTOS environment, mutual exclusion, Liveness, Minimum operating system Kernel, capabilities of commercial RTOS: VxWorks, pSoS, Micro C/OS II.

Unit IV Task assignment and Scheduling

Allocation / Scheduling problem, offline scheduling, online scheduling, pre-emptive / non-pre-emptive scheduling, static / dynamic scheduling, Rate-monotonic scheduling algorithm, problem of priority inversion, priority inheritance protocol, priority ceiling protocol, earliest-deadline-first scheduling algorithm

Unit V Real-Time Language Issues

Real-time language requirements, data typing, control structures, facilitating hierarchical decomposition, synchronization, packages, exception handling, overloading and generics, multitasking, low-level facilities,

Unit VI Fault-Tolerance Techniques

Fault types, fault detection measures, fault detection mechanisms, fault and error containment, Redundancy: Hardware and software redundancy, time redundancy.

Unit VII Case Study of RTLinux and VxWorks RTOS

References:

1. Programming for Embedded systems by Dreamtech software team, Wiley Dreamtech India Pvt. Ltd.
2. Embedded Realtime systems programming, by Sriram V. Iyer and Pankaj Gupta, TMH
3. Realtime computer control by Stuart Bennett, Pearson Education
4. Real time systems by C. M. Krishna, McGraw-Hill
5. Embedded Systems by RajKamal, TMH

Software Project Management

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTCE-602

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

Unit I Project Management Concepts

Management Spectrum, People, Product, Process, Project, W5HH Principle.
Problems with software projects, project management and CMM, project management process: planning, execution and closure. Stepwise overview of project planning

Unit II Software Project Planning

Programme management and project evaluation, Project planning objectives, project planning infrastructure, process planning, effort estimation models, estimation techniques: Function Point Analysis, COCOMO, Use case point analysis. Activity planning: project schedules, projects and activities, network planning models, activity on node & activity on arrow networks.
Risk Management: identification, assessment and projection, control, RMMM plan, Measurement and tracking planning, Configuration management: baselines, configuration items, configuration process, version control, change control, configuration audit, SCM standards

Resource allocation: nature of resources, scheduling resources,

Unit III Project Execution and Closure

Project reporting structures, categories of reporting, collecting the data: partial completion reporting, risk reporting. Visualizing progress: Gantt chart, Slip chart, Ball charts, Timeline charts. Earned value analysis, Prioritizing monitoring, Project tracking, Milestone analysis, Cost impact of software defects, Defect amplification and removal, Defect analysis and prevention.
Project Closure analysis: role of closure analysis, performing closure analysis, closure analysis report

Unit IV Software Quality Assurance

Project management vs quality management, quality concepts, Inspection and Reviews: process, data collection, monitoring and control. Statistical SQA, SQA plan, quality metrics, ISO 9000 standard, BS 6079:1996 standard

Case Study: Software Project Management in CMM level 5 organizations

Text Books:

1. Software project management by Bob Hughes and Mike Cotterell, TMH
2. Software project management in practice by Pankaj jalote, Pearson Education

References:

1. Software Engineering by R.S. Pressman, McGraw Hill
2. Software Testing: Principles and practices by Naresh Chauhan, Oxford University press, India

RESOURCE MANAGEMENT IN COMPUTER SYSTEMS

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTCE-604

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

Historical perspectives, interrupt mechanism, concurrent processes; mutual exclusion and synchronization, system calls and protection; context switching and the notion of a process and threads; synchronization and protection issues; scheduling; memory management including virtual memory and paging techniques; i/o architecture and device management; file systems; distributed file systems; deadlock detection and protection. Case studies. Laboratory experiments on internals of Linux, Windows NT.

References

1. “Operating Systerm Internals & Design Principles”, William Stallings, PHI
2. “Operating Systems: Advance Concepts”, Mukesh Singhal & N G Shivratri, Tata McGraw Hill
3. “Operating System Concepts”, Dhamdhere, TMH

SOFT COMPUTING

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTCE-606

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

Neural Networks: History, overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perception Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks.

Fuzzy Logic: Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation.

Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations.

Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

Fuzzy Logic: Classical Logic, Multivalued Logics, Fuzzy Propositions, Fuzzy Qualifiers, Linguistic Hedges.

Uncertainty based Information: Information & Uncertainty, Nonspecificity of Fuzzy & Crisp Sets, Fuzziness of Fuzzy Sets.

Genetic Algorithms, Scope & application areas, solution of 0-1Knapsack problem using GA

Refrences:

1. “Fuzzy sets and Fuzzy Logic: Theory and applications”,G.J. Klir,B.Yuan, PHI
2. “Introduction to Fuzzy sets and Fuzzy Logic”, M.Ganesh , PHI
3. “An Introduction to Fuzzy Control”, D Driankov, H Hellendoorn, M Reinfrank, Narosa Publishing Company
4. “ Neural Networks: A classroom approach”, Satish Kumar , Tata McGraw Hill
5. Haykin S., “Neural Networks-A Comprehensive Foundations”, Prentice-Hall International, New Jersey, 1999.
6. Anderson J.A., “An Introduction to Neural Networks”, PHI, 1999

ANALYSIS & DESIGN OF ALGORITHMS

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTCE-608(A)

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

Unit 1: Analyzing Algorithms & Problems
Introduction to algorithms, Time and Space Complexity, Basic elements of data structures like linked lists, stacks and queues, trees, graphs, recursion. Different types of sorting algorithms and their complexities

Unit 2: Dynamic Sets, Searching and Graphs
Introduction, Array, amortized time analysis, red black trees, hashing, heaps, dynamic equivalence relations and union-find programs, priority queues with decrease key operations, traversing graphs, DFS, strongly connected components, biconnected complaints, minimum spanning tree algo., single source shortest paths, all pair shortest paths

Unit 3: Greedy and Dynamic Methods
Intro. to greedy and dynamic methods, their algorithms, and comparative study

Unit 4: Backtracking and Branch – and – Bound
General backtracking and Branch and Bound Methods, 8 queen, sum of subset, graph coloring, Hamilton cycles, 0/1 knapsack problem

Unit 5: NP – Hard and NP Complete problems
Basic Concepts, cooks theorem, NP – Hard graph problems, NP hard Scheduling.

Unit 6: Parallel Algorithms
Intro., parallelism, PRAM and other models, some simple PRAM algorithms, handling write conflicts, Merging and Sorting, Finding Connected Components.

Unit 7: Approximation Algorithms
Intro., Absolute Approximation, e-approximation, polynomial time approximation schemes, fully polynomial time approximation schemes. String matching algorithms

SOFTWARE METRICS

No. of Credits: 4	Sessional: 40 Marks
L T P Total	Theory: 60 Marks
4 0 0 4	Total : 100 Marks
	Duration of Exam: 3 Hours

MTCE-608(B)

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

Introduction:

What is measurement and why do it? Measurement in software engineering, scope of software metrics.

The Basics of Measurement:

Representational theory, Measurement & Models, Measurement Scales and Scale Types, Meaningfulness in Measurement

A Goal Framework for Software Measurement:

Classifying software measures, Determining what to measure, Applying the framework

Empirical Investigation & Data Collection:

Four Principles of Investigation, Planning formal experiments, What is good data, How to define the data, How to collect data, When to collect data.

Analyzing Software Measurement Data:

Analyzing the results of experiments, Analysis Techniques, Overview of statistical tests.

Measuring Internal Product Attributes, Size and Structure:

Aspects of Software Size, Length, Reuse, Functionality, Complexity, Types of Structural Measures, Modularity and information flow attributes, Object Oriented Metrics

Measuring External Product Attributes:

Modeling Software Quality, Measuring aspects of quality

Measurement and Management:

Planning a measurement program, Measurement in practice, empirical research in software engineering.

Text Books:

1. Norman E. Fenton & Shari Lawrence Pfleefer, “Software Metrics”, Thomson Computer Press, 1996.

KNOWLEDGE BASED SYSTEM DESIGN

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTCE-701

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

Basics of AI, Introduction to Agents, Knowledge representation, logic semantic tableau and resolution, semantic nets, parallel implementation of semantic nets, partitioned nets, augment transition nets, Frames. Architecture of knowledge based system design, forward and backward chaining, rule based systems. Frame based systems. Search, techniques. Software/hardware support for knowledge base systems. Expert system shells, Fuzzy expert systems, Inference machines, AND/OR parallelism. Case studies.

ADVANCED DBMS

No. of Credits: 4	Sessional: 40 Marks
L T P Total	Theory: 60 Marks
4 0 0 4	Total : 100 Marks
	Duration of Exam: 3 Hours

MTCE-703

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

Unit 1: Introduction: DBMS Architecture and Components, Advantages and Disadvantages; Data models: ER, EER, Network, Hierarchical and Relational data models; Normalization and de-normalization.

Unit 2: Query Processing: General strategies for query processing, query processor, syntax analyzer, Query decomposition, Heuristic Query optimization, Cost estimation.

Unit 3: Transactions, Concurrency control and Recovery: Transaction concept, Anomalies due to interleaved executions, schedules, precedence graph method for serializability, Lock thrashing, phantom problem; Concurrency control protocols: locking schemes, optimistic scheduling, multi-version techniques; reflecting updates: logging schemes and checkpoints.

Unit 4: Object Oriented Database Development: Basic concepts, Object oriented data model, ER Vs OODM, Characteristics, advantages and disadvantages of OODBMSs, Object definition language, Object query language.

Unit 5: Object Relational Databases: Introduction, Basic concepts, History, ORDBMS query language: enhanced SQL (SQL3), advantages and disadvantages of ORDBMS, Challenges of ORDBMS, and Comparison with OODBMS.

Unit 6: Parallel and Distributed Databases: Basic concepts, architectures, parallelization of operations, Methods for data distribution: fragmentation and replication, catalog management, Distributed query processing: semi-joins and bloom-joins.

Unit 7: Databases for Advanced Applications: Data warehousing systems, Data warehouse Vs DBMS, architecture, Data mining systems, KDD process, temporal database concepts, spatial databases, multimedia databases, Web databases, Information retrieval and XML.

References:

1. An Introduction to database systems by Bipin C. Dcsai, Galgolia Publications.
2. Modern Database Management by Feffray A. lioffcr, Mary B. Prcscotl, Fred R Mcfaddcn, 6th edition. 1..1MI Pcarson Education.
3. Principles of distributed database systems, by M. Tamer & Valduricz, 2" edition, LPE Pearson education.
4. Database system concepts by Korth, Silberchatz, Sudarshan, McGraw Hills
5. Raghu Ramakrishnan, Johannes Gehrke, Database Management Systems [3e], McGraw-Hill
6. Database systems:concepts, design and applications by S.K. Singh, Pearson education, 2009

SYSTEM AND NETWORK ADMINISTRATION

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTCE-705

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

Unit 1: N/w Administration
Intro. to networks, TCP/IP model, IP addressing, Subnetting, NAT, VLAN. Basic Concepts of proxy server, webserver, DNS, Firewall, Router, Mail Server and their respective configuration settings. Various Interconnecting Devices: Hub, Switch, Bridges, Routers, Gateway, repeater, brouter. Knowledge about various network related commands: ping, netstat, tracert, traceroute, ifconfig, ipconfig etc.. Steps followed in establishing a network

Unit 2: Security
Concept of security, its need, issues, cryptography techniques:- ciphers, substitution cipher, transposition, symmetric key algorithms like AES, DES, public key algo's like RSA, Authentication algorithms , IPSEC, VAN, Digital signatures, IDS, Firewall. Types of attacks, access control list, filtering rules

Unit 3 Host Administration
Intro. to system Administration, what are the necessary issues to be tackled in host management, installation of unix, linux,windows OS, formatting, file systems like FAT , NTFS, ETC., Booting process in various OS, User accounts, group accounts, passwords, shadow passwords, directory structure of various OS. Process, ps, zombie process, backup, recovery, commands like tar, zip etc. , performance analysis of host machine and how to improve the systems performance

Unit 4 Knowledge of UNIX commands: directory related files, disk related commands, File related commands, I/O redirection and piping, Unix editor vi, Process related commands, communication related commands, Printing related commands, Programming in the Borne and C-Shell; Wild cards; Simple shell programs; Shell variables; Shell programming constructs; interactive shell scripts; Decision structures in shell, Loop Control structure. Role and functions of a system manager, adding and removing users, starting up the system, shutting the system down, Disk management: mounting and unmounting file system, maintaining user accounts.
AWK utility
References :

1. Practice of System and Network Administration, The (2nd Edition) by Thomas A. Limoncelli, Christina J. Hogan, and Strata R. Chalup.
2. Principles of Network and System Administration by Mark Burgess.

MOBILE AND WIRELESS COMMUNICATION

No. of Credits: 4	Sessional: 40 Marks
L T P Total	Theory: 60 Marks
4 0 0 4	Total : 100 Marks
	Duration of Exam: 3 Hours

MTCE-707(A)

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

Introduction
Applications, history, market, reference model and overview. Wireless Transmission— Frequencies, signals, antennas, signal propagation, multiplexing, modulation, spread spectrum, cellular system

MAC and Telecommunication system:
Specialized MAC, SDMA, FDMA, TDMA- fixed TDM, classical ALOHA, slotted, ALOHA, CSMA, DAMA, PKMA, reservation TDMA. Collision avoidance, polling inhibit sense multiple access.('DM A, comparison, CSM- mobile services, architecture radio interlace, protocol, localization, calling, handover, security, new data services, Introduction to W'LL.

Satellite and Broadcast Systems:
History, Applications, GLO, LLO, MLO, routing, localization , handover in satellite system. Digital audio and video broadcasting.

Wireless LAN:
IEEE 802.11-System and protocol architecture, physical layer. MAC layered
management. Bluetooth--- User scenarios, physical layer, MAC layer, networking, security and link management.

Mobile network Layer:
Mobile IP- goals, assumption, requirement, entities, terminology, IP packet delivery, Agent advertisement and discovery, registration, tunneling, encapsulation, optimization ,
reverse tunneling, IPV6.

DHCP. Adhoc Networks- routing , destination sequence distance vector, dynamic source routing, hierarchical algorithm, alternative metric.

Mobile Transport Layer:
Traditional TCP, Indirect 'TCP, Snooping 'TCP, Mobile TCP fast retransmission recovery, transmission/time out freezing, selective retransmission, Transaction oriented TCP. .

Support for Mobility:
File System, WWW-HIT, HTML, system architecture. WAP — architecture, wireless

datagram, protocol, wireless transport layer security, wireless transaction protocol, application environment, telephony application.

References:

1. Jochen Schiller," Mobile Communication" , Pcarson Education,2002
2. Lee, " Mobile Cellular Telecommunications" McGRAW- WIL

SECURITY OF INFORMATION SYSTEMS

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTCE-707(B)

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

Unit-1 Basic Encryption and Decryption: introduction to Ciphers, Monoalphabetic Substitutions such as the Caesar Cipher, Cryptanalysis of Monoalphabetic Ciphers, Polyalphabetic Ciphers such as Vigenere Tableaux, Cryptanalysis of Polyalphabetic Ciphers, Perfect Substitution Cipher such as the Vernam Cipher, Stream and Block Ciphers..

Unit-2 Properties of Arithmetic Operations: Inverses, Primes, Greatest Common Divisor, Euclidean Algorithm, Modular Arithmetic, Properties of Modular Arithmetic, Computing the inverse, Fermat's Theorem, Algorithm for Computing Inverses, Random number generation.

Secure Secret Key (Symmetric) Systems: Data Encryption Standard (DES), Analyzing and Strengthening of DES, Advance Encryption Standard (AES)

Public Key (Asymmetric key) Encryption Systems: Concept of Public key Encryption System, Introduction to Merkle-Hellman Knapsacks, Rivest-Shamir-Adelman (RSA) Encryption, Digital Signature Algorithms (DSA)

Hash Algorithms: Hash Concept, Description of Hash Algorithms , Message Digest Algorithms such as MD4 and MD5 , Secure Hash Algorithms(SHA) .

Unit–3 Applied Cryptography, Protocols and Practice: Key Management Protocols: Diffie-Hellman Algorithm, Key Exchange with Public Key Cryptography.

Public Key Infrastructure (PKI): Concept of Digital Certificate, Certificate Authorities and it's roles, X509 Structure of Digital Certificate.

Unit-4 Network Security Practice: Authentication Applications- Kerberos, X.509 Authentication Service; Electronic Mail Security- Pretty Good Privacy, S/MIME;

IP Security: IP Security Overview,IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations;

Web

Security: Web Security Considerations, Secure Sockets Layer and Transport Lay er Security, Secure Electronic Transaction

Unit–5 Operating System, Database and Program Security: Operating Systems Security: Security Policies, Models of Security, Security Features of Ordinary and trusted Operating System.

Database Security: Security Requirements of Databases, Reliability and Integrity, Protection of Sensitive Data.

Program Security: Kinds of Malicious Code, Virus Signatures, Preventing Virus Infection, Trapdoors, Convert Channels, Control Against Program Threats.

Reference Books:

1. William Stalling, Cryptography and Network Security, 3rd Edition. PHI New Delhi
2. William Stalling, Network Security Essentials, 2nd Edition. PHI New Delhi
3. Charlie Kaufman, Network Security: Private Communication in Public World, 2nd Edition PHI, New Del

Pattern Recognition

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTIT-607(A)

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

Unit 1: Introduction and Bayerian Decision Theory
Introduction to pattern recognition, Systems, design cycles, learning and adoptation, Bayerian decision theory, minimum error-rate classification, classifiers, discriminant functions and decisions surfaces.

Unit II: Maximum – Likelihood and Bayesian parameter estimation
Maximum – Likelihood estimation, bayerian estimation, bayerian parameter estimation,Guarian case and general theory, problems of dimeusability, Hidden marker models.

Unit III: Nonparameter Techniques
Density estimation, parazen windows, Kn – Nearest neighbour, estimation, The nearest neghlaur, rode, metris and nearest – neghron, classification, fuzzy classification, approximation by series expansions.

Unit IV: Linear Discriminant functions:
Linear discriminant functions and decision surfaces, generadized linear discrminant functions, The two category unicorly separate case, minimizing the perception criterion function, relaxation procedures, nonrepersable behaviour, Minimum squared-error procedures, The Ho – Kashyap Procedures, support vexter machines, multicategory generatization.

Unit V: Multilayer Neural Networks
Feed forward operations and classifications, back propagation algorithm, error factors, back propagation as feature & mapping, back propagation, bayer theory and probability, practical techniques for improving back propagation, regularization, complexity adjustment and pruning.

Unit VI: Stochastic methods: Stochastic search, Boltzman learning, boltzman networks of graphical models, evolutionary methods, genetic progrances.

Unit VII: Unsuperversed learning and clustering mixture densities and identificability, maximum, likelihood estimation, application to normal mixtures, unemperouses, Bayerian Learning, Data descriptions and controls, criterion function for clusterian, interface, optimization, hierarchical clustering, component analysis, low dimensial representation and multidimensional scaling.

Text / References:

1. Richard O. Duda, Peter E. Hart and David G. Stork, “Pattern Classification” 2nd Edition, John Wiley

2. John Hertz, Andres Krogh & Richard G. Palmer, “Introduction to the theory of Neural Computation”, Addison Wesley

Data Mining

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTIT-602

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

Unit-1: **Introduction to Data Warehouse**: Data warehousing Definition, DBMS vs data warehouse, Three-tier architecture, Multidimensional data model, Schemas for Multidimensional Databases, OLAP operations, multi-feature cubes.

Unit-2: **Introduction to Data Mining**: Data mining definition & task, KDD process, KDD versus data mining, data mining tools and applications, issues, data mining task primitives, supervised and unsupervised learning approaches, Data preprocessing.

Unit-3: Mining Association rules: The a-priori algorithm, generating rules, improving the efficiency of a-priori; rule mining by partitioning; Parallel and Distributed algorithms: CDA & DDA; advanced techniques: multi-dimensional and multi-level association rules, correlation rules; meta-rule guided mining and constraint based rule mining, Incremental rule mining.

Unit 4: Clustering techniques: Cluster analysis, similarity and distance measures, partitioning methods: squared error, k-means, k-medoids and genetic algorithm approach; Hierarchical Clustering: agglomerative Vs Divisive, Density based methods: Basic definitions and DBSCAN algorithm; Constraint based clustering.

Unit 5: Classification and Prediction
Classification by Decision tree induction: information gain measure, Tree pruning methods, Bayesian classification, rule based classification, backpropagation through Neural Networks, Genetic Algorithm, Rough Sets, Support Vector Machines and Fuzzy techniques; Prediction: linear and non-linear regression techniques.

Unit 6: Recent trends and Web Mining: Mining of Complex Data Objects, Spatial Databases, Temporal Databases; Web Mining, categories of web mining: web structure mining, web content mining and web usage mining, kinds of knowledge discovered in web mining.

Reference books

- Data Mining: Introductory and advanced topics: Margaret H Dunham, S. Sridhar; Pearson education, 2008.
- Data Warehousing In the Real World; Sam Anahory & Dennis Murray; 1997, Pearson.
- Data Mining- Concepts & Techniques; Jiawei Han & Micheline Kamber- 2001, Morgan Kaufmann.

- Data Mining Techniques; Arun Pujar; 2001, University Press; Hyderbad.
- Data Mining; Pieter Adriaans & Dolf Zantinge; 1997, Pearson,
- Data Warehousing, Data Miniing and OLTP; Alex Berson, 1997, Mc Graw Hill.
- Data warehousing System; Mallach; 2000, Mc Graw Hill.

Bluetooth Technology

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTIT-606(A)

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

Introduction to wireless technologies: WAP services, Serial and Parallel Communication,
Asynchronous and synchronous Communication, FDM,TDM, TFM, Spread spectrum technology
Introduction to Bluetooth: Specification, Core protocols, Cable replacement protocol
Bluetooth Radio: Type of Antenna, Antenna Parameters, Frequency hoping
Bluetooth Networking: Wireless networking, wireless network types, devices roles and
states, adhoc network, scatternet
Connection establishement procedure, notable aspects of connection establishement, Mode of connection, Bluetooth security, Security architecture, Security level of services,
Profile and usage model: Generic access profile (GAP), SDA, Serial port profile, Secondary bluetooth profile
Hardware: Bluetooth Implementation, Baseband overview, packet format, Transmission
buffers, Protocol Implementation: Link Manager Protocol, Logical Link Control Adaptation Protocol, Host control Interface, Protocol Interaction with layers
Programming with Java: Java Programming, J2ME architecture, Javax.bluetooth package
Interface, classes, exceptions, Javax.obex Package: interfaces, classes
Bluetooth services registration and search application, bluetooth client and server application.
Overview of IrDA, HomeRF, Wireless LANs, JINI

Text Book:

1. Bluetooth Technology by C.S.R. Prabhu and A.P. Reddi; PHI

Advanced Computer Network

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTIT-606(B)

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

Unit 1:

Data Communication: Data transmission, Parallel Transmission, Serial Transmission, Line Encoding Schemes: Unipolar, Polar, Bipolar, Multiplexing techniques: TDM, FDM, Modulation methods: AM, FM, PM, Pulse Code Modulation.

Unit 2:

Introduction to B-ISDN and ATM, B-ISDN principles, Asynchronous transfer mode, Optical Transmission, Network techniques: Networking layering, Switching of virtual channels and virtual paths, applications of virtual channel/path connections, Signaling principles: capabilities required for B-ISDN signaling, signaling virtual channels, broadband network performance, traffic management aspects: overview of functions, ATM traffic parameters and transfer capabilities, Quality of service.

Unit 3:

B-ISDN reference model: general aspects, layering architecture, relationship between B-ISDN PRM and OSI reference model, B-ISDN protocol reference model description and layer functions, User Network Interface.

Unit 4:

ATM, ATM based services and applications, ATM cell structure, Cell header, ATM connections: virtual path connection, virtual channel connection. ATM switching: matrix type, central memory, ring type switching element. Switching networks: Single stage networks, Multi-stage networks, ATM transmission: cell transfer functions, transmissions systems

Unit 5:

Multi Protocol Label Switching (MPLS), How MPLS works, Installing and removing MPLS paths , Comparison of MPLS versus IP , MPLS local protection , Comparison of MPLS versus Frame Relay , Comparison of MPLS versus ATM , Comparison of MPLS VPN versus IPSec VPN , Access to MPLS networks , Benefits of MPLS.

Unit 6:

Ad-hoc Network Concepts, Routing in Ad-hoc networks, routing protocols.

Text Books: Forouzan, Data Communications and Networking, TMH, 4 th Edition, 2006.
Computer Networks (4th edition), Tanenbaum Andrew S., International edition, 2004.
ATM Networks, Third Edition: Concepts Protocols Applications by Rainer Handel.
Ad-hoc Networks by Charles E.Perkins

Reference Books: William Stallings, Data and Computer Communications, PHI, 7 th Edition, 2003
Leon-Garcia, Widjaja, Communication Networks, Fundamental Concepts and Key Architecture, TMH, 2 nd Edition, 2004.

Neural Networks

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTIT -608(C)

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

Biological neuron, Analogy, Architecture, Classification, Neural Models, Learning Paradigm and Rule, single unit mapping, perception.

Feed forward networks – Review of optimization methods, back propagation, variations in back propagation, FFANN mapping capability, Mathematical properties of FFANNs , Generalization, Bias & variance Dilemma, Radial Basis Function.

Recurrent Networks – Symmetric Hopfield networks and associative memory, Boltzmann machine, Adaptive Resonance Networks

PCA, SOM, LVQ, Applications of Artificial Neural Networks to Function Approximation, Regression, Classification, Blind Source Separation, Time Series and Forecasting.

Text / Reference:

1. Haykin S., “Neural Networks-A Comprehensive Foundations”, Prentice-Hall International, New Jersey, 1999.
2. Anderson J.A., “An Introduction to Neural Networks”, PHI, 1999.
3. Satish Kumar,“Neural Networks: A Classroom Approach”
4 Hertz J, Krogh A, R.G. Palmer, “Introduction to the Theory of Neural Computation”, Addison-Wesley, California, 1991.

NETWORK MANAGEMENT

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTIT-703

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

Network Management : Data and Telecommunication Networks, Review of communication protocols and standards, Review of Network topology (LANs, WANs, MANs) and services, Network Management goals, organization and functions, Network Management standards and Models.

SNMP Management Versions; SNMP VI Network Management-Organization, information models, communication and functional Models, SNMP Management: V2, V3; SNMP Management RMON; Modification in SNMPV2, System Architecture and Structure of Management Information, SNMPV2 MIB, Protocol and its complexity with SNMP. -SNMPV3 Architecture Applications and Management Information base. SNMPV3 Security Models and access Controls, SNMP Management RMON.

Ethernet & Optical Network Management. SONET/SDH, DWDM, MetroEthernet, MPLS/GMPLS, pseudo-wire technologies and their OAM&P, Telecommunication Management Network, Models Standards, Architecture and its implementation issues. Network Management tools and Applications. Web based Management JAVA Management extensions, OSI model and OSI management areas – FCAPS.

References :

1. Network Management: Principles and Practice by Mani Subramanian
2. Network Management Fundamentals by Alexander Clemm

MULTIMEDIA TECHNOLOGY

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTIT-705(B)

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

UNIT – I

Introduction:

Concept of Multimedia, Multimedia Applications, Hardware Software requirements, Multimedia products & its evaluation.

Components of multimedia: Text, Graphics, Audio, Video., Compression techniques

UNIT – II

Animation:

Introduction, Basic Terminology techniques, Motion Graphics 2D & 3D animation.

Introduction to MAYA (Animating Tool):

UNIT – III

Fundamentals, Modeling: NURBS, Polygon,Subdivisions,Organic, animation, paths & bones, deformers.

UNIT – IV

Working with MEL: Basics & Programming,Dynamics

Rendering & Special Effects: Shading & Texturing Surfaces, Lighting, Special effects.

TEXT BOOKS:

1. David Hillman, “Multimedia Technology & Applications”, Galgotia Publications,2000
2. Rajneesh Agrawal, “Multimedia Systems”, Excel Books,2000

Natural Language Processing

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTIT-707(A)

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

UNIT – I

Introcution to NLP and NLU – Applications of NLP & NLU, open problem, Differences levels of Language Analysis

UNIT – II

Syntatic processing – Linguistic Background – Outline of English Syntax, Top down & Bottom up processing, Finite state models and morphological processing.
Grammer for Natural language, Ambiguity Resolution.

UNIT – III

Semantic Introduction – Semantic and logical form, Ambiguity, speech acts and embedded Sentences, other strategies for Sementic Interpretation.

UNIT – IV

Speech Recognition and Spoken language – Issue in Speech Recognition sound structure, Signal processing, HMM model, NLP, NLU and speech Recognition.

TEXT BOOKS:

1. James Allen, “Natural Language Understanding”, Pearson education, 2003
2. Rajeev S., Zevarsky, “Speech processing and Recognition , PHI, 200

MODERN DIGITAL COMMUNICATION TECHNIQUES

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTCN-601

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

Unit-1 Introduction

Model of a Digital communication system, Communication channels and their characteristics, Signals & classification, Sampling theorem, Probability theory

Unit-2 Noise

Sources of noise, Signal to noise ratio, Noise figure, Calculation of noise figure, Noise temperature

Unit-3 Waveform Coding Techniques

Quantization ,Pulse Code Modulation(PCM),PCM generator and receiver, Companding in PCM, Delta modulation, Differential PCM, Comparison of Digital pulse modulation methods

Unit-4 Digital Modulation Techniques

Introduction, ASK, PSK, FSK, MSK, QPSK, BPSK, Detection of Binary modulation techniques in the presence of noise

Unit-5 Information theory

Concept of information & Entropy, Shannon theorem, Channel capacity, Mutual information, Information rate

Unit-6 Coded Digital Communication

Introduction to source encoding & channel encoding, Structure of Linear block code, Hamming code, Structure of cyclic code, Reed-solomon codes, Bose Chaudhuri Hocquenghem(BCH)

Unit-7 Spread Spectrum Techniques

Model of spread spectrum digital communication, Direct sequence spread spectrum ,Frequency hopped spread spectrum

Reference Books

1. John G. Proakis, Digital communication, Tata Mcgraw hill(TMH) Publication,3rd edition,1990
2. Simon Haykin, Digital communication, John wiley & sons,1998
3. B.P Lathi, Modern Digital & Analog Communication System, 3rd university press 1998
4. S.G.Wilson, Digital modulation & coding, PHI, 1996

DATA COMMUNICATION NETWORKS

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTCN-607(A)

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

OSI Reference Model

Overview of Data Communication and Networking - Analog / Digital transmission, multiplexing and spreading, transmission media, Circuit switching and Telephone network - DSL, ADSL and Cable Modem, Network Configuration, Concepts of layering , ISO's OSI reference model, Physical Layer Standards - RS 232C, RS 449, RS 422A / 423A, X.21 and V.24.

Data Link Layer

Error detection and correction, Data link control - Flow and Error control - Sliding window protocol - ARQ schemes, HDLC protocol - Point to Point Protocol, Multiple Access Techniques - Random Access, Controlled Access, Logical Link Control (LLC) and Medium Access Sub-layer functions - LAN standards - IEEE 802.3 (CSMA/CD) - Fast Ethernet - Giga Bit Ethernet, IEEE 802.4 (Token Bus), IEEE 802.5 (Token Ring), IEEE 802.11 (Wireless LAN).

Network Layer

Inter-networking - Addressing - Routing - Link state and Distance Vector Routing - Congestion control algorithms - Network Layer Protocols - ARP, RARP, IPv4, ICMP, IPv6 and ICMPv6 - Unicast Routing - RIP, OSPF, BGP and Multicast Routing - IGMP, DVMRP, MOSPF, CBT, PIM.

Transport Layer

Processes to Processes Delivery - Transmission Control Protocol (TCP) - User Datagram Protocol, Stream Control Transmission Protocol (SCTP) - Data Traffic - Congestion Control and Quality of Service - Techniques to improve QOS - Integrated Services - Differentiated Services, QoS in switched networks.

Session, Presentation And Application Layers

Services, Network security - security Cryptography, Message confidentiality, message integrity, message authentication, Digital Signature, Entity Authentication, Key Management, Application layer- DNS, E-mail (SMTP), FTP, HTTP, Voice over IP.

References

1. Forouzan, Data Communications and Networking, TMH, 4th Edition, 2006.
2. William Stallings, Data and Computer Communications, PHI, 7th Edition, 2003.
3. S.Tanenbaum, Computer Networks, 4th Edition, Pearson Education Asia Inc., 2004.
4. Leon-Garcia, Widjaja, Communication Networks, Fundamental Concepts and Key Architecture, TMH, 2nd Edition, 2004.

INTERNET PROTOCOLS

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTCN-607(B)

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

Protocol Basics

Introduction - Internet protocol - IP version 4 - IPv4 Addressing - Decimal notation - Internet Control Message Protocol - Design issues - Internet Group Message Protocol - Ipv6 - Addressing - Hexadecimal Notation.

Transport Over IP

Introduction - User Datagram Protocol (UDP) - UDP message format - Protocols using UDP - Transmission Control Protocol - Applications - SCTP - RTP.

Multiprotocol Label Switching

MPLS Fundamentals - Signaling protocols - Label Distribution protocol - Traffic engineering in MPLS - Extensions to RSVP - LSP Tunnels.

Generalized MPLS

Generic signaling extensions - GMPLS - Choosing Reservation protocol- TE - CR-LDP - Generalized RSVP-TE - Generalized CR-LDP.

Applications of IP

IP Encapsulation - VPNs - Mobile IP - Header Compression - Voice over IP - IP Telephony - IP and ATM - IP over Dialup links.

References

1. Adrian Farrel, The Internet and its protocols , Morgan Kaufmann publishers, 2004.
2. Pete Loshin, IPv6 Theory, Protocol and Practice, Edition, Morgan Kaufmann 2nd Publishers, 2004.
3. Uyless Black, TCP / IP and Related Protocols, 2 nd Edition, Tata Mc Graw Hill, 1995.

CRYPTOGRAPHY AND NETWORK SECURITY

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTCN-606(B)

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

Symmetric Ciphers
Introduction, Classical Encryption Techniques- Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Block Ciphers and Data Encryption Standard - Simplified DES, Block Cipher Principles, Data Encryption Standard, Strength of DES, Differential and Linear Crypt Analysis, Block Cipher Design Principles, Block Cipher Modes of operation.

AES and Confidentiality
Advanced Encryption Standard- Evaluation Criteria for AES, AES Cipher; Contemporary Symmetric Ciphers- Triple DES, Confidentiality using Symmetric Encryption- Placement of Encryption Function, Traffic Confidentiality, Key Distribution, and Random Number Generation.

Public-Key Encryption And Hash Functions
Public Key Cryptography and RSA- Principles of Public Key Cryptosystems, RSA Algorithm; Key Management, Diffie-Hellman Key Exchange, Elliptic Curve Cryptography; Message Authentication and Hash Functions- Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions and MACs; Hash Algorithms- MD5 Message Digest Algorithm; Secure Hash Algorithm, Digital Signatures and Authentication Protocols, Digital Signature Standards.

Network Security Practice
Authentication Applications- Kerberos, X.509 Authentication Service; Electronic Mail Security- Pretty Good Privacy, S/MIME; IP Security- IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations; Web Security- Web Security Considerations, Secure Sockets Layer and Transport Layer Security, Secure Electronic Transaction.

System Security
Intruders- Intruder Detection, Password Management; Malicious Software- Virus and Related Threats, Virus Counter Measures; Firewalls- Firewall Design Principles, Trusted Systems.

References

1. William Stalling, Cryptography and Network Security, 3rd Edition. PHI New Delhi
2. William Stalling, Network Security Essentials, 2nd Edition. PHI New Delhi
3. Charlie Kaufman, Network Security: Private Communication in Public World, 2nd Edition PHI, New Delhi

FUNDAMENTALS OF MIDDLEWARE TECHNOLOGIES

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTCN-608(A)

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

UNIT-I:
Introduction to client server computing: Evolution of corporate computing models from centralized to distributed computing, Distributed computing architectures, client server models. Benefits of client server computing, pitfalls of client server programming.

UNIT-II:
CORBA with Java: Core CORBA, OMG object Model, CORBA object model, ORB, IIOP, CORBA Objects, OMG Interface Definition Language (OMG IDL), Stubs and Skeletons, Dynamic Invocation Interface, Dynamic Skeleton Interface, Object Adapter (Portable Object Adapter), Interface Repository, ORB Interoperability, CORBAIDL mapping CORBA java- to- IDL mapping, The introspective CORBA/Java object, Dynamic CORBA-The portable count, the dynamic count multi count.

UNIT-III:
Java Bean Component Model and RMI: Events, properties, persistency, EJB container frame work, Session and Entity Beans, The EJB client/server development Process The EJB container protocol, support for transaction EJB packaging EJB design Guidelines. RMI basics – Remote Interface, Remote Object, Remote method Invokation, Transport layer, RMI flow, Creating remote objects, designing client/server in RMI.

UNIT-IV:
Web Services and Mobile Agents: Web Services Overview, Implementing SOA with Web services, Core technologies: HTTP, XML, SOAP, WSDL, Defining SOAP Messages with WSDL, Implementing Web Service Clients in Java, Generating client code from WSDL, Mobile Agents - Basic architecture, Advantages, Mobile agent framework systems, Network services

References

1 Client/Server programming with Java and CORBA Robert Orfali and Dan Harkey, John Wiley & Sons ,SPD 2nd Edition
2 Java programming with CORBA 3rd Edition, G.Brose, A Vogel and K.Duddy, Wiley-dreamtech, India John wiley and sons
3 C# and the .NET Platform Andrew Troelsen, Apress Wiley-dreamtech, India Pvt Ltd

INTERNET PROGRAMMING

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTCN-608(B)

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

Basic Network and Web Concepts
Internet standards – TCP and UDP protocols – URLs – MIME – CGI – Introduction to SGML.

JAVA Programming
Java basics - I/O streaming - files - Looking up Internet Address - Socket programming -
client/server programs – E-mail client – SMTP – POP3 programs – web page retrieval – protocol
handlers – content handlers – applets – image handling – Remote Method Invocation.

Scripting Languages
HTML – forms – frames – tables – web page design – JavaScript introduction – control structures
- functions – arrays – objects – simple web applications.

Dynamic HTML
Dynamic HTML – introduction – cascading style sheets – object model and collections – event
model - filters and transition - data binding - data control - ActiveX control - handling of multimedia data.

Server Side Programming
Servlets – deployment of simple servlets – web server (Java web server / Tomcat / Web logic) – HTTP GET and POST requests – session tracking – cookies – JDBC – simple web applications –
multi-tier applications.

References :

1. "Internet & World Wide Web: How to Program" (4th Edition) by Paul Deitel
2. "Internet Programming with VBScript and JavaScript" (Web warrior series) by Kate Kalata

SYSTEM AND NETWORK ADMINISTRATION

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTCN-701

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

Unit 1: N/w Administration

Intro. to networks, TCP/IP model, IP addressing, Subnetting, NAT, VLAN. Basic Concepts of proxy server, webserver, DNS, Firewall, Router, Mail Server and their respective configuration settings. Various Interconnecting Devices: Hub, Switch, Bridges, Routers, Gateway, repeater, brouter. Knowledge about various network related commands: ping, netstat, tracert, traceroute, ifconfig, ipconfig etc.. Steps followed in establishing a network

Unit 2: Security

Concept of security, its need, issues, cryptography techniques:- ciphers, substitution cipher, transposition, symmetric key algorithms like AES, DES, public key algo's like RSA, Authentication algorithms , IPSEC, VAN, Digital signatures, IDS, Firewall. Types of attacks, access control list, filtering rules

Unit 3 Host Administration

Intro. to system Administration, what are the necessary issues to be tackled in host management, installation of unix, linux,windows OS, formatting, file systems like FAT , NTFS, ETC., Booting process in various OS, User accounts, group accounts, passwords, shadow passwords, directory structure of various OS. Process, ps, zombie process, backup, recovery, commands like tar, zip etc. , performance analysis of host machine and how to improve the systems performance

Unit 4 Knowledge of UNIX commands: directory related files, disk related commands, File related commands, I/O redirection and piping, Unix editor vi, Process related commands, communication related commands, Printing related commands, Programming in the Borne and C-Shell; Wild cards; Simple shell programs; Shell variables; Shell programming constructs; interactive shell scripts; Decision structures in shell, Loop Control structure. Role and functions of a system manager, adding and removing users, starting up the system, shutting the system down, Disk management: mounting and unmounting file system, maintaining user accounts.
AWK utility

References :

1. Practice of System and Network Administration, The (2nd Edition) by Thomas A. Limoncelli, Christina J. Hogan, and Strata R. Chalup.
2. Principles of Network and System Administration by Mark Burgess.

HIGH SPEED SWITCHING ARCHITECTURE

No. of Credits: 4	Sessional: 40 Marks
L T P Total	Theory: 60 Marks
4 0 0 4	Total : 100 Marks
	Duration of Exam: 3 Hours

MTCN-705(A)

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

High Speed Network

LAN and WAN network evolution through ISDN to BISDN - Transfer mode and control of BISDN - SDH multiplexing structure - ATM standard ; ATM adaptation layers.

LAN Switching Technology

Switching concepts; Switch forwarding techniques; switch path control - LAN switching; cut through forwarding; store and forward - virtual LANs.

ATM Switching Architecture

Switch models - Blocking networks - basic and enhanced banyan networks - sorting networks - merge sorting - rearrangeable networks - full and partial connection networks - nonblocking networks - recursive network - construction and comparison of non-blocking network -switches with deflection routing - shuffle switch - tandem banyan.

Queues in ATM Switches

Internal queuing - Input, output and shared queuing - multiple queuing networks - combined input, output and shared queuing - performance analysis of queued switches.

IP Switching

Addressing mode - IP switching types-flow driven and topology driven solutions - IP Over ATM address and next hop resolution - multicasting - IPv6 over ATM.

References

1. Achille Patavina, Switching Theory: Architectures and performance in Broadband ATM Networks. John Wiley & Sons Ltd., New York, 1998.
2. Christopher Y Metz, Switching protocols & Architectures. McGraw Hill, New York, 1998.
3. Ranier Handel, Manfred N Huber, Stefan Schrodder. ATM Networks-concepts, protocols, applications, 3rd Edition, Adisson Wesley, New York, 1999.
4. John A.Chiong, Internetworking ATM for the internet and enterprise networks. McGraw Hill, NewYork, 1998.

OPTICAL NETWORKING

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTCN-705(B)

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

UNIT 1, "Introduction to Optical Networking"

Introduction SONET/SDH and dense wavelength-division multiplexing (DWDM) , Add/drop multiplexers (ADMs), ADM nodes on the ring. Multiservice provisioning platforms - ADM, DACS, RPR, SAN transport, DWDM, and Ethernet switching.

UNIT 2, "Fiber-Optic Technologies"

This chapter discusses the physics behind fiber-optic cables. It examines various linear effects, such as attenuation and dispersion, as well as nonlinear effects at high bit rates with WDM signaling. Various fiber types are presented along with their refractive index profiles. Fiber loss budget analysis is also presented with examples.

UNIT 3, "Wavelength-Division Multiplexing"

Wavelength-division multiplexing principles, coarse wavelength-division multiplexing, dense wavelength-division multiplexing, the ITU grid, WDM systems, WDM characteristics, impairments to transmission, and dispersion and compensation in WDM systems. OSNR calculations for fiber amplifiers.

UNIT 4, "SONET Architectures"

SONET framing, multiplexing, virtual tributaries, SONET network elements, SONET topologies, SONET protection mechanisms, APS, two-fiber UPSR, DRI, and two-fiber and four-fiber BLSR rings.

UNIT 5, "Packet Ring Technologies"

Ethernet over SONET/SDH encapsulation schemes, Ethernet over SONET/SDH using ANSI T1X1.5 147R1 Generic Framing Procedure (GFP) headers, Ethernet over Packet over SONET/SDH using ITU-T x.86 LAPS, and IEEE 802.17 RPR.

UNIT 6, "Multiservice SONET Platforms"

Cisco ONS 15000 family.- ONS 15454 MSPP, 15454 MSTP, and the 15454 SDH. Electrical and optical cards associated with the ONS 15454, E-Series Ethernet switch cards and the ML-Series Layer 2/3..

UNIT 7, "Ethernet, IP, and RPR over SONET and SDH"

Ethernet, IP, and RPR provisioning aspects of the ONS 15454 for SONET and SDH., SONET/SDH optical provisioning and the creation of Ethernet circuits over the optical layer. VRF and RPR provisioning.

References :

1. “Optical Network Design and Implementation (Networking Technology)”, by Vivek Alwayn, Cisco press
2. “Handbook of Fiber Optic Data Communication”, Third Edition: A Practical Guide to Optical Networking by Casimer DeCusatis

ROUTING IN COMMUNICATION NETWORKS

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTCN-707(A)

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

Circuit Switching Networks
Dynamic Alternative Routing- Dynamic Routing in Telephone Network - ATM networks with virtual paths - Statistical multiplexing and homogeneous sources , delay guarantees, No statistical multiplexing , heterogonous sources.

Packet Switching Networks
Distance vector Routing, Link State Routing, Inter domain Routing-Classless Interdomain routing (CIDR), Interior Gateway routing protocols (IGRP) - Routing Information Protocol (RIP), Open Shortest Path First (OSPF), Exterior Gateway Routing Protocol (EGRP) - Border Gateway Protocol (BGP), Apple Talk Routing.

High Speed Networks
Routing in optical networks- Optical link networks- Single hop, multi hop optical networks, hybrid optical networks, photonic networks , Routing in the PLANET network-Packet level Routing - Call level Routing - Network infrastructure -Deflection Routing.- Topologies, Deflection routing Algorithms-Performance of routing algorithms on regular topologies - Deflection routing on time varying topologies, resequencing - unslotted operation.

Mobile Networks
Routing in Cellular Mobile Radio Communication networks- Network Architecture, Air interface functionality, Mobility management, Connectionless Data service for cellular systems, Mobility and Routing in Cellular Digital Packet Data (CDPD) network, Packet Radio Routing-DARPA packet radio network, Routing algorithms for small, medium and large sized packet radio networks.

Mobile Ad-Hoc Networks
Internet based mobile ad-hoc networking, Routing algorithms - Table-driven routing - Destination Sequenced Distance Vector (DSDV), Source initiated on-demand routing- Dynamic Source Routing (DSR), Ad-hoc On- demand Distance Vector (AODV), Hierarchical based routing- Cluster head Gateway Switch Routing (CGSR) and Temporally-Ordered Routing Algorithm (TORA).

References
1. M. Steen strub, Routing in Communication networks, Prentice Hall

International, NewYork, 1995

2. Internetworking Technologies Handbook, 4 th Edition, Inc. Cisco Systems, ILSG Cisco Systems, 2003.

3. William Stallings, ISDN and Broadband ISDN with Frame Relay and ATM, PHI, New Delhi, 2004.

4. Behrouz A Forouzan, Data Communications and Networking , 3 rd Edition, TMH, 2004

5. William Stallings, High Speed Networks TCP/IP and ATM Design Principles, Prentice Hall International, New York, 1998.

PERSONAL COMPUTING DEVICE COMMUNICATION

No. of Credits: 4		Sessional:	40 Marks
L T P Total		Theory:	60 Marks
4 0 0 4		Total :	100 Marks
		Duration of Exam:	3 Hours

MTCN-707(B)

Note: Five questions will be set in all by the examiner. At most two internal choices can be provided

Radio Propogation
Radio Propagation Characteristics, Models for Path loss, Shadowing & Multipath fading- delay spread, Coherence bandwidth, Coherence Time, Doppler Spread .

Channel Allocation & Handover
Frequency Reuse, basic theory of hexagonal cell layout, spectrum efficiency, FDM/TDM, Cellular System, channel allocation schemes, Handover analysis, cellular CDMA, Erlang capacity, Antennas for mobile radio and characteristics.

Modulation and Multiple Access Techniques
Digital modulation for Mobile radio, Analysis under fading channel, diversity techniques and RAKE demodulator, Spread Spectrum Communication, Multiple Access Techniques used in Mobile Wireless Communication.

Equalization, Diversity and Coding
Linear and Nonlinear Equalization, Adaptive Equalization, Diversity techniques, RAKE Receiver, Speech codes and channel codes.

PCS & Satellite Systems
PACS - Architecture, PHS, PCS and ISM bands, satellites for Personal Communication Services, WLL, Cordless telephones.

References

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2. W. C. Y. Lee, Mobile Communications Engineering: Theory and applications, 2nd Edition, McGraw-Hill International, 1998.