School of Engineering & Technology

Syllabi and Course Structure

Computer Science and Engineering

(M.Tech. in Network Engineering)

Academic Programmes

July, 2013
Faculty of Engineering & Technology

**M.Tech. in Computer Science & Engineering (Network Engineering)**

**Course Structure**

**First Semester**

<table>
<thead>
<tr>
<th>Sub Code</th>
<th>Sub Name</th>
<th>L</th>
<th>T</th>
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<tbody>
<tr>
<td>M11001</td>
<td>Advanced Topics in Algorithm Design</td>
<td>4</td>
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<tr>
<td>M11002</td>
<td>Advanced Software Engineering</td>
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<td>M11003</td>
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<td>M111**</td>
<td>Elective – I</td>
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<tr>
<td>M111**</td>
<td>Elective – II</td>
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<td>M11004</td>
<td>Advanced Topics in Algorithms Lab</td>
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**Second Semester**

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<tr>
<td>M12007</td>
<td>Network Management</td>
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<tr>
<td>M12008</td>
<td>Network Protocol &amp; programming</td>
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<td>M12009</td>
<td>Advance Computer Network</td>
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<td>G11007</td>
<td>Research Methodology &amp; Technical communication</td>
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<td>M121**/M1 1106</td>
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<td>M121**</td>
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<td>M12010</td>
<td>Advance technology lab</td>
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<td>M12011</td>
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**Third Semester**

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**Fourth Semester**

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<td>M14002</td>
<td>Dissertation-II</td>
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Faculty of Engineering & Technology

\textbf{M.Tech. in Computer Science & Engineering (Network Engineering)}

\textbf{Proposed ELECTIVE Theory Subjects:}

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<tr>
<td>M11104</td>
<td>Information system security</td>
<td>M11105</td>
<td>Mobile computing</td>
<td>M11106</td>
<td>Digital Image Processing</td>
<td>M12111</td>
<td>Distributed and Cloud computing</td>
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<tr>
<td>M11101</td>
<td>Advance Data Communication network</td>
<td>M11103</td>
<td>Optical network</td>
<td>M12109</td>
<td>Neural Network</td>
<td>M12112</td>
<td>Grid computing</td>
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<tr>
<td>M11110</td>
<td>Geographic Information system</td>
<td>M11112</td>
<td>Information Theory &amp; coding</td>
<td>M12103</td>
<td>Pattern Reorganization</td>
<td>M12113</td>
<td>Web engineering</td>
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<tr>
<td>M11111</td>
<td>Parallel computation and application</td>
<td>M11107</td>
<td>Secure Communication and VPN</td>
<td>M12110</td>
<td>Artificial Intelligence and Expert system</td>
<td>M12114</td>
<td>Network flow &amp; Traffic Engineering</td>
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</table>
Advanced Data Structure: Graph, B-tree, binomial heaps and, Fibonacci heap.


Linear Programming: The simplex algorithm and duality.

Number Theoretic Algorithm: GCD, modular arithmetic, solving modular linear equation and Chinese remainder theorem.


Parallel Algorithms: Model for parallel computation, basic techniques, work and efficiency, parallel evaluation of expressions, parallel sorting networks and parallel sorting.

Suggested Books
3. Basse S., Computer Algorithms - Introduction to Design and Analysis, Addison Wesley
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M.Tech. in Computer Science & Engineering (Network Engineering) Semester I

Contact Hours (L-T-P): 4-0-0

M11002- Advanced Software Engineering: Course Outlines


Suggested Books:
Faculty of Engineering & Technology

M.Tech. in Computer Science & Engineering (Network Engineering) Semester I

Contact Hours (L-T-P): 4-0-0

M11003 - Advanced Operating Systems: Course Outlines


CPU Scheduling: Basic Concepts, Scheduling Criteria, Algorithms, Multiple-processor Scheduling, Real Time Scheduling, Algorithm Evaluation.


Protection and Security: Threats, Intruders, Accidental Data Loss, Cryptography, User authentication, Attacks from inside the system, Attacks from outside the system, Protection Mechanism, Trusted Systems, Domain of Protection, Access Matrix, Programs Threats, System Threats.

Distributed systems, topology network types, design strategies. Network operating structure, distributed operating system, remote services, and design issues. Distributed file system: naming and transparency, remote file access, Stateful v/s Stateless Service, File Replication.

Distributed co-ordinations: Event Ordering, Mutual Exclusion, Atomicity, Concurrency Control, Deadlock Handling, Election Algorithms, and Reaching Agreement. Case studies of Unix and MS-DOS operating system.

Suggested Books

**Faculty of Engineering & Technology**

**M.Tech. in Computer Science & Engineering (Network Engineering) Semester I**

**Contact Hours (L-T-P): 0-0-4**

**M11004- Advanced Topics in Algorithm Lab: Course Outlines**

**List of Experiments**

1. Write a Program to implement Efficient Matrix Multiplication
2. Write a Program to define the graphs and list all nodes and Links
3. Write a Program to implement the concept of BFS
4. Write a Program to implement the concept of DFS
5. Write a Program to implement the concept of B-tree
6. Write a Program to implement Dijkstra Algorithm
7. Write a Program to implement the concept of Binomial Heap
8. Write a program to find Greatest Common Divisor
9. Write a program using Chinese remainder theorem
10 Write program to solve linear equations
11 Write a program to solve Travelling Salesman problem
12 Write a program to implement Vertex cover problem
13 Write a program to implement all pair shortest path Algorithm
Faculty of Engineering & Technology

M.Tech. in Computer Science & Engineering (Network Engineering) Semester I

Contact Hours (L-T-P): 0-0-4

M11005- Advanced Software Engineering Lab: Course Outlines

List of Experiments
Students will Identify Projects they will be working on in this Lab. Once Projects are Identified then they will work on objectives given for the projects below

1. To perform the user’s view analysis: Use case diagram for
2. To perform the system analysis: Requirement analysis, SRS
3. To perform the function oriented diagram: DFD and Structured chart
4. To perform the user’s view analysis: Use case diagram
5. To draw the structural view diagram: Class diagram, object diagram
6. To draw the behavioral view diagram: Sequence diagram, Collaboration diagram
7. To draw the behavioral view diagram: State-chart diagram, Activity diagram
8. To draw the implementation view diagram: Component diagram.
9. To draw the implementation view diagram: deployment diagram
10. To perform various techniques for testing using manual Testing
Faculty of Engineering & Technology

M.Tech. in Computer Science & Engineering (Network Engineering) Semester II

Contact Hours (L-T-P): 4-0-0

M12007 - Network Management: Course Outlines


2. Basic Foundations: Standards, Models, and Language: Network Management Standards, Network Management Model, Organization Model, Information Model – Management Information Trees, Managed Object Perspectives, Communication Model; ASN.1- Terminology, Symbols, and Conventions, Objects and Data Types, Object Names, An Example of ASN.1 from ISO 8824; Encoding Structure; Macros, Functional Model


4. SNMP Management – RMON: Remote Monitoring, RMON SMI and MIB, RMON1- RMON1 Textual Conventions, RMON1 Groups and Functions, Relationship Between Control and Data Tables, RMON1 Common and Ethernet Groups, RMON Token Ring Extension Groups, RMON2 – The RMON2 Management Information Base, RMON2 Conformance Specifications.


TEXT BOOKS:

REFERENCE BOOKS:
M. Tech. in Computer Science & Engineering (Network Engineering) Semester II

Contact Hours (L-T-P): 4-0-0

M12008: Network Protocol & Programming: Course Outlines

Introduction:
Course introduction, network architecture, layering and protocols, OSI architecture, Internet architecture. Delay, hardware building blocks, Application Programming Interface (API), Encoding, framing, error detection, Ethernet (802.3), token rings (802.5, FDDI), wireless (802.11). Network adaptors, Switching and forwarding, circuit switching, packet switching, datagrams, Switching and forwarding, IP, service model. Routing and forwarding, UDP, TCP

Application Layer Programming:
Application-layer protocols, HTTP, FTP, SMTP, DNS (domain hierarchy, name servers, name resolution)

Sockets Programming:
Socket, UDP client-server, peer-to-peer. TCP sockets. Socket Programming in Java, Cache, CDN, P2P. Socket options (Broadcasting, multicasting), non-blocking I/O. Non-blocking I/O

Transport Layer Programming:
Reliable transmission (stop-and-wait, sliding window). Finite state machine; Go-back-n and selective repeat ARQs. TCP flow control. TCP congestion control (additive increase / multiplicative decrease, slow start, fast retransmit, fast recovery), brief on congestion-avoidance mechanisms

Network Layer Programming:
TCP discussion topics, introduction to link state and distance vector routing algorithm. Link state and distance vector routing algorithm, hierarchical routing. RIP, OSPF, BGP, multicast routing and mobile IP

Text Books:

Reference Books:
1. D. E. Comer, Computer Networks and Internets, Prentice Hall
Faculty of Engineering & Technology

M.Tech. in Computer Science & Engineering (Network Engineering) Semester II

Contact Hours (L-T-P): 4-0-0

M12009-Advanced Computer Network: Course Outlines

HIGH SPEED NETWORKS

CONGESTION AND TRAFFIC MANAGEMENT

TCP AND ATM CONGESTION CONTROL

INTEGRATED AND DIFFERENTIAL SERVICES
Integrated Services Architecture - Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ - Random Early Detection, Differentiated Services

PROTOCOLS FOR QOS SUPPORT

TEXT BOOKS:

REFERENCES:
Faculty of Engineering & Technology

M.Tech. in Computer Science & Engineering (Network Engineering) Semester II

Contact Hours (L-T-P): 3-0-0

G11007-Research Methodology & Technical Communication: Course Outlines

Research: Meaning & Purpose, Review of literature, Problem definition/Formulation of research problem, Research proposal, Variables, Hypothesis, types, construction of hypothesis

Classification of research: Quantitative research: Descriptive Research, Experimental Research

Qualitative research: Observational studies, Historical research, Focus group discussion, Case study method,

Sources of data collection: Primary and Secondary Data Collection, Sample and Sampling technology, Non-probability and Probability Sampling

Data Analysis, Report Writing, Results and References,

Thesis Writing and Journal Publications: Writing thesis, Writing journal and conference papers, IEEE and Harvard style of referencing, Effective presentation, Copyrights, and Avoid plagiarism
Faculty of Engineering & Technology

**M.Tech. in Computer Science & Engineering (Information Security) Semester I**

**Contact Hours (L-T-P): 3-0-0**

*M11104-Information System Security: Course Outlines*

**Introduction to Securities:** Introduction to security attacks, services and mechanism, Classical encryption techniques substitution ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers. Modern Block Ciphers: Block ciphers principles, Shannon’s theory of confusion and diffusion, fiestal structure, Data encryption standard (DES), Strength of DES, Idea of differential cryptanalysis, block cipher modes of operations, Triple DES

**Modular Arithmetic:** Introduction to group, field, finite field of the form GF(p), modular arithmetic, prime and relative prime numbers, Extended Euclidean Algorithm, Advanced Encryption Standard (AES) encryption and decryption Fermat’s and Euler’s theorem, Primality testing, Chinese Remainder theorem, Discrete Logarithmic Problem, Principals of public key crypto systems, RSA algorithm, security of RSA

**Message Authentication Codes:** Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions, Secure hash algorithm (SHA)

**Digital Signatures:** Digital Signatures, Elgamal Digital Signature Techniques, Digital signature standards (DSS), proof of digital signature algorithm

**Key Management and distribution:** Symmetric key distribution, Diffie-Hellman Key Exchange, Public key distribution, X.509 Certificates, Public key Infrastructure.

**Authentication Applications:** Kerberos

**Electronic mail security:** pretty good privacy (PGP), S/MIME.


**System Security:** Introductory idea of Intrusion, Intrusion detection, Viruses and related threats, firewalls.

Suggested Books:
2. Behrouz A. Frouzan: Cryptography and Network Security, TMH
Module 1: Introduction

Module 2: Data Link Layer
Introduction to Data Link Layer, Framing, Error Detection and Correcting Codes, Hamming Code, Block Codes and Convolution Codes, ARQ Techniques, Transmission Codes, Baudot, EBCDIC and ASCII Codes, Barcodes, Terminal Handling. ARQ Protocols: Stop & Wait Protocols, Sliding Window Protocols, Performance and Efficiency, Multi Access Protocols: ALOHA and CSMA.

Module 3: Network Layer

Module 4: Transport Layer

References:
Introducing GIS and spatial data: Definition - maps and spatial information, computer assisted mapping and map analysis, components of GIS, people and GIS, maps and spatial data, thematic characteristics of spatial data, other sources of spatial data: census, survey data, air photos, satellite images, field data. Spatial and attributes data modeling and Management: Data quality and data standards: Concepts, Definition, Components and assessment of data quality: Spatial entities, generalization, Raster and Vector spatial data structures, comparison of Vector and Raster Methods, Acquisition of spatial data for terrain modeling, Raster and Vector approach to digital terrain modeling, modeling network, layered approach and object, oriented approach, modeling third and fourth dimension, problem of data management, database management system - relational database model - liking spatial and attribute data - GIS database application and development.


GIS Modeling for decision support: Models of spatial processes: natural and scale analogue models, conceptual models, mathematical model, models of physical and environmental processes, modeling human process, gravity model, problems related to using GIS to model spatial processes. Maps as output, alternative cartographic outputs, non-cartographic outputs, spatial multimedia, delivery mechanism, GIS and spatial decision supports, maps as decision tools.

Suggested Books
M.Tech. in Computer Science & Engineering (Information Security) Semester I

Contact Hours (L-T-P): 3-0-0

M1111 - Parallel Computation and Application: Course Outlines

Introduction to Parallel Computing: Basic concepts about program/process/thread concurrent Execution, Parallel Execution, granularity, Potential of Parallelism, Need of Parallel Computation, Levels of parallel processing, Parallel processing Vs. Parallel computing, Dataflow Computing concept, Applications of parallel processing, Scientific Applications/Image processing, Engineering Application, Database query/Answering applications, AI Applications, Mathematical simulations and modeling

Classification of Parallel Computers: Types of Classification, Flynn's/Handler classification, UMA/NUMA/COMA, Loosely coupled/tightly coupled, Classification based grain size and Instruction level parallelism.

Parallel Computer Architecture: Introduction to various computer architecture, Pipeline processing, Vector/Array processing, VLIW and Super scalar architecture, Associative architecture, Multithreaded architecture


References:
Overview of Mobile Computing: Its applications, Radio Communication, Mobile Computing Architecture, Mobile System Networks, Data Dissemination, Mobility Management,

Introduction to Cellular network: components, Architecture, Call set-up, Frequency Reuse and Co-channel cell, Cell Design, Interference, Channel assignment, Hand Off;

Cellular Network Standards: Digital cellular communication, Multiple Access Techniques: FDMA, TDMA, CDMA. GSM: System Architecture, Mobile services & features, Protocols, Radio interface, Handover, GSM Channels, Localization and calling, User validation; General Packet Radio Service; Introduction to CDMA based systems; Spread spectrum in CDMA systems; coding methods in CDMA; IS-95


Mobile Ad-hoc and Sensor Networks: Introduction, MANET, Routing in MANET’s Wireless Sensor Networks, Applications; Mobile Devices: Mobile Agent, Application Server, Gateways, Portals, Service Discovery, Device Management,

Support for Mobility: Mobile IP: Architecture, Packet delivery and Hand over Management, Location Management, Registration, Tunneling and Encapsulation, Route optimization, DHCP.

Mobile Transport Layer: Conventional TCP/IP transport protocols, Indirect TCP, Snooping TCP, Mobile TCP

Suggested Books
M11103 - Optical Network: Course Outlines

1. Introduction: Three generations of Digital Transport Networks; A brief introduction to WDM and TDM; The Optical Marketplace; Wireless Optical Systems; Key Optical Nodes; Other Key Terms; Evolution of Optical Systems; Key attributes of Optical Fiber.

2. Telecommunications Infrastructure: The Local Connections; The Backbone Connections; The Digital Multiplexing Hierarchy; The Digital Signaling Hierarchies; T1 / DS1 and T3 / DS3; The Layered Protocol Model in the Transport Network; considerations for Interworking Layer1, Layer 2, and Layer 3 Networks.

3. Characteristics of Optical Fiber: The Basics; The Wavelength; The Basic Components; Structure of the Fiber; Fiber Types; Key Performance Properties of Fiber; Attenuation; Amplifier Spontaneous Emission; Chromatic Dispersion; Lasers.

4. Timing and Synchronization: Timing and Synchronization in Digital Networks; Effect of a Timing error; The Clocking Signal; Types of Timing in Networks; Timing Variations; Methods of Clock Exchange; Distribution of Timing Using SONET and DS1; Timing Downstream Devices; Building Integrated Timing Supply; Synchronization Status Messages and Timing Loops.

5. SONET and SDH: Introduction; The SONET Multiplexing Hierarchy; SONET and SDH Multiplexing Structure; The SONET / SDH Frame Structure; SONET and SDH Functional Components; SONET and SDH Problem Detection; Locating and Adjusting Payload with Pointers; Virtual Tributaries in more detail; Virtual Tributaries in Virtual Containers; The Overhead Bytes; SONET and SDH Concatenation.

TEXT BOOKS:

REFERENCE BOOKS:
M.Tech. in Computer Science & Engineering (Information Security)  
Semester I

Contact Hours (L-T-P): 3-0-0

M11112-Information Theory & Coding: Course Outlines

Information theory – Concept of amount of information -units, Entropy -marginal, conditional and joint entropies -relation among entropies Mutual information, information rate, channel capacity, redundancy and efficiency of channels.

Discrete channels – Symmetric channels, Binary Symmetric Channel, Binary Erasure Channel, Cascaded channels, repetition of symbols, Binary unsymmetric channel, Shannon theorem. Continuous channels – Capacity of band limited Gaussian channels, Shannon-Hartley theorem, Trade off between band width and signal to noise ratio, Capacity of a channel with infinite band width, Optimum modulation system.


Codes for error detection and correction – Parity check coding, Linear block codes, Error detecting and correcting capabilities, Generator and Parity check matrices, Standard array and Syndrome decoding, Hamming codes, Encoding and decoding of systematic and unsystematic codes. Cyclic codes – Generator polynomial, Generator and Parity check matrices, Encoding of cyclic codes, Syndrome computation and error detection, Decoding of cyclic codes, BCH codes, RS codes, Burst error correction.

M.Tech. in Computer Science & Engineering (Information Security) Semester I

Contact Hours (L-T-P): 3-0-0

M11107 - Secure Communication and VPN: Course Outlines

Module 1: Introduction to Communication Security

Module 2: Windows Security

Module 3: VPN

Module 4: VPN & Firewalls

References:
Faculty of Engineering & Technology

M.Tech. in Computer Science & Engineering (Information Security) Semester II

Contact Hours (L-T-P): 3-0-0

M11106 - Digital Image Processing: Course Outlines

Fundamentals Of Image Processing

Image Enhancement and Restoration

Image Segmentation and Feature Analysis
Detection of Discontinuities, Edge Operators, Edge Linking and Boundary Detection, Thresholding, Region Based Segmentation, Motion Segmentation, Feature Analysis and Extraction.

Multi Resolution Analysis and Compressions

Applications of Image Processing
Representation and Description, Image Recognition, Image Understanding, Image Classification, Video Motion Analysis, Image Fusion, Steganography, Colour Image Processing.

Suggested Books:
1. Digital Image Processing - Dr. S.Sridhar Oxford University Press
M12109 - Neural Network: Course Outlines

Introduction to artificial neural networks: Biological neural networks, Pattern analysis tasks: Classification, Regression, Clustering, Computational models of neurons, Structures of neural networks, Learning principles

Linear models for regression and classification: Polynomial curve fitting, Bayesian curve fitting, Linear basis function models, Bias-variance decomposition, Bayesian linear regression, Least squares for classification, Logistic regression for classification, Bayesian logistic regression for classification


Radial basis function networks: Regularization theory, RBF networks for function approximation, RBF networks for pattern classification

Kernel methods for pattern analysis: Statistical learning theory, Support vector machines for pattern classification, Support vector regression for function approximation, Relevance vector machines for classification and regression


Suggested books:
1. B. Yegnanarayana, Artificial Neural Networks, Prentice Hall of India, 1999
4. C.M. Bishop, Pattern Recognition and Machine Learning, Springer,
M12103 - Pattern Recognition: Course Outlines

Introduction and mathematical preliminaries - What is pattern recognition?, Clustering vs. Classification; Applications; Linear Algebra, vector spaces, probability theory, estimation techniques.

Classification: Bayes decision rule, Error probability, Error rate, Minimum distance classifier, Mahalanobis distance; K-NN Classifier, Linear discriminant functions and Non-linear decision boundaries.

Fisher’s LDA, Single and Multilayer perceptron, training set and test sets, standardization and normalization.

Clustering: Different distance functions and similarity measures, Minimum within cluster distance criterion, K-means clustering, single linkage and complete linkage clustering, MST, medoids, DBSCAN, Visualization of datasets, existence of unique clusters or no clusters.

Feature selection: Problem statement and Uses, Probabilistic separability based criterion functions, interclass distance based criterion functions, Branch and bound algorithm, sequential forward/backward selection algorithms, (l,r) algorithm.

Feature Extraction: PCA, Kernel PCA.

Recent advances in PR: Structural PR, SVMs, FCM, Soft-computing and Neuro-fuzzy.

Books & References:

PREREQUISITES

Vector spaces and Linear Algebra; Algorithms.
Probability theory; Statistics.

REFERENCES

M12110- Artificial Intelligence and Expert System: Course Outlines

Overview of Artificial Intelligence: Definition & Importance of AI.

Knowledge: General Concepts: Introduction, Definition and Importance of Knowledge, Knowledge-Based Systems, And Representation of Knowledge, Knowledge Organization, Knowledge Manipulation, And Acquisition of Knowledge.

LISP and Other AI Programming Languages: Introduction to LISP : Syntax and Numeric Function, Basic List Manipulation Functions in LISP, Functions, Predicates and Conditionals, Input, Output and Local Variables, Iteration and Recursion, Property Lists and Arrays, Miscellaneous Topics, PROLOG and Other AI Programming Languages.


Knowledge Organization and Management: Introduction, Indexing and Retrieval Techniques, Integrating Knowledge in Memory, Memory Organization Systems.


Text Book:


Reference Books:

Faculty of Engineering & Technology

M.Tech. in Computer Science & Engineering (Information Security) Semester II

Contact Hours (L-T-P): 3-0-0

M12111-Distributed and Cloud Computing: Course Outlines

Introduction to Parallel and Distributed Systems, goals, hardware concepts, software concepts, client server model; communication, layered protocols, remote procedure call, objective invocation, message & stream oriented communication; processes, threads, clients, servers; naming entities, mobile and unreferenced entities. Clock synchronization, algorithms, transaction; consistency and replication, data-centric & client-centric models, protocols; fault tolerance, process resilience, reliable client-server & group Communication, commit, recovery; security, channels, access, security control; distributed object-based systems explanation and comparison; distributed file systems (SUN, CODA) and comparison; distributed document-based system and coordination-based systems, multimedia systems, Parallel Programming Languages and Algorithms.

Suggested reference materials:
3. Joel M. Crichlow “An Introduction to Distributed & Parallel Computing” 2nd ed. PHI.
4. M. Sasikumar, Dinesh Shikhare P Ravi Prakash "Introduction to parallel Processing" PHI
5. Andrew S. Tanenbaum "Distributed Operating System"TMH
M.Tech. in Computer Science & Engineering (Information Security) Semester II

Contact Hours (L-T-P): 3-0-0

M12112-Grid Computing: Course Outlines

Grid Computing: values and risks – History of Grid computing, Grid computing model and protocols, Overview and types of Grids.

Desktop Grids: Background, Definition, Challenges, Technology, Suitability, Grid server and practical uses, Clusters and Cluster Grids, HPC Grids, Scientific in sight, Application and Architecture, HPC application, Development Environment and HPC Grids, Data Grids, Alternatives to Data Grid, Data Grid architecture.

The open Grid services Architecture, Analogy, Evolution, Overview, Building on the OGSA platform, Implementing OGSA based Grids, Creating and Managing services, Services and the Grid, Service Discovery, Tools and Toolkits, Universal Description Discovery and Integration


Suggested Books:
Module 1: Introduction to WWW, HTML & XML


Module 2: Servlet & JSP


Module 3: EJB

Introduction to EJB, Java Beans, Types of Beans, Session Beans, Context and Naming Convention, Creating Beans for Web Application, Deploying Beans.

Module 4: Web Security


References:
2. Evan Bayross, “HTML, DHTML, Java Script, Perl, CGI”, BPB.
Module 1: Introduction

Module 2: Shortest Path Algorithms

Module 3: Maximum and Minimum Flow Algorithms

Module 4: Trees And Forest

References: