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PROGRAMME: M Tech (CSE) **SEM: III**

Subject Title	Subject Code
Mobile network systems	MTCS 301

Unit	Contents *(Theory)*
I	Introduction to wireless, mobile and cellular mobile systems- cellular mobile telephone systems, analog and digital cellular systems- - fre,.quency reuse, co-channel interference.
II	Medium access control - MAC, SDMA, FDMA, TDMA, CDMA, Hand offs and dropped calls-initiation of handoff, power difference, mobile assisted cell-site and Intersystem handoff.
III	Mobile Telecommunication standards, satellite and broadcast systems - GSM, DECT, TETRA, IMT-2000, CTEO, LEO and MEO, - IEEE 802.11, HIPERLAN, Bluetooth
IV	Network support for mobile systems - Cellular analog, MTSO interconnection, reverse tunneling, IPV6, DHCP, Wireless ATM-W ATM services, functions, radio access layer.
V	Mobile transport and application layer protocol - Review of traditional TCP, fast retransmit/fast recovery, transmission/timeout freezing, file systems, W W W, W AP.

REFERENCES

1. Jochen Sciiiller, "Mobile Communications ", Pearson Education Asia Publications (Low Price Edition), 2000, Ch 1 to 11.
2. William C.Y Lee, "Mobile Cellular Telecommunications ", McGraw Hill International 'Editions, 1995, Ch 1, 2, 8, 9, 11.

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PROGRAMME: M Tech (CSE) **SEM: III**

Subject Title	Subject Code
Fault Tolerant Computing System	MTCS 302

Unit	Contents *(Theory)*
I	Introduction: Computer and Computation Distribution, System models and Fault models. Test generation for combinational circuits, sequential circuits and Fault simulation.
II	Fault Tolerance Concepts- Recovery in time, Fault detection techniques, Modeling Fault tolerant systems - Rollback modular redundancy and Exception Handling.
III	Fault Tolerant in Real time Systems - Architecture of Fault - tolerant computers general purpose commercial systems - High availability systems - Critical computations
IV	Fault Tolerant multiprocessor - Communication Architectures, Shared memory Interconnections, loop architectures, Tree Networks, Graph Network and in Binary cube Interconnections
V	Fault Tolerant Software - **Design** of fault Tolerant software - Reliability Models, Construction of acceptance tests, validation of Fault tolerant software.

References:

1. Israel & Krishnan, "Fault Tolerant Systems" Elsevier Publications, 2007.
2. D. K. Pradhan, "Fault Tolerant computing - Theory and Techniques "Prentice Hall.Inc. 1986.
3. Levi & Agrawala, "Fault Tolerant Systems Design, McGraw hill, 1994.
4. MA. Breuer and A.D.Friedman, "Diagnosis and Reliable design of Digital Systems", Computer Sci. Press, 1976.

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PROGRAMME: M Tech (CSE) **SEM: III**

Subject Title	Subject Code
Design and analysis of parallel algorithms	MTCS 303

Unit	Contents *(Theory)*
I	Introduction to Parallel computers - SIMD - EREW, CREW SM-SIMD algorithms – shared memory SIMD, Tree and mesh interconnection computers.
II	Sorting - Sorting **on a Linear** Array, **Sorting on** a Mesh, **Sorting on** EREW SIMD **computer**, MIMD **Enumeration** Sort, MIMD Quick sort. Sorting on other Networks
III	Matrix operations - Mesh Transpose, Shuffle Transpose, EREW transpose - Mesh. multiplication, Cube multiplication - Matrix by vector Multiplication Tree Multiplication.
IV	Numerical problems- Linear. Equations - SIMD algorithm- Roots of Nonlinear Equations MIMD algorithm- partial Differential Equations, computing Eigen values.
V	Graph Theoretical Problems - computing the connectivity matrix. Finding connected components, Traversing. The minimal Alpha-Beta Tree, Storage requirements.

Reference Books :

1. S.G. Akl, "The Design and Analysis of Parallel Algorithms", Prentice Hall of India. 1989.
2. S. G. Akl, "Parallel Sorting Algorithms ", Academic Press, 1985.

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PROGRAMME: M Tech (CSE) **SEM: III**

Subject Title	Subject Code
Real Time System	MTCS 304

Unit	Contents *(Theory)*
I	Introduction to Real-time computing - Structure of a Real-Time System Characterization of Real-Time Systems and tasks - Performance **measures.**
II	Task Assignment and Scheduling- Uniprocessor scheduling Algorithms - Task Assignment -Mode Changes - Fault Tolerant Scheduling.
III	Real-Time Communication - Network topologies and Architecture Issues - Protocols Contention-based, Token-based, polled bus and Fault Tolerant routing.
IV	Real-Time Databases - Transaction Priorities and Aborts - Concurrency control Issues Scheduling Algorithms - Two-phase approach to improve predictability..
V	Programming Languages and Tools - Hierarchical decomposition - RunTime error handling -Overloading - Timing specification - Recent trends and developments.

References :

1. CM Krishna and Kang G Shin, "Real-Time Systems", International Editions, ISBN-0-07114243-6, McGraw Hill Companies, Inc., New York, 1997

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PROGRAMME: M Tech (CSE) **SEM: III**

Subject Title	Subject Code
High Performance Computing	MTCS 305

Unit	Contents *(Theory)*
I	Introduction to high performance computing: Aim, Architectures, Cluster, Grid,Meta-computing Middle ware, Examples of representative applications. Programming models: Parallel programming paradigms, task partitioning and mapping, shared memory, message passing, peer-to-peer, broker-based. Introduction to PVM and MPI.
II	Architecture of cluster-based systems: Issues in cluster design: performance, single-system-image,fault tolerance, manageability, programmability, load balancing, security, storage.High performance sequential computing:Effects of the memory hierarchy,Out-of-order execution, superscalar processors, Vector processing.
III	Shared-memory processing: Architectures (extensions of the memory hierarchy), Programming paradigms, OpenMP. Distributed-memory processing: Architectural issues (networks and interconnects), Programming paradigms,MPI (+MPI2).
IV	Grids:Computational grids,Data grids,Architecture of Grid systems,Grid security infrastructure, Examples of Grids:Globus.The productivity crisis & future directions: Development overheads, Petaflops programming, New parallel languages: UPC, Titanium, Co-Array FORTRAN.
V	Performance Issues and Techniques:Cost and Frequency Models for I/O, paging, and caching.Notion of Cacheing; temporal and spatial locality models for instruction and data accesses; Intra-process parallelism and pipelining.Typical Compiler Optimizations of Programs; Improving Performance: Identifying program bottlenecks - profiling, tracing; simple high-level-language optimizations - locality enhancement, memory disambiguation, moving loop-invariants.

REFERENCE BOOKS:-

1. Charles Severance, Kevin Dowd, O'reilly, "High Performance Computing", Second Edition July 1998
2. David j. Kuck, "High Performance Computing", Oxford Univ Pr, 1996
3. Gary W. Sabot, "High Performance Computing ", Addison-Wesley, 1995
4. Dowd K, "High Performance Computing", O' Reilly Series, 1993.
5. R.E. Bryant and D. O'Hallaron, "Computer Systems:A Programer's Perspective", Pearson Education, 2003.

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PROGRAMME: M. Tech. (CSE) **SEM: III**

Subject Title	Subject Code
Seminar*	MTCS-306

*** Presentation on the relevant topic.**

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PROGRAMME: M. Tech. (CSE) **SEM: III**

Subject Title	Subject Code
Minor Project	MTCS-307

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PROGRAMME: M Tech (CSE) **SEM: III**

Subject Title	Subject Code
CLOUD COMPUTING	MTCS 314

Unit	Contents *(Theory)*
I	**UNDERSTANDING CLOUD COMPUTING** Cloud Computing, History of Cloud Computing, Cloud Architecture, Cloud Storage, Why Cloud Computing Matters, Advantages of Cloud Computing, Disadvantages of Cloud Computing and Cloud Computing Services
II	**DEVELOPING CLOUD SERVICES** Web-Based Application, Pros and Cons of Cloud Service Development, Types of Cloud Service Development, Software as a Service, Platform as a Service, Web Services, On-Demand Computing, Discovering Cloud Services Development Services and Tools.
III	**CLOUD COMPUTING FOR EVERYONE** Centralizing Email Communications, Collaborating on Schedules, Collaborating on To-Do Lists, Collaborating Contact Lists, Cloud Computing for the Community, Collaborating on Group Projects and Events, Cloud Computing for the Corporation
IV	**USING CLOUD SERVICES** Collaborating on Calendars, Schedules and Task Management, Exploring Online Scheduling Applications, Exploring Online Planning and Task Management, Collaborating on Event Management, Collaborating on Contact Management, Collaborating on Project Management, Collaborating on Word Processing, Collaborating on Databases, Storing and Sharing Files
V	**OTHER WAYS TO COLLABORATE ONLINE** Collaborating via Web-Based Communication Tools, Evaluating Web Mail Services, Evaluating Web Conference Tools, Collaborating via Social Networks and Groupware

REFERENCES

1. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and collaborate Online, Que Publishing, August 2008.
2. Padam Gulwani and Anshuman Sharma "Information Storage and Management", SCITECH Publications
3. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On- demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008.
4. Gautam Shroff, Enterprse Cloud Computing: Technology, Architecture, Application, Cambridge University Press, New Delhi

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PROGRAMME: M Tech (CSE) **SEM: III**

Subject Title	Subject Code
Data Mining & Warehousing	MTCS 315

Unit	Contents *(Theory)*
I	**Data Warehouse**: Evolution, Characteristics, Architecture, Components- Multi Dimensional Data Model (Data Marts, Metadata), Data Warehouse Implementation – Mapping the Data Warehouse to Multiprocessor Architecture, OLAP & OLTP. Data Mining: Motivation, Importance, Functionalities, KDD Steps in Data Mining Process, Architecture, Classification & Techniques. Type of Database.
II	**Mining ASSOCIATION RULES & Data Preparation** Association Rules: Introduction, Single-Dimensional & Multilevel Mining Association Rules for Transaction Databases, Relational databases and Data Warehouses. Boolean Association Rules from Transactional Databases, Association Mining to Correlation Analysis, Constraint-Based Association Mining. Market Basket Analysis, Types of Association Rules, Methods for Classification and Prediction: Methods for Data Classification and Prediction. Data Preparation: Cleaning, Integration, Transformation, Reduction, Discretization Concept Hierarchies.
III	**Mining Primitives & Issues Regarding Classification and Prediction Mining** Primitives: Architecture, Query Languages, Designing Graphical User Interfaces Based on Data Mining Query Language Architectures of Data Mining Systems. Classification and Prediction: Classification by Decision Tree Induction & Back propagation, Bayesian Classification, Classification Based on Concepts from Association Rule Mining, Other Classification Methods, Prediction, Classifier Accuracy.
IV	**Cluster Analysis & Concepts Description** Clusters Analysis: Types of Data in Cluster Analysis, Major Clustering Methods, Partitioning Methods, Hierarchical Methods. Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Outlier Analysis. Concepts Description: Characterization and Comparison, Data Generalization and Summarization Based Characterization, Analytical Characterization-Analysis of Attribute Relevance, Mining Class Comparisons-Discriminating between Different Classes, Mining Descriptive Statistical Measures
V	**Mining of Multimedia Data & Applications Mining** Complex Types of Data: Multidimensional Analysis and Descriptive Mining of Complex, Data Objects, Mining: Spatial Databases, Multimedia Databases, Time-Series and Sequence Data, Text Databases, World Wide Web. APPLICATIONS : Data Mining – Social Impacts of Data Mining – Tools – An Introduction to DB Miner – Case studies – Mining WWW – Mining Text Databases – Mining Spatial Databases.

REFERENCES

1.Data Mining – Concepts and Techniques - JIAWEI HAN & MICHELINE KAMBER Harcourt India.
2.Data Mining Techniques – ARUN K PUJARI, University Press
3.Building the DataWarehouse- W. H. Inmon, Wiley Dreamtech India Pvt. Ltd..
4. Alex Berson, Stephen J Smith, "Data Warehousing, Data Mining & OLAP", Tata Mcgraw Hill, 2004.
Usama M. Fayyad, Gregory Piatetsky , Shapiro, Padhrai Smyth and Ramasamy Uthurusamy, "Advances In
5.Knowledge Discovery And Data Mining", The M.I.T Press, 1996.
6. Ralph Kimball, "The Data Warehouse Life Cycle Toolkit", John Wiley & Sons Inc., 1998.
7. Sean Kelly, "Data Warehousing In Action", John Wiley & Sons Inc., 1997.

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PROGRAMME: M Tech (CSE) **SEM: III**

Subject Title	Subject Code
Computer Graphics and Multimedia	MTCS 324

Unit	Contents *(Theory)*
I	Introduction to raster & random graphics fundamentals, Display devices & comparison Point plotting, line drawing & circle drawing & their algorithm like DDA & Bressenham's, Video Basics, Adapter Cards (MCA, CGA, EGA, VGA, etc.)
II	Translation, Rrotation, Scaling, Shearing reflection, Inverse transformation, Homogeneous co-ordinate system, Matrices transformation, Composite transformation, Windowing and clipping, World co-ordinate system, Screen co-ordinate system, Viewing transformation, Line clipping, Cohen Sudherland, Midpoint line clipping algorithms, Polygon clipping: sudherland- Hodgeman, Weliler-Atherton algorithms.
III	Translation, Rotation, Scaling, Parallel and perspective projection, Types of parallel and perspective projection, Hidden surface elimination: Depth comparison, Back face detection algorithm, Painters algorithm, Z-buffer algorithm, Curve generation, Bezier and B-spline methods
IV	Basic Illumination Model, Diffuse reflection, Specular reflection, Phong Shading, Gourand shading, ray tracing, color models like RGB, YIQ, CMY, HSV
V	An Introduction to Multimedia, Multimedia hardware, Multimedia System Architecture. Data & File Format standards. i.e RTF, TIFF, MIDI, JPEG, DIB, MPEG, Audio: digital audio, MIDI, processing sound, sampling, compression. Video: Avi, 3GP,MOV,MPEG , compression standards, compression through spatial and temporal redundancy. Multimedia Authoring tools

References:

1. Donald Hearn and M.P. Becker "Computer Graphics" Pearson Pub.
2. Pradeep K.Bhatia " Computer Graphics",I.K International Publishing House PVT.LTD
3. Principles of Interactive Computer Graphics by William M. Newman
4. Rogers, "Procedural Elements of Computer Graphics", Tata McGraw Hill
5. Folay Vandam, Feiner, Hughes "Computer Graphics Principle & Practice" , Pearson Pub.
6. Sinha and Udai , "Computer Graphics", Tata McGraw Hill
7. Parekh "Principles of Multimedia" Tata McGraw Hill
8. Prabhat k Andleigh, Kiran Thakral , "Multimedia System Design " PHI Pub.
9. James E. Shuman, "Multimedia in Action" Thomson / Vikas Publishing House.
10. Tay Vaughan " Multimedia: making it work" Tata McGraw Hill 1999, 4th Edition
11. Buss,3D Computer Graphics, Cambridge University Press,New Delhi

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PROGRAMME: M Tech (CSE) **SEM: III**

Subject Title	Subject Code
Simulation & Modeling	MTCS 325

Unit	Contents *(Theory)*
I	**Introduction to modeling and simulation:** Modeling and simulation Methodology, system modeling, concept of simulation, continuous and discrete time simulation. Simulation Examples Queuing systems And Communications networks General Principles -Event -driven Simulation, World Views List processing.
II	**Introduction to Queuing Theory:** Characteristics of queuing system, Poisson's formula, birth-death system, equilibrium of queuing system, analysis of M/M/1 queues. Application of queuing theory in computer system like operating systems, computer networks etc.
III	**Simulation software :** History, Selection process, Simulation in High Level Language (C, C++, Pascal, Fortran), Simulation package(Matlab/Simulink), Interpreted vs. compiled simulators, Future trends. Statistical models-Terminology and Concepts, Useful Statistical Models and Distributions.
IV	**Random Number Generation :** Properties of Random Numbers, Generation of Pseudo-Random Numbers, for Randomness and Pitfalls. Random Variate Generation- Inverse Transform, Direct Transform, Convolution, Reject.
V	**Verification and validation:** Design of simulation experiments, validation of experimental models, testing and analysis. Simulation languages comparison and selection, study simulation sw -SIMULA, DYNAMO, STELLA, POWERSIM.

Reference Books :

1. Gorden G., System simulation, Printice Hall.
2. Payer T., Introduction to system simulation, McGraw Hill.
3. Seila, Applied Simulation Modeling, Cengage
4. Spriet, Computer Aided Modeling and Simulation, W.I.A.
5. Sushil, System Dynamics, Wiley Eastern Ltd. 23
6. Shannon R.E., System simulation, Prentice Hall

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