M.TECH. (COMPUTER SCIENCE AND ENGINEERING)

CURRICULUM I TO IV SEMESTERS (FULL TIME)

SEMESTER I

Paper Code	Paper Name	Weekly Contact Paper Period (WCP)				Credit	Marks
		Lecture	Tutorial	Practical	Total		
Theoretical:							
MTCSE120	Mobile Communication	3	0	0	3	3	100
MTCSE121	Advanced Computer Architecture	3	0	0	3	3	100
MTCSE122	Data Structures and Algorithms	3	0	0	3	3	100
MTCSE123	Object Oriented Software Engineering	3	0	0	3	3	100
MTCSE124	Computer Networks and Management	3	0	0	3	3	100
Practical:							
MTCSE125	Data Structures Lab	0	0	3	3	2	50
MTCSE126	Networking Lab	0	0	3	3	2	50
MTCSE127	Software Engineering Lab	0	0	3	3	2	50
Total Marks: 650							

MOBILE COMMUNICATION
MTCSE120

UNIT I
WIRELESS COMMUNICATION FUNDAMENTALS
Introduction – Wireless transmission – Frequencies for radio transmission – Signals – Antennas – Signal Propagation – Multiplexing – Modulations – Spread spectrum – MAC – Cellular Wireless Networks.

UNIT II
TELECOMMUNICATION SYSTEMS
GSM – System Architecture – Protocols – Connection Establishment – Frequency Allocation – Routing – Handover – Security – GPRS.

UNIT III
WIRELESS NETWORKS
Wireless LAN – IEEE 802.11 Standards – Architecture – Services – HIPERLAN – Adhoc Network – Blue Tooth-Future Wireless Network- Case study on 4G- Architecture of Wireless Network- Wireless ATM.

UNIT IV
NETWORK LAYER
Mobile IP – Dynamic Host Configuration Protocol – Routing Protocols.

UNIT V
TRANSPORT AND APPLICATION LAYERS
TCP over Wireless Networks – Indirect TCP – Snooping TCP – Mobile TCP – Fast Retransmit / Fast Recovery – Transmission/Timeout Freezing – Selective Retransmission – Transaction Oriented TCP – WAP – WAP Architecture – WDP – WTLS – WTP – WSP – WML –WML Script– WAE – WTA.

TEXT BOOKS:

1. Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education, 2003.
2. William Stallings, "Wireless Communications and Networks", Pearson Education, 2002.

REFERENCES:

1. Kaveh Pahlavan, Prasanth Krishnamoorthy, "Principles of Wireless Networks", First Edition, Pearson Education, 2003.
2. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, 2003.
3. C.K.Toh, "AdHoc Mobile Wireless Networks", First Edition, Pearson Education, 2002.
4. Burkhardt, "Pervasive Computing", First Edition, Pearson Education, 2003.

ADVANCED COMPUTER ARCHITECTURE
MTCSE121

UNIT I
FUNDAMENTALS OF COMPUTER DESIGN AND PIPELINING
Fundamentals of Computer Design – Measuring and reporting performance – Quantitative principles of computer design. Instruction set principles – Classifying ISA – Design issues. Pipelining – Basic concepts – Hazards – Implementation – Multi-cycle operations.

UNIT II
INSTRUCTION LEVEL PARALLELISM WITH DYNAMIC APPROACHES
Concepts – Dynamic Scheduling – Dynamic hardware prediction – Multiple issues – Hardware based speculation – Limitations of ILP – Case studies.

UNIT III
INSTRUCTION LEVEL PARALLELISM WITH SOFTWARE APPROACHES
Compiler techniques for exposing ILP – Static branch prediction – VLIW – Advanced compiler support – Hardware support for exposing more parallelism – Hardware versus software speculation mechanisms – Case studies.

UNIT IV
MULTIPROCESSORS AND MULTICORE ARCHITECTURES
Symmetric and distributed shared memory architectures – Performance issues – Synchronization issues – Models of memory consistency – Software and hardware multithreading – SMT and CMP architectures – Design issues – Case studies.

UNIT V
MEMORY AND I/O
Cache performance – Reducing cache miss penalty and miss rate – Reducing hit time – Main memory and performance – Memory technology. Types of storage devices – Buses – RAID – Reliability, availability and dependability – I/O performance measures – Designing an I/O system.

REFERENCES:

1. John L. Hennessey and David A. Patterson, "Computer Architecture – A quantitative approach", Morgan Kaufmann / Elsevier, 4th. edition, 2007.
2. David E. Culler, Jaswinder Pal Singh, "Parallel Computing Architecture: A hardware/ software approach", Morgan Kaufmann / Elsevier, 1997.
3. William Stallings, "Computer Organization and Architecture – Designing for Performance", Pearson Education, Seventh Edition, 2006.
4. Behrooz Parhami, "Computer Architecture", Oxford University Press, 2006.

DATA STRUCTURES AND ALGORITHMS
MTCSE122

UNIT I
COMPLEXITY ANALYSIS & ELEMENTARY DATA STRUCTURES
Asymptotic notations – Properties of big oh notation – asymptotic notation with several parameters – conditional asymptotic notation – amortized analysis – NP-completeness – NP hard– recurrence equations – solving recurrence equations – arrays – linked lists – trees.

UNIT II
HEAP STRUCTURES
Min-max heaps – Deaps – Leftist heaps –Binomial heaps – Fibonacci heaps – Skew heaps - Lazy-binomial heaps.

UNIT III
SEARCH STRUCTURES
Binary search trees – AVL trees – 2-3 trees – 2-3-4 trees – Red-black trees – B-trees – splay trees – Tries.

UNIT IV
GREEDY & DIVIDE AND CONQUER
Quicksort – Strassen's matrix multiplication – Convex hull - Tree-vertex splitting – Job sequencing with deadlines – Optimal storage on tapes

UNIT V
DYNAMIC PROGRAMMING AND BACKTRACKING
Multistage graphs – 0/1 knapsack using dynamic programming – Flow shop scheduling – 8-queens problem – graph coloring – knapsack using backtracking

REFERENCES:

1. E. Horowitz, S. Sahni and Dinesh Mehta, Fundamentals of Data structures in C++, Galgotia, 1999.
2. E. Horowitz, S.Sahni and S. Rajasekaran, Computer Algorithms / C++, Galgotia, 1999.
3. Adam Drozdex, Data Structures and algorithms in C++, Second Edition, Thomson learning – vikas publishing house, 2001.
4. G. Brassard and P. Bratley, Algorithmics: Theory and Practice, Printice –Hall, 1988.
5. Thomas H.Corman, Charles E.Leiserson, Ronald L. Rivest, "Introduction to Algorithms", Second Edition, PHI 2003.

OBJECT ORIENTED SOFTWARE ENGINEERING
MTCSE123

UNIT I
INTRODUCTION
System Concepts – Software Engineering Concepts – Development Activities – Managing Software Development – Unified Modeling Language – Project Organization – Communication

UNIT II
ANALYSIS
Requirements Elicitation – Concepts – Activities – Management – Analysis Object Model – Analysis Dynamic Models

UNIT III
SYSTEM DESIGN
Decomposing the system – Overview of System Design – System Design Concepts – System Design Activities – Addressing Design Goals – Managing System Design

UNIT IV
OBJECT DESIGN AND IMPLEMENTATION ISSUES
Reusing Pattern Solutions – Specifying Interfaces – Mapping Models to Code – Testing

UNIT V
MANAGING CHANGE
Rationale Management – Configuration Management – Project Management – Software Life Cycle

REFERENCES:

1. Bernd Bruegge, Alan H Dutoit, Object-Oriented Software Engineering, 2nd ed, Pearson Education, 2004.
2. Craig Larman, Applying UML and Patterns, 3rd ed, Pearson Education, 2005.
3. Stephen Schach, Software Engineering 7th ed, McGraw-Hill, 2007.

COMPUTER NETWORKS AND MANAGEMENT
MTCSE124

UNIT I
HIGH SPEED NETWORKS
Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection, ATM Cell – ATM Service Categories – AAL. High Speed LAN's: Fast Ethernet, Gigabit Ethernet, Fiber Channel – Wireless LAN's.

UNIT II
CONGESTION AND TRAFFIC MANAGEMENT
Queuing Analysis- Queuing Models – Single Server Queues – Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks– Frame Relay Congestion Control.

UNIT III
TCP AND ATM CONGESTION CONTROL
TCP Flow control – TCP Congestion Control – Retransmission – Timer Management – Exponential RTO back off – KARN's Algorithm – Window management – Performance of TCP over ATM. Traffic and Congestion control in ATM – Requirements – Attributes – Traffic Management Frame work, Traffic Control – ABR traffic Management – ABR rate control, RM cell formats, ABR Capacity allocations – GFR traffic management.

UNIT IV
INTEGRATED AND DIFFERENTIATED SERVICES
Integrated Services Architecture – Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ – Random Early Detection, Differentiated Services.

UNIT V
PROTOCOLS FOR QoS SUPPORT
RSVP – Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms – Multiprotocol Label Switching – Operations, Label Stacking, Protocol details – RTP – Protocol Architecture, Data Transfer Protocol, RTCP.

TEXT BOOKS:

1. William Stallings, "HIGH SPEED NETWORKS AND INTERNET", Pearson Education, Second Edition, 2002.

REFERENCES:

1. Warland & Pravin Varaiya, "HIGH PERFORMANCE COMMUNICATION NETWORKS", Jean Harcourt Asia Pvt. Ltd., II Edition, 2001.
2. Irvan Pepelnjk, Jim Guichard and Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume 1 and 2, 2003.

DATA STRUCTURES LAB

MTCSE125

1. Write C/C++ programs to implement the following using an array.
    a) Stack ADT
    b) Queue ADT
2. Write a C/C++ program to perform Min Heap.
3. Write a C/C++ program to perform Min Deaps.
4. Write a C/C++ program to perform the following operations:
    a) Insert an element into a binary search tree.
    b) Delete an element from a binary search tree.
    c) Search for a key element in a binary search tree.
5. Write a C/C++ program to perform the following operations on B-Trees:
    a) Insertion
    b) Deletion
6. Write a C/C++ program to perform the following operations on AVL-Trees:
    a) Insertion
    b) Deletion
7. Write a C/C++ program to perform Tries.
8. Write a C/C++ program for sorting a given list of elements in ascending order using Quick sort method.
9. Write a C/C++ program to implement convex hull
10. Write a C/C++ program to perform 0/1 Knapsack using Dynamic Programming.
11. Write a C/C++ program to perform Graph coloring using backtracking.
12. Consider the problem of eight queens on an (8x8) chessboard. Two queens are said to attack each other if they are on the same row, column, or diagonal. Write a C++ program that implements backtracking algorithm to solve the problem i.e. place eight non-attacking queens on the board.

NETWORKING LAB
MTCSE126

1. Socket Programming
    a. TCP Sockets
    b. UDP Sockets
    c. Applications using Sockets
2. Simulation of Sliding Window Protocol
3. Simulation of Routing Protocols
4. Development of applications such as DNS/ HTTP/ E – mail/ Multi - user Chat
5. Simulation of Network Management Protocols
6. Study of Network Simulator Packages – such as opnet, ns2, etc.

SOFTWARE ENGINEERING LAB
MTCSE127

Programs, assignments covering the need of Software Engineering (MTCSE123)

CASE TOOLS

The student is expected to take up about five mini-projects and model them and produce Use Cases, Analysis documents- both Static and Dynamic aspects, Sequence Diagrams and State-Charts, Database Design using Rational Products.

1. Online Bookshop
2. Simulation of a small manufacturing Company
3. A Content Management System
4. Air traffic Simulation
5. Automated Community Portal
6. File Management System
7. Medical Imaging System