

M. Tech. - Computer science & Engineering - Part Time – 2007

Course Code	Course Title	L	T	P	C
Semester – I – Theory					
MCS651	Computer Architecture	3	0	3	4
MCS653	Operating Systems	3	0	0	3
MCS655	Data Structures and Algorithms	3	0	0	3
	Sub Total	10			
Semester – II – Theory					
MCS652	Microprocessor Based System Design	3	0	3	4
MMA652	Mathematical Foundations for Computer Science	3	1	0	4
MCSE02 / MCSE04 / MCSE06 / MCSE08	Elective-1	3	0(1)	0	3(1)
Practical					
MCS691	Computer Lab 1 (OS and Data Structures Lab)	0	0	6	2
	Sub Total	13(1)			
Semester – III – Theory					
MCS751	Compiler Design	3	1	0	4
MCS753	Computer Networks	3	0	3	4
MCSE01/ MCSE03/ MCSE05/ MCSE07	Elective - 2	3	0	0	3(1)
	Sub Total	11(1)			
Semester – IV – Theory					
MMG752	Engineering Management	3	0	0	3
MCS752	Database Technology	3	0	0	3
MCSE10 / MCSE12 / MCSE14 / MCSE16	Elective-3	3	0(1)	0	3(1)
Practical					
MCS792	Computer lab - II (System S/W& DBMS Lab)	0	0	6	2
MCS794	Term Paper/Seminar	0	0	6	2
MCS796	Industrial Training/ Interdepartmental Project	0	0	3	1
	Sub Total	14(1)			
Semester –V- Theory					
Course Code	Course title	L	T	P	C
MCS851	Software Engineering	3	1	0	4
MCSE09 / MCSE11 / MCSE13 / MCSE15	Elective-4	3	0(1)	0	3(1)
MCSE17 / MCSE19 / MCSE21/ MCSE23 / MCSE25	Elective- 5	3	0(1)	0	3(1)
Practical					
MCS891	Project Work Phase-1	0	0	12	6
	Sub Total	16(2)			
Semester –VI					
Practical					
MCS892	Project work Phase -II	0	0	24	15
	Sub Total	15			
	Grand Total	79(5)			

Total Credits to be earned for the award of the Degree: 79(+5)

MCS655	DATA STRUCTURES AND ALGORITHMS	3	0	0	3
LINEAR AND NON-LINEAR DATA STRUCTURES 9					
Stacks, Queues & Lists Implementation and Applications – Cursor implementation of Linked Lists – Trees – Binary Trees – Binary Search Tree – Tree Traversals – AVL Trees – Splay Trees.					
SEARCHING AND SORTING 9					
Sequential search – Binary search – sorting techniques: Bubble sort, selection sort, insertion sort, heap sort, merge sort, quick sort and radix sort					
ALGORITHMS 9					
Greedy Algorithms – Dynamic Programming – Back patching – Branch and Bound – Divide and Conquer – Lower Bound Theory.					
GRAPH AND PARALLEL ALGORITHMS 9					
Graphs – representations – traversals: BFS, DFS – minimum spanning tree – shortest path – bi-connected and strongly components – parallel algorithms – sorting – matrix multiplication					
SELECTED TOPICS 9					
NP completeness – approximation algorithms – NP hard problems – magic square.					
References:					
1. E. Horowitz, S. Sahani & Mehta Fundamentals of Data Structures in C++, Galgotia 1999.					
2. Langsman, Augestein & Tanenbaum, Data Structures Using C & C++, 2 nd Edition, PHI 2002.					
3. T.H. Cormen, C.E. Leiserson, R.L. Rivest, Introduction to Algorithms, McGraw Hill Book Company, 1994.					
4. Weiss, Data Structures and Algorithm Analysis in C++ 2 nd Edition Pearson Education 2003.					
5. M.J. Quinn, Designing Efficient Algorithms for Parallel Computers, McGraw Hill Book Company, 1998.					
6. Kenneth A. Berman & Jerome L. Paul, Fundamentals of Sequential and Parallel Algorithms Thomson Learning 2003.					
MCS652	MICROPROCESSOR BASED SYSTEM DESIGN	3	0	3	4
ARCHITECTURE AND PROGRAMMING ISSUES OF 8086 9					
Intel 8086 architecture – addressing modes – instruction set – format – assembler directives – Assembly language programming					
ARCHITECTURE FEATURES OF ADVANCED PROCESSORS 9					
Architectural features of 80286, 80386, 80486, Pentium, Pentium Pro, Celeron, PII, PIII & P4 processors, multimedia extensions – Applications					
CONTROL APPLICATIONS 9					
Microprocessors for Control Applications – Micro controller based design of a system – Real time control using micro controllers.					
INTERFACING 9					
Interfacing with peripheral devices - Peripheral Controllers – Bus concepts – Bus Standards – Examples – Choosing a bus standard for an application.					
SPECIAL PURPOSE PROCESSORS 9					
Introduction to Co-processors, DSP Processors, Graphic Processors and their applications					
References:					
1. Barry B. Brey, The Intel Microprocessors 8086/8088, 80186/80188, 80286, 386, 486 Pentium, Pentium Pro, Pentium II, PIII, P4: Architecture Programming and Interfacing 6 th Edition, Pearson Education, 2003.					
2. Microprocessors and Micro Computer Based System Design, Mohammed Rafiqzaman, PHI 2003.					
3. Liu & Gibson Microcomputer Systems: The 8086/88 Family: Architecture, Programming & Design 2 nd Edition PHI 2002.					
4. The 8086 /8088 family : Design Programming and interfacing , Uffenback , PHI 2002.					
5. The 8088 and 8086 microprocessor :Programming ,Interfacing , Software , Hardware and Applications. Triebel &Singh ,PHI 2002					
MMA652	MATHEMATICAL FOUNDATION FOR COMPUTER SCIENCE	3	1	0	4
LOGIC 9					
Statements - Connectives - Truth Tables - Normal forms - Predicate calculus - Inference - Theory for Statement Calculus and Predicate Calculus - automata theorem proving. SETS - Sets - Relations – Graphs – Functions. COMBINATORICS: Review of Permutation and Combination - Mathematical Induction - Pigeonhole principle - Principle of Inclusion and Exclusion - generating function - Recurrence relations					
ALGEBRAIC STRUCTURES 9					
Semi group - Monoid – Groups (Definition and Examples only) Cyclic group - Permutation group (Sn and Dn) - Substructures - Homomorphism of semi group, monoid and groups - Cosets and Lagrange Theorem – Normal Subgroups - Rings and Fields (Definition and examples only)					
RECURSIVE FUNCTIONS 9					
Recursive functions – primitive recursive functions – computable and non computable functions. LATTICES: Partial order relation – poset – Hasse Diagram – Boolean algebra.					
FINITE AUTOMATA AND REGULAR LANGUAGES 9					
Finite automata and regular languages-Regular expressions and regular languages-Memory required to recognize a language-Non Determinism and Kleene’s Theorem-Pumping Lemma-Decision Problems					
PUSH DOWN AUTOMATA AND CONTEXT FREE LANGUAGES 9					
Push down Automata and Context free languages-context free grammars-definition –examples-operations-derivation trees-Ambiguity-PDA and CFG Context free and non –context free languages.					
References:					
1. J. P. Trembley, Manohar, Discrete Mathematical Structures with Applications to Computer Science, TMH					
2. K.H. Rosen, “Discrete Mathematics and its Applications”, McGraw - Hill Book Company, 1999.					
3. John. C. Martin, “Introduction to Languages and Theory of Computation”, II edition, McGraw Hill 1997.					
4. Hop craft and Ulman, “Introduction to automata, languages and computation”, Narosa Publishers 1986.					
5. Mott, Kandel & Baker, “Discrete Mathematics for Computer Scientists & Mathematics”, 2 nd Edition, PHI 2002					

Reference Books:

- 1.R.Pannerselvam,"Production and operation Management", Prentice Hall of India,2002.
- 2.Reddin W.J., "Effective Management", Tata McGraw Hill Company, New Delhi,1998.
- 3.S.S.Khanka,"Entrepreneurial Development", S.Chand and Company Limited, New Delhi,2001.
- 4.Gaither,"Production and Operations Management ", Thomson Asia (P) Ltd., Bombay, Ninth Edition,2002.
- 5.Chase,Aquilano & Jacob "Production and Operations Management", Tata McGraw Hill, 8th Edition,1999.
- 6.Principles of Marketing :Philip Kotler,Tata McGraw Hill,8th edition ,2004.
- 7.Chakraborty,Managerial effectiveness and Quality of Work life: Indian Insights, Tata McGraw Hill,2000.
- 8.Hisrich, Entrepreneurship, Tata McGraw Hill, New Delhi,2001.

MCS752	DATABASE TECHNOLOGY	3	0	0	3
INTRODUCTION TO DATABASE 9					
Database Environment – Data Models – Relational Model – Relational algebra and Calculus – SQL: Data Definition, Data Manipulation, Query by Example – Commercial Databases: PL/SQL – Stored Procedure.					
DATABASE PLANNING 9					
Design and Administration – Fact Finding Techniques – ER Modeling – Enhanced ER Modeling – Normalization					
SECURITY 9					
Transaction Management – Query Processing – Programmatic SQL – Distributed DBMS: Introduction, Architecture, Design and Advanced Concepts – Query Processing – Updating Distributed Data – Distributed Transaction Management, Concurrency Control – Recovery.					
INTRODUCTION TO OBJECT DBMS 9					
Concepts – Design – Standards and Systems – Object relational DBMS – OODBMS.					
DBMS IN WEB APPLICATIONS 9					
Structured and Semi Structured Data: XML and DBMS – Overview: of Data Warehousing– OLAP – Data Mining.					

References

1. Thomas M Connolly, Carolyn E Begg , Database Systems 3/e, A Practical Approach to Design Implementation and Management, Addison Wesley.
2. Bipin C. Desai, An Introduction to Database Systems, Galgotia Publications 2001.
3. C. J. Date, An Introduction to Database Systems 7/e, Pearson Education.
4. Abraham Silberschatz, Henry F Korth, S.Sudershan Database System Concepts Fourth Ed.
5. Prabhu, Object Oriented Database Systems: Approaches and Architecture, PHI 2002.
6. Morrison, Database Driven Websites, Thomson Learning 2003.

MCS794	TERM PAPER AND SEMINAR	0	0	6	2
<ul style="list-style-type: none"> ❖ The Students are expected to prepare paper on any current emerging technology in computer science. ❖ The Students are expected to deliver the seminars on the respective topics. ❖ The students will be evaluated based on the presentation and demonstration. ❖ Report and VIVA-VOCE 					

MCS851	SOFTWARE ENGINEERING	3	1	0	4
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Unit I

Introduction – Computer Based System Engineering – Emergent System Properties – Systems and their environment – System modeling – The system engineering process – System procurement - Software Process – Software Process Models – Process iteration – Software specification – Software design and implementation – Software validation – Software evolution – Automated process support – Project Management – Management activities - Project planning – Project scheduling – Risk Management. **9**

Unit II

Software Requirements – Functional and non-functional requirements – User requirements – System requirements – The software requirements document – Requirements engineering Processes – Feasibility studies – Requirements elicitation and analysis – Requirements validation – Requirements management – System Models – Context models – Behavioral models – Data models – Object Models – CASE Workbenches – Software Prototyping – Prototyping in the software process – Rapid prototyping technique – User Interface Prototyping – Formal specification – Formal specification in the software process – Interface specification – Behavioral specification **9**

Unit III

Architectural Design – System structuring – Control models – Modular decomposition – domain Specific architectures – Distributed systems architectures – Multiprocessor architectures – Client-Server Architectures – Distributed object architectures – CORBA – Object-Oriented Design – Objects and object classes – Design Evolution – Real-time Software design – System design, Real-time executives –Monitoring and control systems – Data acquisition systems – Design with reuse – Component-based development – Application families – Design patterns – User Interface Design – Principles – User Interaction – Information Presentation – User Support – Interface Evaluation **9**

Unit-IV:

Dependability – Critical systems – Availability and Reliability – Safety – Security – Critical System Specification – Software Reliability Specification – Safety Specification – Security Specification – Critical System Development – Fault Minimization – Fault Tolerance – Fault Tolerant Architectures – Safe System Design **9**

Unit V

Verification and Validation – Planning – Software inspections – Automated static analysis – Clean room Software Development – Software Testing – Defect Testing – Integration Testing – Object Oriented Testing – Testing Work benches – Critical Systems validation – Formal methods and Critical Systems - Reliability validations – Safety Assurance – Security Assessments – Managing people-Software cost estimation- Quality management – process improvement. **9**

REFERENCES

1. Sommerville I, "Software Engineering", 6th edition, Addison Wesley, 2001.
2. Fairley, "Software Engineering Concepts", McGraw-Hill, 1985.
3. Roger S. Pressman, 'Software Engineering: A Practitioner Approach', 5th edition, McGraw-Hill, 1999.
4. David Gustafson, "Software Engineering", Schaum's outlines, Tata McGraw-Hill, 2003.

MCSE02	MULTIMEDIA SYSTEMS	3	0	0	3
INTRODUCTION 9					
Multimedia applications - System architecture - Objects of Multimedia Systems -Multimedia databases.					
COMPRESSION AND FILE FORMATS 9					
Types of compression - Image compression - CCITT - JPEG - Video image compression - MPEG-DVI Technology - Audio compression - RTF format - TIFF file format - RIFF file format - MIDI - JPEG DIB - TWAIN.					
INPUT/OUTPUT TECHNOLOGIES 9					
Traditional devices - Pen input - Video display systems - Scanners - Digital audio - Video images and animation.					
STORAGE AND RETRIEVAL 9					
Magnetic Media - RAID - Optical media - CD-ROM - WORM - Juke box - Cache management – DVD.					
APPLICATION DESIGN 9					
Application classes - Types of systems - Virtual reality design - Components - Databases - Authoring Systems - Hyper media - User interface design - Display/Playback issues - Hypermedia linking and embedding.					
References					
1. Andleigh PK and Thakrar K, Multimedia Systems Design, Pearson Education, 2003					
2. Vaughan T, Multimedia, Tata McGraw Hill, 1999.					
3. Koegel Buford JFK, Multimedia Systems, Addison Wesley Longman, 1999.					
4. Steinmetz, Multimedia: Computing, Communicatio and Application Pearson Education 1996					
5. Rao, Bojkovic & Milovanovic, Multimedia Communication Systems: Techniques standards & Networks PHI 2003					
MCSE04	SOFT COMPUTING	3	0	0	3
ARTIFICIAL NEURAL NETWORKS 9					
Basic concepts - Single layer perception - Multilayer Perception - Supervised and Unsupervised learning -Back propagation networks - Kohnen's self organizing networks - Hopfield network..					
FUZZY SYSTEMS 9					
Fuzzy sets and Fuzzy reasoning - Fuzzy matrices - Fuzzy functions - Decomposition - Fuzzy automata and languages - Fuzzy control methods - Fuzzy decision making.					
NEURO - FUZZY MODELING 9					
Adaptive networks based Fuzzy interface systems - Classification and Regression Trees - Data clustering algorithms - Rule based structure identification - Neuro-Fuzzy controls - Simulated annealing – Evolutionary computation.					
GENETIC ALGORITHMS 9					
Survival of the Fittest - Fitness Computations - Cross over - Mutation -Reproduction - Rank method - Rank space method					
SOFTCOMPUTING AND CONVENTIONAL AI 9					
AI search algorithm - Predicate calculus - Rules of interference – Semantic networks - Frames - Objects - Hybrid models - Applications.					
References					
1. Jang J.S.R., Sun C.T. and Mizutani E, "Neuro-Fuzzy and Soft computing", Pearson Education 2003.					
2. Timothy J.Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill, 1997.					
3. Laurene Fausett, "Fundamentals of Neural Networks", Pearson Education, 2003.					
4. George J. Klir and Bo Yuan, "Fuzzy sets and Fuzzy Logic", Prentice Hall, USA 1995.					
5. Nih J.Nelsson, "Artificial Intelligence - A New Synthesis", Harcourt Asia Ltd., 1998.					
6. D.E . Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley,N.Y, 1989.					
MCSE06	PATTERN RECOGNITION	3	0	0	3
PATTERN RECOGNITION 9					
Overview of pattern recognition - Discriminant functions - Supervised learning - Parametric estimation -Maximum likelihood estimation - Bayesian parameter estimation - Perceptron algorithm - LMSE algorithm -Problems with Bayes approach - Pattern classification by distance functions - Minimum distance pattern classifier.					
UNSUPERVISED CLASSIFICATION 9					
Clustering for unsupervised learning and classification - Clustering concept - C-means algorithm - Hierarchical clustering procedures - Graph theoretic approach to pattern clustering - Validity of clustering solutions.					
STRUCTURAL PATTERN RECOGNITION 9					
Elements of formal grammars - String generation as pattern description - Recognition of syntactic description - Parsing - Stochastic grammars and applications - Graph based structural representation.					
FEATURE EXTRACTION AND SELECTION 9					
Entropy minimization - Karhunen - Loeve transformation - Feature selection through functions approximation - Binary feature selection.					
RECENT ADVANCES 9					
Neural network structures for Pattern Recognition - Neural network based Pattern associates – Unsupervised learning in neural Pattern Recognition - Self organizing networks - Fuzzy logic - Fuzzy pattern classifiers - Pattern classification using Genetic Algorithms.					
References					
1. Robert J.Schalkoff, Pattern Recognition: Statistical, Structural and Neural Approaches, John Wiley & Sons Inc., New York, 1992.					
2. Tou and Gonzales, Pattern Recognition Principles, Wesley Publication Company, London, 1974.					
3. Duda R.O., and Hart.P.E., Pattern Classification and Scene Analysis, Wiley, New York,1973.					
4. Morton Nadier and Eric Smith P., Pattern Recognition Engineering, John Wiley & Sons, New York, 1993					

MCSE08	INTERNET PROGRAMMING	3	1	0	4
INTRODUCTION TO INTERNET SERVICES: CLIENT SIDE SCRIPTING					
Overview – Hyper Text Markup Language – Java Script Programming – DHTML:					
FUNDAMENTALS OF JAVA					
Features of Java – Object Oriented Concepts – Classes – Objects – Abstract Class – Interfaces - Packages – Exception Handling – Multi Threading.					
CORE JAVA					
Abstract Window Toolkit – JFC - Applets – Networking.					
ADVANCED JAVA					
Networking - JDBC – Servlets – JSP (Java Server Pages) – JAVA BEANS .					
ENTERPRISE TECHNOLOGIES					
RMI – Introduction to EJB.					
References					
1. Deitel & Deitel, Internet & World Wide Web How to program, Prentice Hall 2000.					
2. Java 2: The Complete Reference, D. Norton and H. Schildt, Tata McGraw- Hill 2000.					
3. Java Servlets: Application Development, Karl Moss, 2/e, Tata McGraw- Hill.					
4. Bruce Eckel, Thinking in Java 2 nd Edition, Pearson Education 2000.					
5. Cay S. Horstmann, Gray Cornell, Core Java 2 Vol. 1 & 2. Pearson Education 2001					
MCSE01	OBJECT ORIENTED ANALYSIS AND DESIGN	3	0	0	3
OBJECT ORIENTED DESIGN PRINCIPLES					
The Object model – Classes and objects – Complexity – Classification – Notation – Process – Pragmatics – Binary and entity relationship – Object types – Object state – OOAD life cycle					
OBJECT ORIENTED ANALYSIS					
Overview of Object Oriented Analysis – Shaler/Mellor, Coad/Yourdan, Rambaug, Booch – UML – Use cases – Conceptual model – Behavior analysis – Overview of diagrams – Aggregation.					
OBJECT ORIENTED DESIGN METHODS					
UML – Diagrams – Collaborations – Sequence – Class – Design patterns and frameworks – Comparisons with other design methods.					
MANAGING OBJECT ORIENTED DEVELOPMENT					
Managing analysis and design – Evaluation – Testing – Coding – Maintenance - Metrics					
CASE STUDIES IN OBJECT ORIENTED DEVELOPMENT					
Design of foundation class libraries – Object Oriented Databases – Client/Server computing – Middleware					
References:					
1. Craig Larman, “Applying UML and Patterns”, Addison Wisley, 2000					
2. Grady Booch, James Rambaug, Ivar Jacobson , “The Unified Modeling Language User guide”, Addison Wisley 1999					
3. Ali Bahrami, “Object Oriented System Development”, McGraw Hill International Edition 1999					
4. Fowler, “Analysis Patterns”, Addison Wisley, 1994					
5. Erich Gamma, “Design Patterns”, Addison Wisley, 1994					
MCSE03	DIGITAL IMAGE PROCESSING	3	0	0	3
DIGITAL IMAGE FUNDAMENTALS					
Image Transforms - Walsh, Hadamard, Discrete cosine, Hotelling Transforms, Image formation, File formats – FFT.					
IMAGE ENHANCEMENT AND RESTORATION					
Histogram modification techniques - Image smoothening - Image Sharpening - Image Restoration - degradation Model - Digitalization of Circulant and block circulant matrices - Algebraic approach to restoration.					
IMAGE COMPRESSION AND SEGMENTATION					
Compression Models - Elements of information theory - Error free Compression -Image segmentation - Detection of Discontinuities - Edge linking and boundary detection - Threshold - Regions Oriented Segmentations - Morphology.					
FEATURE EXTRACTION					
Image feature description - Interpretation of Line drawings, Image pattern recognition algorithms.					
KNOWLEDGE REPRESENTATION AND USE					
Knowledge representations and use - Image analysis using Knowledge about scenes - Image understanding using two dimensional methods.					
References					
1. Gonzalez R & Woods B.E., Digital Image Processing, Iind Ed., Pearson Education 2002					
2. Nick Efford, Digital Image Processing, Pearson Education 2000.					
3. Chanda & Majumder, Digital Image Processing, Pearson Education 2000.					
4. Anil Jain.K, Fundamentals of Digital image Processing, Prentice Hall of India, 1989.					
5. Sid Ahmed, Image Processing, McGraw Hill, New York, 1995.					
MCSE05	AGENT BASED SYSTEMS	3	0	0	3
INTRODUCTION					
Definitions - History - Intelligent Agents - Structure-Environment - Basic Problem Solving Agents-Formulating - Search Strategies - Intelligent search - Game playing as search.					

KNOWLEDGE BASED AGENTS	9
Representation - Logic-First order logic - Reflex Agent - Building a knowledge Base - General Ontology -Inference - Logical Recovery	
PLANNING AGENTS	9
Situational Calculus - Representation of Planning - Partial order Planning- Practical Planners – Conditional Planning - Replanning Agents	
AGENTS AND UNCERTAINTY	9
Acting under uncertainty - Probability Bayes Rule and use - Belief Networks - Utility Theory – Decision-Network - Value of Information - Decision Theoretic Agent Design.	
HIGHER LEVEL AGENTS	9
Learning agents - General Model - Inductive Learning - Learning Decision Trees-Reinforcement Learning -Knowledge in Learning - Communicative agents -Types of communicating agents - Future of AI	

References

1. Stuart Russell and Peter Norvig Artificial Intelligence - A Modern Approach, Pearson Education, 2003.
2. Patrick Henry Winston, Artificial Intelligence, 3rd Edition, AW, 1999.
3. Nils.J.Nilsson, Principles of Artificial Intelligence, Narosa Publishing House, 1992.

MCSE07	NEURAL NETWORKS	3	0	0	3
BACK PROPAGATION					9
Introduction to Artificial Neural Systems - Perceptron - Representation - Linear separability - Learning -Training algorithm - The back propagation network - The generalized delta rule - Practical considerations -BPN applications.					
STATISTICAL METHODS					9
Hopfield nets - Cauchy training - Simulated annealing - The Boltzmann machine. Associative memory -Bidirectional associative memory - Applications.					
COUNTER PROPAGATION NETWORK & SELF ORGANIZING MAPS					9
CPN building blocks - CPN data processing. SOM data processing - Applications.					
ADAPTIVE RESONANCE THEORY AND SPATIO TEMPORAL PATTERN CLASSIFICATION					9
ART network description - ART1 - ART2 - Application. The formal avalanche - Architecture of spatio temporal networks - The sequential competitive avalanche field - Applications of STNs.					
NEO – CONGNITRON					9
Cognitron - Structure & training - The neocognitron architecture - Data processing - Performance – Addition of lateral inhibition and feedback to the neocognitron. Optical neural networks - Holographic correlators.					

References

1. James Freeman A. and David Skapura M., Neural Networks - Algorithms, Applications & Programming Techniques Pearson Education, 2000.
2. Yegnanarayana B., Artificial Neural Networks, Prentice Hall of India Private Ltd., New Delhi, 1999.
3. Laurene Fausett, Fundamentals of Neural Networks, Pearson Education 2003.

MCSE10	PARALLEL COMPUTERS AND ALGORITHMS	3	0	0	3
INTRODUCTION					6
Fundamentals – Data parallelism – Shared variable – Generation communication – Message passing					
MULTIPROCESSOR ARCHITECTURE					10
Computational demand of modern science – Advent of Parallel processing - Parallel processing Terminology – PRAM Algorithms – PRAM Model of Parallel Computation – Reducing the number of processors – Problem Defying Fast Solution on PRAMS – Processor Arrays – Multiprocessors – Multi computers – Fylnns’ Taxonomy					
PARALLEL PROCESSOR					10
Parallel programming languages – Programming parallel processes – C* - SEQUENIC – nCUBE C, OCCAM, C_LINDA					
ALGORITHM					10
Elementary parallel Algorithms – Matrix Multiplication – Fast Fourier Transform – Sorting – Dictionary Operation – Graph Algorithm – Combinational Search					
CASE STUDIES					9
Overview & Main Features of EVAL – Syntax Description – Operations & Expressions – Modules – Substitutes					

References

1. Vipin Kumar , An Introduction to Parallel Computing: Design and Analysis of Algorithms 2nd Edition Pearson Education 2002.
2. Kai Hwang, Advanced Computer Architecture, TMH 2003.
3. Wilkinson, Parallel Programming, Pearson Education 1999.
4. Parallel Computing Theory and Practice, Michael J Quinn, McGraw Hill

MCSE12	E-COMMERCE	3	0	0	3
INTRODUCTION					9
Infrastructure for Electronic Commerce - Networks - Packet Switched Networks - TCP/IP Internet protocol - Domain name Services - Web Service Protocols - Internet applications - Utility programs – Markup Languages - Web Clients and Servers - Intranets and Extranets - Virtual private Network.					
CORE TECHNOLOGY					9
Electronic Commerce Models - Shopping Cart Technology - Data Mining - Intelligent Agents – Internet Marketing - XML and E-Commerce.					
ELECTRONIC PAYMENT SYSTEMS					9
Real world Payment Systems - Electronic Funds Transfer - Digital Payment -Internet Payment Systems - Micro Payments - Credit Card Transactions - Case Studies.					

SECURITY					9
Threats to Network Security - Public Key Cryptography - Secured Sockets Layer - Secure Electronic Transaction - Network Security Solutions - Firewalls.					
INTER/INTRA ORGANIZATIONS ELECTRONIC COMMERCE					9
EDI - EDI application in business - legal, Security and Privacy issues - EDI and Electronic commerce - Standards - Internal Information Systems - Macro forces - Internal commerce - Workflow Automation and Coordination - Customization and Internal commerce - Supply chain Management.					
References:					
1. Ravi Kalakota and Andrew B Whinston , Frontiers of Electronic commerce, AddisonWesley, 1996					
2. Pete Loshin, Paul A Murphy , Electronic Commerce, II Edition , Jaico Publishers 1996.					
3. David Whiteley, e - Commerce : Strategy, Technologies and Applications - McGraw Hill , 2000.					
MCSE14	DATA-MINING AND DATA-WAREHOUSING		3	0	0 3
INTRODUCTION					9
Relation to statistics, databases, machine learning - Taxonomy of data mining tasks - Steps in data mining process - Overview of data mining techniques.					
VISUALIZATION AND STATISTICAL PERSPECTIVES					9
Visualization - Dimension reduction techniques - Data summarization methods - Statistical Perspective - Probabilistic - Deterministic models - Clustering - Regression analysis - Time series analysis – Bayesian learning.					
PREDICTIVE MODELING					9
Predictive Modeling - Classification - Decision trees - Patterns - Association rules - Algorithms.					
DATA WAREHOUSING					9
Design - Dimensional Modeling - Meta data - Performance issues and indexing -VLDB issues – Development life cycle - Merits.					
APPLICATIONS					9
Tools - Applications - Case Studies.					
References					
1. Usama M.Fayyad, Geogory Piatetsky - Shapiro, Padhrai Smyth and Ramasamy Uthurusamy, "Advances in Knowledge Discovery and Data Mining", The M.I.T Press, 1996.					
2. Jiawei Han, Micheline Kamber, Data Mining Concepts and Techniques, Morgan Kauffmann Publishers,2000.					
3. Ralph Kimball, "The Data Warehouse Life Cycle Toolkit", John Wiley & Sons Inc., 1998.					
4. Sean Kelly, "Data Warehousing in Action", John Wiley & Sons Inc., 1997.					
MCSE16	EMBEDDED SYSTEM		3	0	0 3
OVERVIEW					9
Overview of embedded systems, Design challenge, Processor technology , IC technology, Design technology- Custom-Single purpose processors: Custom single purpose processor design, optimizing custom single processors, Basic architecture, operation, programmers view, development environment, Application specific instruction set processors, selecting a microprocessor					
STANDARD SINGLE-PURPOSE PROCESSORS					9
Peripherals Timers, counters, watchdog timers, UART ,Pulse width modulator, LCD controller, Keypad controller, ADC, Real time clocks					
MEMORY					9
Memory write ability and storage performance, Common memory types, composing memories, memory hierarchy and cache, advanced RAM: DRAM, FPM DRAM, EDO DRAM, SDRAM, RDRAM, Memory management Unit					
INTERFACING					9
Arbitration, Multi-level bus architectures, Serial protocols: I2C bus, CAN bus, Fire Wire bus, USAB, Parallel protocols: PCI and ARM bus, Wireless Protocols: IrDA, Bluetooth,IEEE802.11					
CASE STUDIES					9
Digital Camera: Case study of embedded system - Brief study State Machine and Concurrent Process Models - Control systems: Open loop and closed loop systems, General control systems and PID controllers, Fuzzy control, Practical issues related to computer based control, Benefits of computer based control implementations					
Reference					
1. Frank Vahid and Tony Givargis, Embedded System Design: A Unified Hardware and Software Introduction, Wiley 2001					
2. Mazidi, The 8051 Microcontrollers & Embedded Systems, Pearson Education 2003.					
3. Janathan W. Valvano, Embedded Microcomputer Systems: Real-time Interfacing, Thomson Learning 2003.					
MCSE09	MOBILE COMMUNICATION		3	1	0 4
INTRODUCTION					9
Medium access control – Telecommunication systems - Satellite systems - Broadcast systems.					
STANDARDS					9
Wireless LAN - IEEE 802.11 - HIPERLAN - Bluetooth.					
ADHOC NETWORKS					9
Characteristics - Performance issues - Routing in mobile hosts.					
NETWORK ISSUES					9
Mobile IP - DHCP - Mobile transport layer - Indirect TCP - Snooping TCP - Mobile TCP - Transmission / time-out freezing - Selective retransmission - Transaction oriented TCP.					
APPLICATION ISSUES					9
Wireless application protocol - Dynamic DNS - File systems - Synchronization protocol - Context-aware applications - Security - Analysis of existing wireless network .					

MCSE17	LEGACY SYSTEMS	3	1	0	4
MVS/Z/OS, TSO, JCL 9					
MVS overview-Z/OS enhanced features over MVS-architectural summary-subsystems-TSO ISPF-JCL-Job entry subsystems-introduction of parameters and coding rules-JOB Statements-EXEC Statement, condition, disposition, DD Statements-DCB Parameters-Instream data-JCL procedures					
VSAM 9					
Symbolic Names-SDSF-Utilities-System Abend Codes-Access Method Services-VSAM Concepts-VSAM Internal organization-VSAM Catalog Management-Generation Data Groups(GDG).					
VS COBOL FOR OS/390 & Z/OS 9					
Introduction-Program Organization-COBOL DIVISIONS-Language Syntax-I/O and File handling-Environmental interconnectivity-with CICS,DB2,IMS etc-Compiling debugging and error codes					
DB2 APPLICATION PROGRAMMING 9					
Relational DBMS-An introduction-Overview of DB/UDB7.1-DB2 Objects-Executing SQL form SPUIF/QMF-Coding SQL in host application languages-Coding dynamic SQL in host languages-Performance monitoring-DB2 utilities-DB2 with CICS-DB2 Connectivity with other DBMS.					
CICS 9					
CICS Concepts-An introduction-Batch vs Online processing-CICS components for interconnectivity-Application programming-MAPS and displays-File handling-CICS Queuing Facilities-CICS-Debugging Techniques-Program Control					

Note: Course Materials to be Provided by Industry Partners.

ELECTIVE 5	SEMESTER V
MCSE19	3 0 0 3
DISTRIBUTED COMPUTING	
1. SOFTWARE ARCHITECTURES	9 0 0
Client - Server Architectures - Challenges - Design Methodology - Intranets and Groupware - Hardware and Software for Intranet - Groupware and Features - Network as a Computer - The Internet - IP Addressing - Internet Security - Open Systems - Concepts and Reality.	
2. OPERATING SYSTEM ISSUES	9 0 0
Distributed Operating Systems - Transparency - Inter-Process Communication - Client - Server Model - Remote Procedure Call - Group Communications - Threads -	
3. SYSTEM MODELS	9 0 0
System Models - Process Synchronization - Deadlocks - Solutions - Load Balancing - Distributed File Systems - Distributed Shared Memory Systems - Micro-Kernels.	
4. FUNDAMENTAL DISTRIBUTED COMPUTING ASPECTS	9 0 0
Theoretical Foundations - Logical Clocks - Vector Clocks - Global State - Termination - Correctness - Election Algorithms - Termination Detection - Fault Tolerance - Missing Token - Consensus Algorithms - Byzantine - Consensus - Interactive Consistency.	
5. MANAGING DISTRIBUTED DATA	9 0 0
Distributed Databases - Distribution Transparency - Distributed Database Design - Query Translation - Query Optimization - Concurrency Control - Object-Oriented Databases - Strategic Considerations - Applications of Object-oriented Databases.	

References:

1. **Tanenbaum, Distributed Systems: Principles and Paradigms, Pearson Education 2003**
2. **Albert Fleishman, Distributed Systems - Software Design & Implementation, Springer-Verlag, 1994.**
3. **Mukesh Singal and Shivaratu N.G., Advanced Concepts in Operating Systems, McGraw Hill, Newyork 1994.**
4. **George Coulouris and Jean Dollimore, Distributed Systems - Concepts and Design 3rd Edition, Pearson Education 2003.**
5. **Tanenbaum, Distributed Operating Systems, Pearson Education 2003**

MCSE21	WEB SERVICES	3	1	0	4
1. WEB SERVICES CONCEPTS- XML SCHEMA BASIC 9					
Introduction to Web services, Benefits of Web services, How Web services work Understanding XML Schema – Basic. Elements and attributes, Complex types and simple types Occurrence constraints, Element groups, nil values.					
2. UNDERSTANDING TO XML SCHEMA – ADVANCED 9					
Namespaces, Qualification, Global declarations, Modular schemas, Extensions and restrictions, Substitution groups, importing types.					
3. UNDERSTANDING WEB SERVICES STANDARDS 9					
Understanding Soap (Simple Object Access Protocol) SOAP and XML, SOAP messages, SOAP message exchange model, SOAP encoding and XML schemas, SOAP data types, SOAP transports.					
3. UNDERSTANDING WSDL (WEB SERVICES DESCRIPTION LANGUAGE) 9					
Describing Web services, WSDL anatomy, Defining data types and messages, defining a Web service interface, defining a Web service implementation, Message patterns.					
4. UNDERSTANDING UDDI (UNIVERSAL DIRECTORY AND DISCOVERY INTERFACE) 9					
UDDI registries, UDDI publish Interface, UDDI inquiry Interface, Using UDDI and WSDL together.					

References:

1. **Keith Ballinger, .NET web services Architecture & Implementation, Pearson Education 2003.**
2. **Deital & Deital, C# How to Program, Pearson Education 2002.**
3. **Pardi, XML in Action: Web Technology, PHI 2002**

ELECTIVE 5

SEMESTER V

MCSE23 CLIENT SERVER COMPUTING

3 0 0 3

1. INTRODUCTION TO CLIENT/SERVER

Necessity for Client/Server computing – Components of Client/Server – Benefits of Client/Server - Client/Server models – Planning for Client/Server – Technical planning.

2. MIGRATING TO CLIENT/SERVER

Impact of Client/Server – Hardware – Technology – Software – Database management system – Data warehousing.

3. NETWORKING

The basics – System and Network management – middleware – communication – essential techniques.

4. CASE TOOLS

Using CASE Tools – Benefits of CASE – Other functions – Workflow – Database Design – Object Oriented Development.

5. APPLICATION DEVELOPMENT

Events – Domain – Application Models – GUI Development – Upgrading to Client/Server – Performance tuning and Optimization.

References:

- 1. Jenkins et al., “Client/Server Unleashed” Techmedia, SAMS Publishing 2001**
- 2. Roger Fournier, A Methodology for Client/Server and Web Application Development, Prentice Hall 1999.**
- 3. David Ruble, Practical Analysis & Design for Client/Server & GUI Systems, Prentice Hall 1997.**