



Rajiv Gandhi Technological University, Bhopal (MP)
M.E./ M.Tech. Computer Science and Engineering
Scheme of Examination

SATI (Vidisha), Bansal, TIT, LNCT, RKDF (Bpl), SSSIT (Sehore), Medicap (Ind), MITS (Ujjain), SRI (jbl)

“FIRST SEMESTER”

S · N o	Subject Code	Subject Name	Contact Period		Internal Assessment	End Sem. Exam		Total Marks
			L	P		T	P	
1.	MCSE-101	Advanced Computational Mathematics	3	-	50	100	-	150
2.	MCSE-102	Advanced Data Structures and Algorithm	3	-	50	100	-	150
3.	MCSE-103	Advanced Computer Architecture	3	-	50	100	-	150
4.	MCSE-104	Object Oriented Technology	3	-	50	100	-	150
5.	MCSE-105	Advanced Computer Networking	3	-	50	100	-	150
6.	MCSE-106	Laboratory I MCSE-103, MCSE-105	-	3	25	-	100	125
7.	MCSE-107	Laboratory II MCSE-102, MCSE-104	-	3	25	-	100	125
Total				6	300	500	200	1000



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“SECOND SEMESTER”

S. No	Subject Code	Subject Name	Contact Period		Internal Assessment	End Sem. Exam		Total Marks
			L	P		T	P	
8.	MCSE-201	Web Technology and Commerce	3	-	50	100	-	150
9.	MCSE-202	Information and coding theory	3	-	50	100	-	150
10.	MCSE-203	Elective I	3	-	50	100	-	150
11.	MCSE-204	Elective II	3	-	50	100	-	150
12.	MCSE-205	Elective III	3	-	50	100	-	150
13.	MCSE-206	Lab III MCSE-201	-	3	25	-	100	125
14.	MCSE-207	Lab IV	-	3	25	-	100	125
	Total		15	6	300	500	200	1000

MCSE-203 Elective-I	MCSE-204 Elective-II	MCSE-205 Elective-III
(A) S/W Engg and Project Mgt (B) Artificial Intelligence & Computing Logic (C) Advanced Micro processor (D) Process Dynamics and Cont (E) Comp. Graphics & Multimed (F) Distributed System (G) Biometrics	(A) Advanced DBMS (B) Soft computing (C) VLSI (D) Robotics & comp. vision (E) Digital signal Proc. (F) Mobile Computing (G) Human Comp Interface	(A) MIS ERP CRM (C) Parallel Computing (D) Simulation & Modeling (E) Digital Image Process (F) CORBA Architecture (G) Knowledge MGT (H) Info Security



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“THIRD SEMESTER”

S.No.	Code No.	Subject	Contact Period			Internal Assessment	End Sem Exam		Total
			L	T	P		Theory	Pract	
1.	MCSE- 301	Elective – IV	3	--	--	50	100	--	150
2	MCSE -302	Elective - V	3	--	--	50	100	--	150
3	MCSE -303	Seminar		--	3	50		--	50
4.	MCSE -304	Project		--	3	50		50	100
5.	MCSE -305	Preliminary Dissertation		--	3	50			50
								100	
		TOTAL				250	200	50	500

MCSE-301 Elective IV	MCSE -302 Elective V
(A) Data Mining and Ware Housing (B) Web Engineering (C) Real Time and Fault Tolerant sys (D) Mechatronics (E) Virtual Reality (F) ERP And CRM (G) Logistics and SCM (H) Bio informatics	(A) Software testing and Quality assurance (B) Semantic Networks (C) Embedded Systems (D) CAD/ CAM (E) Multimedia management (F) Network Security (G) Grid computing G) Computing Ethics



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“FOURTH SEMESTER”

S.No.	Code No.	Subject	Contact Period			Internal Assessment	End Sem Exam		Total
			L	T	P		Theory	Pract	
1.	MCSE-401	Dissertation Evaluation & Defence	--	--	6	200	--	300	500
		TOTAL				200	--	300	500

Grand Total of Marks:1000+1000+500+500=3000

*Max.Min. Pass Marks:

1. Theory Marks = 100 PassMin = 40
2. Practical Max. 50/100 PassMin = 25/50
3. Internal Ass. Marks 25/50/200 Pass Min = 15/30/120
4. Dissertation End. Exam = 300 Pass Min = 150

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LIST OF ELECTIVE SUBJECTS

CODE	SUBJECT	REMARK
MCSE-E11	S/W Engg and Project Mgt	
MCSE-E12	Advanced DBMS	
MCSE-E13	MIS ERP CRM	
MCSE-E14	Data Mining and Ware Housing	
MCSE-E15	Software testing and Quality assurance	
MCSE-E21	Artificial Intelligence & Computing Logic	
MCSE-E22	Soft computing	
MCSE-E23	Parallel Computing	
MCSE-E24	Web Engineering	
MCSE-E25	Semantic Networks	
MCSE-E31	Advanced Micro processor	
MCSE-E32	VLSI	
MCSE-E33	Simulation & Modeling	
MCSE-E34	Real Time and Fault Tolerant sys	
MCSE-E35	Embedded Systems	
MCSE-E41	Process Dynamics and Cont	
MCSE-E42	Robotics & comp. vision	
MCSE-E43	Digital Image Process	
MCSE-E44	Mechatronics	
MCSE-E45	CAD/ CAM	
MCSE-E51	Comp. Graphics & Multimed	
MCSE-E52	Digital signal Proc.	
MCSE-E53	CORBA Architecture	
MCSE-E54	Virtual Reality	
MCSE-E55	Multimedia management	
MCSE-E61	Distributed System	
MCSE-E62	Mobile Computing	
MCSE-E63	Knowledge MGT	
MCSE-E64	ERP And CRM	
MCSE-E65	Network Security	
MCSE-E71	Biometrics	
MCSE-E72	Human Comp Interface	
MCSE-E73	Info Security	
MCSE-E74	Logistics and SCM	
MCSE-E75	Grid computing	
MCSE-E84	Bio informatics	
MCSE-E85	Computing Ethics	

Category of Course	Course Title	Course Code	Credits-			Theory Papers
			L	T	P	
	ADVANCED COMPUTATIONAL MATHEMATICS	MCSE-101	3	-	-	Max. Marks-100 Min. Marks-40 Duration: 3 hrs.

UNIT 1

Linear Algebra: Linear transformation, vector spaces, hash function, Hermite polynomial, Heavisite's unit function and error function. Elementary concepts of Modular mathematics

UNIT 2

Solution of Partial Differential Equation (PDE) by separation of variable method, numerical solution of PDE (Laplace, Poisson's, Parabolic) using finite difference methods, Elementary properties of FT, DFT, WFT, Wavelet transform, Haar transform.

UNIT 3

Probability, compound probability and discrete random variable. Binomial, Normal and Poisson's distributions, Sampling distribution, elementary concept of estimation and theory of hypothesis, recurred relations.

UNIT 4

Stochastic process, Markov process transition probability transition probability matrix, just and higher order Markov process, Application of Eigen value problems in Markov Process, Markov chain. Queuing system, transient and steady state, traffic intensity, distribution queuing system, concepts of queuing models (M/M/1: Infinity/ Infinity/ FC FS), (M/M/1: N/ Infinity/ FC FS), (M/M/S: Infinity/ Infinity/ FC FS)

UNIT 5

Operations of fuzzy sets, fuzzy arithmetic & relations, fuzzy relation equations, fuzzy logics. MATLAB introduction, programming in MATLAB scripts, functions and their application.

Reference Books:

1. Higher Engineering Mathematics by B.V. Ramana, Tata Mc Hill.
2. Advance Engineering Mathematics by Ervin Kreszig, Wiley Eastern Edd.
3. Applied Numerical Methods with MATLAB by Steven C Chapra, TMH.
4. Advance Engg Mathematics, O' Neil, Cengage (Thomson)
4. Introductory Methods of Numerical Analysis by S.S. Shastry,
5. Introduction of Numerical Analysis by Forberg
6. Numerical Solution of Differential Equation by M. K. Jain
7. Numerical Mathematical Analysis By James B. Scarborough
8. Fourier Transforms by J. N. Sheddon
9. Fuzzy Logic in Engineering by T. J. Ross
10. Fuzzy Sets Theory & its Applications by H. J. Zimmersoms

Category of Course	Course Title	Course Code	Credits-			Theory Papers
			L	T	P	
	ADVANCED DATA STRUCTURES AND ALGORITHM	MCSE-102	3	-	-	Max. Marks-100 Min. Marks-40 Duration: 3 hrs.

UNIT 1

INTRODUCTION: Basic concepts of OOPs – Templates – Algorithm Analysis – ADT - List (Singly, Doubly and Circular) Implementation - Array, Pointer, Cursor Implementation

UNIT 2

BASIC DATA STRUCTURES: Stacks and Queues – ADT, Implementation and Applications - Trees – General, Binary, Binary Search, Expression Search, AVL, Splay, B-Trees – Implementations - Tree Traversals.

UNIT 3

ADVANCED DATA STRUCTURES: Set – Implementation – Basic operations on set – Priority Queue – Implementation - Graphs – Directed Graphs – Shortest Path Problem - Undirected Graph - Spanning Trees – Graph Traversals

UNIT 4

MEMORY MANAGEMENT ; Issues - Managing Equal Sized Blocks - Garbage Collection Algorithms for Equal Sized Blocks - Storage Allocation for Objects with Mixed Sizes - Buddy Systems - Storage Compaction

UNIT 5

SEARCHING, SORTING AND DESIGN TECHNIQUES: Searching Techniques, Sorting – Internal Sorting – Bubble Sort, Insertion Sort, Quick Sort, Heap Sort, Bin Sort, Radix Sort – External Sorting – Merge Sort, Multi-way Merge Sort, Polyphase Sorting - Design Techniques - Divide and Conquer - Dynamic Programming - Greedy Algorithm – Backtracking - Local Search Algorithms

Reference Books :

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson P
2. Aho, Hopcroft, Ullman, "Data Structures and Algorithms", Pearson Education P
3. Drozdek, Data Structures and algorithm in Java, Cengage (Thomson)
4. Gilberg, Data structures Using C++, Cengage
3. Horowitz, Sahni, Rajasekaran, "Computer Algorithms", Galgotia,
4. Tanenbaum A.S., Langram Y, Augestien M.J., "Data Structures using C & C++", Prentice Hall of India, 2002

Category of Course	Course Title	Course Code	Credits-			Theory Papers
			L	T	P	
	ADVANCED COMPUTOR ARCHITECTURE	MCSE- 103	3	-	-	Max. Marks-100 Min. Marks-40 Duration: 3 hrs.

UNIT 1

Flynn's and Handler's Classification of parallel computing structures. Pipelined and Vector Processors.

UNIT 2

Data and control hazards and method to resolve them. SIMD multiprocessor structures. I

UNIT 3

Interconnection networks. Parallel Algorithms for array processors, Search algorithms, MIMD multiprocessor systems,

UNIT 4

Scheduling and load balancing in multiprocessor systems, Multiprocessing control and algorithms.

Reference Books:

1. Advance Computer Architecture, parthsarthy, Cengage (Thomson)
2. Computer Architecture and Organisation- John Hays, Mc.Graw-Hill.
3. Computer Architecture and Parallel Processing- Hwang And Briggs, TMH.

Category of Course	Course Title	Course Code	Credits-			Theory Papers
			L	T	P	
	OBJECT ORIENTED TECHNOLOGY	MCSE-104	3	-	-	Max. Marks-100 Min. Marks-40 Duration: 3 hrs.

UNIT 1

Overview of object oriented concepts: Need for object oriented programming, characterization of object oriented languages.

Unit 2

Object oriented Design : object structure concepts, methodology for object oriented design (Booch, and chen and chen), Design modelling, system design life cycle.

Unit 3

Object oriented programming : An overview of c++ programming, loops and decisions, structures and functions, objects and classes, Array and pointers, Inheritance, virtual function, files and stream.

Unit 5

Object oriented Databases : Relational v/s object oriented databases, The architecture of OO databases, Query languages for OO databases, Gemstone/O2/orion.

Unit 6

Distributed object oriented systems: Object management group, CORBA.

Reference Books :

1. Object Oriented Analysis and Design, Satzinger, Cengage (Thomson)
2. Object Oriented S/W Development by Mc. Gregor & Sykes DA, Van Nostrand.
2. OOP in C++ by Lafore, Galgotia Pub.
3. The C++ Programming Language by Stroustrup B, Addison Wesley
4. Introduction to OOP by Witt KV, Galgotia Pub.
5. Object Data Management by Cattel R., Addison Wesley
6. Modern Data Base System by Kim W, ACM Press, Addison Wesley
7. OOP by Blaschek G, Springer Verlag
8. An Introduction to Java Programming and OOAD, Johnson, Cengage

Category of Course	Course Title	Course Code	Credits-			Theory Papers
			L	T	P	
	ADVANCED COMPUTER NETWORKING	MCSE-105	3	-	-	Max. Marks-100 Min. Marks-40 Duration: 3 hrs.

UNIT 1

Review of Networking and O.S. fundamentals, ISO-OSI Model, different layers and their functions, LAN, MAN, WAN, Communication media & principles IEEE standards etc.

UNIT 2

Internetworking with TCP/IP, Basic concepts, Principles, Protocols and Architecture, Address handling Internet protocols and protocol layering. DNS, Applications: TELNET, RLOGN , FTP, TFTP, NFS, SMTP, POPL, IMAP, MIME, HTTP,STTP,DHCP, VOIP, SNMP.

UNIT 3

Introduction to Router, Configuring a Router, Interior & Exterior Routing, RIP, Distance Vector Routing, OSPF, BGP, Uni-cast, Multicast and Broadcast. Multicast routing protocols: DVMRP, MOSPF, CBT, PIM, MBONE, EIGRP, CIDR, Multicast Trees, Comparative study of IPv6 and IPv4.

UNIT 4

VPN addressing and routing, VPN Host management, ATM Concepts, Services Architecture, Equipments and Implementation

UNIT 5

Introduction to wireless transmission and medium access control, wireless LAN: IEEE 802.11, Hiper LAN , Bluetooth Mobile Network and Transport layer, WAP GSM and CDMA: Network architecture and management

Reference Books:

1. Computer Networks: Tanenbaum.
2. Internetworking with TCP/IP: Comer.
3. Data Communications, Computer Networks and Open Systems: Hallsall.
4. Data Communications, Stalling.
5. Mobile Communication: Schiller, Pearson Education
6. Computer Communications and network Technology, Gallo, Cengage (Thomson)
7. Wireless and Mobile Network Architecture: Yi Bing Lin, Wiley
8. ATM Network: Kasara, TMH
9. TCP/IP protocol Suite, Forouzan ,TMH

Category of Course	Course Title	Course Code	Credits-			Theory Papers
			L	T	P	
	Web Technology and Commerce	MCSE-201	3	-	-	Max. Marks-100 Min. Marks-40 Duration: 3 hrs.

UNIT 1

Introduction to building blocks of electronic commerce: Internet and networking technologies, IP addressing, ARP, RARP, ICMP, DNS.

UNIT 2

Static and dynamic web pages, tiers, plug-ins, frames and forms. Exposure to Markup languages, HTML, DHTML, VRML, SGML, XML etc. CGI, Applets & Serve-lets, JSP & JAVA Beans, active X control, ASP, Comparative case study of Microsoft and JAVA technologies, web server scalability, Software technologies for building E- Commerce applications, Distributed objects, object request brokers, component technology, Web services, Web application architectures, Browsers, Search engines.

UNIT 3

Security of E-Commerce transactions, review of cryptographic tools, authentication, signatures, observers, anonymity, privacy, tractability, key certification, management etc., EDI, Payment protocols and standards, smart card, e-card, e-wallet technologies, electronic money and electronic payment systems.

UNIT 4

Business models for electronic commerce, electronic marketplaces, auctions and other market mechanisms, design of auctions, optimization algorithms for marketplaces, multi-agent systems.

UNIT 5

E-Governance: E-Governance architecture, Public private partnership, Readiness, Security, Digital divide and Cyber-law.

Reference Books:

1. Minoli and Minoli, Web technology and Commerce, TMH
2. Web Technology, Achyut Godbole, Atul Kahate, TMH
3. Principles of Web Design, Sklar, Cengage
4. Electronic Commerce, Schneider, cengage Learn
5. The E-Business revolution, Daniel Amor, PHI
6. E-Government, Satyanarayana, PHI
7. E-Commerce, Greenstein, TMH
8. Koisur David : Electronic Commerce, Microsoft
9. Ravi Kalakota : Frontiers of Electronic commerce, AW.

Category of Course	Course Title	Course Code	Credits-			Theory Papers
			L	T	P	
	Information theory and coding	MCSE-202	3	-	-	Max. Marks-100 Min. Marks-40 Duration: 3 hrs.

Unit 1

Introduction to uncertainty, information, entropy and its properties, entropy of binary memory-less source and its extension to discrete memory-less source, coding theorem, data compression, prefix coding, HUFFMAN coding, Lempel-Ziv Coding. Binary image compression schemes, run length encoding, CCIIT group 3 and 4 compression

Unit 2

Discrete memory less channels, Binary symmetric channel, mutual information & its properties, channel capacity, channel coding theorem, and its application to BSC, Shannon's theorem on channel capacity, capacity of channel of infinite bandwidth, Bandwidth signal to noise Trade off, Practical communication system in light of Shannon's theorem, Fading Channel.

Unit 3

Group and field of Binary system Galois field and its construction in $GF(2^m)$ and its basic properties, vector spaces and matrices in $GF(2)$, Linear Block Codes, Systematic codes, and its encoding circuits, syndrome and error detection minimum distance, error detecting and correcting capabilities of block code, Decoding circuits, Probability of undetected error for linear block code in BSC Hamming code and their applications.

Unit 4

Cyclic codes and its basic properties, Generator & parity check matrix of cyclic codes, encoding & decoding circuits, syndrome computation & error detection, cyclic Hamming codes. Introduction to BCH codes, its encoding & decoding, error location & correction. Introduction to convolution codes, its construction & viterbi algorithm for maximum likelihood decoding.

UNIT 5

Video image compression and algorithms. Cryptography, encryption, decryption, cryptogram, crypto analysis. Concept of cipher

Reference Books:

1. Digital Communication by Haykins Simon Wiley Publ.
2. Error control Coding: Theory and Application, by Shu Lin and Costello, PHI
3. Modern analog and Digital Communication system, by B.P. Lathi
4. Digital Communication by Sklar, Pearson Education
5. Principal of Communication system by Taub & Schilling, TMH
6. Error Correcting Codes by Peterson W., MIT Press
7. Digital Communication by Carson, MGH
8. Digital Communication by Proakis, TMH

Category of Course	Course Title	Course Code	Credits-			Theory Papers
			L	T	P	
	Software Engineering and project mgt	MCSE-203 (A)	3	-	-	Max. Marks-100 Min. Marks-40 Duration: 3 hrs.

UNIT 1

Introduction, Life cycle models, Project effort estimation, LOC and function point based estimates. Requirement analysis and specifications, formal requirements, specifications,

UNIT 2

Fundamental issues in software design: goodness of design, cohesion, coupling. Function-oriented design, structured analysis and design. Overview of object-oriented concepts, Object oriented methodology for analysis & design. Unified Modeling Language (UML), Unified design process, User interface design

UNIT 3

Coding standards and guidelines, Code walkthrough and reviews, Unit testing, Black box and white box testing, integration and system testing.

Unit 4

Software quality and reliability, software project management, project planning, measurement and metrics, cost estimation. Scheduling and tracking, team management, risk analysis, project management tools and techniques, PERT, CPM. Software Quality Assurance: factors and components.

UNIT 5

Configuration management, software maintenance issues and techniques, software reuse, client-sever software development.

Reference Books:

1. Pressman R.S. Software Engineering: A Practitioner's Approach, MGH
2. Pankaj Jalote. An Intergrated Approach to Software Engineering, Narosa.
3. Foundation of Software Engineering- Mall, PHI
4. Foundation of Software Engineering- Ghezzi, PHI

Category of Course	Course Title	Course Code	Credits-			Theory Papers
			L	T	P	
	Artificial Intelligence & Computing Logic	MCSE-203 (B)	3	-	-	Max. Marks-100 Min. Marks-40 Duration: 3 hrs.

UNIT 1

Game playing: Overview, Mini-max Search procedure, Adding Alpha-Beta Cutoffs, Additional Refinements, Iterative Deepening, References on specific games.

UNIT 2

Planning : Overview, An example domain, components of a planning system Goal Stack planning, nonlinear Planning using constraint posting, Hierarchical planning, Reactive Systems, Other planning techniques. Understanding: What is Understanding? What makes Understanding hard? Understanding as constraint satisfaction.

UNIT 3

Natural language processing: Introduction, Syntactic processing, Semantic Analysis, Discourse and pragmatic Processing. Parallel and Distributed AI: Psychological modeling, Parallelism in Reasoning Systems, Distributed Reasoning Systems. Learning: Rote learning, learning by taking advice, Learning in Problem solving, learning from examples, Explanation-based, Discovery, Analogy, Formal learning theory, Neural Net learning and Genetic learning.

UNIT 4

Connectionist Models: Introduction, Learning in Neural Networks, Applications of Neural Networks, Recurrent Networks, Distributed representations, connectionist AI and symbolic AI, Case studies, of NNs in pattern recognition, Image processing, Computer vision etc. Common Sense : Qualitative Physics, Common sense ontology, Memory organization, Case-based reasoning.

UNIT 5

Fuzzy Logic : Introduction, Fuzzy set theory, Fuzzy set relations, statistical decision making, Introduction to Fuzzy Logic controllers, various fuzzification and defuzzification methods, Some case studies of FLCs in diagnosis, control, human activities, Robots, Image recognition, Databases, Information retrieval Expert system for damage assessment.

UNIT 6

Introduction to Neuro-fuzzy systems & its applications in real world computing. Overview of Evolutionary Algorithms & its applications in search and optimization areas.

Reference Books :

1. Artificial Intelligence - E. Rich, K. Knight, TMH
2. Fuzzy Systems theory application- T.Terano, K.Asai, M. Sugeno, Academic P
3. Introduction to Neural Networks - Wassermann, Van Nostrand Reinhold.
4. Fuzzy sets and Fuzzy logic - G.Klir and B Yuan, PHI
5. Artificial Intelligence, an Engineering approach- R.J. Schal Koft, Mc Graw hill
6. Hand Book of Evolutionary Algorithms - Oxford University Press.

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			L	T	P	
	Advanced Microprocessors	MCSE-203 (C)	3	-	-	Max. Marks-100 Min. Marks-40 Duration: 3 hrs.

8086/88 Architecture and Instruction Set, Programming Techniques, Microprocessor Product Development, designing 8086 CPU Module, Main Memory System design, Basic I/O Overview of the 80386, Memory Segmentation, Privilege levels, Paging, Multitasking, communicating among tasks, Handling faults and Interrupts, 80286 Emulation, 8086 Emulation.

80387 Numeric processor Extension, Programming for performance, Reset and Real Mode.

Overview of 80486, Memory Segmentation, 80386 Emulation, 80286 Emulation, 8086 Emulation.

Introduction to latest families of Intel processors.

Case Studies of Microprocessor System design for various applications.

Reference Books:

1. The 8086 microprocessor, Ayala, Cengage
2. The 8086/8088 family - J.Uffenbeck, PHI
3. Advanced 80386 Programming Techniques - J.L. Turley, Osborne TMH.
4. 80386 Microprocessor Handbook - C.H. Pappas and W.H. Murray Osborne
5. Advanced 80486 Programming Techniques - J.L. Turley, Osborne TMH.
6. Microprocessor System Design - Conner, Mc Graw Hill.

Category of Course	Course Title	Course Code	Credits-			Theory Papers
			L	T	P	
	Comp. Graphics & Multimedia	MCSE-203 (E)	3	-	-	Max. Marks-100 Min. Marks-40 Duration: 3 hrs.

Basics of Computer Graphics, Graphics display devices, Input devices; Raster Graphics: line and circle drawing algorithms Windowing and clipping: Cohen and Sutherland line clipping. Cyrus beck clipping method; Computations on polygons: point inclusion problem, polygon filling, polygon intersection, clipping. 2D and 3D Geometrical Transformations: scaling, translation, rotation, reflection; viewing Transformations, parallel and perspective projection, curves and Surfaces: cubic splines, Bezier curves B-splines, Hidden line/surface removal methods; Rendering & Visualization, Illuminations model; shading: Gouraud, Phong; Introduction to Ray-tracing. Multimedia Components, Multimedia system designs an introduction compression & decompression data & file format standard. Multimedia input/output technologies. Storage technologies. Multimedia authoring & user interface. Hyper media massaging. Distributed multimedia system

Reference Books :

1. Rogers D.F. Procedural Elements of Computer Graphics, McGraw Hill.
2. Hearn and Baker. Computer Graphics, Prentice-Hall of India, New Delhi
3. Foley and VanDam. Fundamentals of Interactive Computer Graphics, Addison
4. Multimedia System Design- Prabhat K. andleigh and Kiran Thakrar, PHI
5. Multimedia Systems, Ed. by John F.K. Buford, Addison - Wesley Pub. 1994.

Category of Course	Course Title	Course Code	Credits-			Theory Papers
			L	T	P	
	Advanced DBMS	MCSE-204 (A)	3	-	-	Max. Marks-100 Min. Marks-40 Duration: 3 hrs.

DBMS Concepts Introduction, Data models, Entities and attributes, Relationships, E-R diagram. Relational Data models: Domains, Tuples, Attributes, Keys, Relational database, Schemas, Integrity constraints. Relational algebra and relational calculus. Normalization, Normal forms.

Query Processing and Optimization. Distributed databases: Fragmentation, Replication, Location & Fragment transparency, Distributed Query Processing and Optimization. Object oriented and object relational databases: Specialization, Generalization, Aggregation, Association. Introduction to Image and Multimedia databases and data structures. Data structure- R tree, K d tree, Quad trees, Content based retrieval: Color Histograms. Web databases: Accessing databases through web

Reference Books :

- 1.Fundamentals of Database System, Elmasri, S. Navathe, Benjamin Cummings,
- 2.An Introduction to Data base System, Volume I (Vth Ed), C.J. Date, Addison W
- 3.H. F. Korth and A. Silberschatz. Database Concept, 2nd Edition, McGraw Hill,
4. Rob, DBMS, Cengage (Thomson)
- 5.Object Oriented databases :Narang, Prentice-Hall of India, New Delhi

Category of Course	Course Title	Course Code	Credits-			Theory Papers
			L	T	P	
	Soft Computing	MCSE-204 (B)	3	-	-	Max. Marks-100 Min. Marks-40 Duration: 3 hrs.

INTRODUCTION: production systems, Study and comparison of breadth first search and depth first search. Techniques, other Search Techniques like hill Climbing, Best first search. A* algorithm, AO* algorithms. Knowledge Representation, Problems in representing knowledge, knowledge representation using propositional and predicate logic, Resolution, Refutation, theorem proving, monotonic and nonmonotonic reasoning.

ARTIFICIAL NEURAL NETWORKS : Basic concepts - Importance of tolerance of imprecision and uncertainty. Biological and artificial neuron, Single layer perception - Multilayer Perception - Supervised and Unsupervised learning – Back propagation networks - Kohonen's self organizing networks - Hopfield network.

FUZZY SYSTEMS : Introduction, History of the Development of Fuzzy Logic, Fuzzy sets and Fuzzy reasoning - Fuzzy matrices - Fuzzy functions - Decomposition - Fuzzy automata and languages - Fuzzy control methods - Fuzzy decision making.

NEURO - FUZZY MODELING : 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: Survival of the Fittest - Fitness Computations - Cross over - Mutation - Reproduction - Rank method - Rank space method.

Reference Books :

1. Rajsekaran & Pai – Neural Networks, fuzzylogic & Genetic algorithms, PHI
2. Rich E and Knight K, Artificial Intelligence, TMH, New Delhi.
3. Hagan, Dernuth & Beale, Neural network design, Thomson learning, VP.
4. Philip D. Wasserman, Neural Computing, Van Nostrand Reinhold Pub.
5. Kecman: Learning & soft Computing, Pearson Edu.

Category of Course	Course Title	Course Code	Credits-			Theory Papers
			L	T	P	
	Robotics and Computer Vision	MCSE-204 (D)	3	-	-	Max. Marks-100 Min. Marks-40 Duration: 3 hrs.

Basic components of robotics system, Kinematics and manipulators, selection of Co-ordinate frames, Homogeneous transformation, solution of kinematics equations, Lagrangian equations and manipulator dynamics, Control design, Languages for Robots and Applications.

3D-vision, Perspective vision, CCD camera study, real time processing. Segmentation using Genetic Algorithm: Adaptive algorithm for indoor scene, and outdoor scene.. Interpretation of pictures, shape recognition, dynamic scene analysis. Introduction to AGV, clustering and non supervised learning method.

Reference Books :

1. "Digital Image Processing And Computer Vision"-R.Schalkoff,Wiley.
2. "Computer Vision"-D.H. Ballard and C.M.Brown, Prentice Hall.
3. "Introduction to Robotics"-Craig,J.J, Addison Wesley.
4. "Robot Vision"-Horn B., MIT Press.
5. "Robotics"-Lee, Mc Graw Hill.

Category of Course	Course Title	Course Code	Credits-			Theory Papers
			L	T	P	
	Digital Signal Processing	MCSE-204 (E)	3	-	-	Max. Marks-100 Min. Marks-40 Duration: 3 hrs.

TO BE DETAILED AND EXPANDED

Discrete time signals and system, Z transforms, Design procedure for FIR & IIR Filters. Introduction to DFT errors in digital filtering, method of fast computation of DFT, NTT & WTFA. Powerspectrum, Estimation of DFT, NTT, WTFA & int application to digital filter. Multirate digital filtering, Linear Phase design of filter, & H/W implementation consideration.

Reference Books:

1. Digital Signal Processing Using Matlab, Ingle, Cengage
2. Digital Signal Processing,White,Cengage (Thomson)
3. "Digital Signal Processing"- Openhem And Shepher, Mc.Graw-Hill.

Category of Course	Course Title	Course Code	Credits-			Theory Papers
			L	T	P	
	Mobile Computing	MCSE-204 (F)	3	-	-	Max. Marks-100 Min. Marks-40 Duration: 3 hrs.

UNIT 1

Introduction to cellular mobile systems: Basic cellular system, performance, criteria, Uniqueness of mobile Radio environment, operation of cellular systems, marketing Image of Hexagonal shaped cells, Planning of cellular system, Analog cellular systems, digital cellular systems, cell splitting.

UNIT 2

Cell coverage for signal & Traffic: Introduction, obtaining the mobile point to point model, Propagation over water or flat open areas, Foliage loss, Propagation in near in distance, long distance Propagation obtain path loss from a point to point Prediction model, call-site antenna Heights & Signal coverage calls, mobile to mobile Propagation.

UNIT 3

Co channel Interference reduction: Co channel interference , exploring co channel interference area, in a system, Real time co channel interference measurement at mobile radio Transceivers, Decision of an omni directional antenna system, Design of a directional antenna system,. Lowering the antenna height, reduction of co channel interference by mean of a notch in the tilted antenna Pattern, Power control.

UNIT 4

Frequency management & channel Assignment: Frequency management, Frequency-spectrum utilization, set up channels definition of channel assignment, fixed channel assignment, non fixed channel assignment algorithms How to operate north additional spectrum, Traffic & channel assignment, Perception of call blocking from the subscribers.

UNIT 5

Handoffs & Dropped calls: Value of Implementing Handoffs, initiation of a hand off, Delaying a handoff, Forced Handoffs, Queuing of Handoffs, power difference handoff , Mobile assisted handoff & soft Handoff, call site Handoff only, intersystem Handoff, introduction to dropped call rate, Formula of Dropped call rate, Finding the values of g & u .

UNIT 6

Special topics: Wireless and Mobile Computation – SS7, GSM, CDMA, Mobile IP, Wireless Mobile ATM, Multicast Routing Protocols, Location Management, Mobile Agents, Mobility Management.

Reference Books:

1. J. Schiller, Mobile Communication, Pearson Press.
2. Wireless Network, Kaveh Pahalwan
3. Adhoc Networking by Charles E. Perkins, Addison Wisely
4. Mobile cellular Telecommunications by William C.Y. Lee TMH

Category of Course	Course Title	Course Code	Credits-			Theory Papers
			L	T	P	
	Management Information System ERP-CRM	MCSE-205 (A)	3	-	-	Max. Marks-100 Min. Marks-40 Duration: 3 hrs.

UNIT 1

Management Information System (MIS) definition, Objectives and benefits, MIS as strategic tool, obstacles and challenges for MIS, functional and cross functional systems, hierarchical view of CBIS, structured and unstructured decision, Operation and mgt support, Decision process and MIS, info system components and activities, Value chain and MIS support.

UNIT 2

System concepts: types, definition, characteristics, feedback (Pull) and feed-forward (Push) control, system stress and entropy, computer as closed system, law of requisite variety, open and flexible (Adaptive) systems, work system model and comparison with input-process-output model, five views of work system: structure, performance, infrastructure, context and risk and their effect on product performance.

UNIT 3

Info concepts: define data, info, knowledge, intelligence and wisdom. Information characteristics and attributes, info measurement and probability, characteristics of human as info processor.

UNIT 4

Planning and control Concepts: terminologies, difficulties in planning, system analysis and development plan-purpose and participants, info planning, (SDLC) system development life cycle for in-house and licensed sw, system investigation, analysis of needs, design and implementation phases, training of Operational personnel, evaluation, Control and Maintenance of Information Systems.

UNIT 5

E-business components and interrelationship, Evolution of Enterprise Resource Planning (ERP) from MRP, Supply chain management (SCM) and Customer relationship management (CRM), Integrated data model, strategic and operational issues in ERP, Business Process Re-Engineering (BPR), significance and functions, BPR, information technology and computer NW support to MIS.

UNIT 6

ERP Implementation, role of consultants, vendors and users, customization, methodology of ERP implementation and guidelines for ERP implementation, ERP modules.

Reference books:

1. Davis and Olson, MIS, TMH
2. James O' Brian, MIS, TMH
3. Oz, MIS, Cengage
4. Business Process Re-Engineering, Jayaraman, TMH.
5. ERP by V.K. Garg, PHI
6. ERP by Alex Leon, and manuals of SAPP, MFG-pro.
7. ERP, Monk, Cengage (Thomson)

Category of Course	Course Title	Course Code	Credits-			Theory Papers
			L	T	P	
	Parallel Computing	MCSE-205 (C)	3	-	-	Max. Marks-100 Min. Marks-40 Duration: 3 hrs.

Parallel processing, Parallel computer structure, designing of parallel algorithms, analyzing algorithms, general principles of parallel computing, Parallel sorting algorithms Batcher's bitonic sort, Bitonic sort using the perfect shuffle, parallel bubble sort, add-even transport sort, Tree sort, quicksort, sorting on the CRCW, CRFW, EREW models, searching a sorted sequence, CREW, CRCW & EREW searching, searching on a random sequence EREW, ERCW, CREW & CRCW searching on SIMD computers, searching on a Tree, mesh, A Network for merging, merging on the CRFW, ERFW models, Computing Fourier Transforms, computing the DFT in parallel, a parallel FFT algorithm.

Reference Books :

1. Design & Analysis of Parallel Algorithm by Salim & Akl, PHI.
2. Design Efficient Algorithm for Parallel Computers by Michel J. Quinn, TMH.

Category of Course	Course Title	Course Code	Credits-			Theory Papers
			L	T	P	
	Simulation & Modeling	MCSE-205 (D)	3	-	-	Max. Marks-100 Min. Marks-40 Duration: 3 hrs.

Introduction to modeling and simulation: Modeling and simulation methodology, system modeling, concept of simulation, continuous and discrete time simulation.

Basic concept of probability and random variables continuous and discrete random variables, distribution of random variables: discrete and continuous, Compartmental models: linear, nonlinear and stochastic models.

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.

System Dynamics modeling: Identification of problem situation, preparation of causal loop diagrams and flow diagrams, equation writing, level and rate relationship. Simulation of system dynamics models.

Verification and validation: Design of simulation experiments, validation of experimental models, testing and analysis. Simulation languages comparison and selection, study of Simulation sw -SIMULA, DYNAMO, STELLA, POWERSIM.

Reference Books :

1. Gordon 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.
6. Shannon R.E., System simulation, Prentice Hall

Category of Course	Course Title	Course Code	Credits-			Theory Papers
			L	T	P	
	Digital Image Processing	MCSE-205 (E)	3	-	-	Max. Marks-100 Min. Marks-40 Duration: 3 hrs.

Image capture and digitization, Image Representation, data structures for picture representation Image Transformation, Fast Fourier Transform, Walsh Transform, Hadmark Transform, Hotelling Transform, Hough Transform.

Boundry detection, Image Enhancement, Spatial Domain, Frequency Domain, Histogram, Low Pass Filtering, High Pass Filtering, Thresh olding, Global Thrsh olding.

Texture analysis, texture classification feature extraction, rule-based picture segmentation. Introduction to Color Images, Representation, Segmentation.

Reference Books :

1. "Digital Image Processing"- R.C.Gonzalex and P.Wintex,Addison weslay.
2. "Fundamentals of Digital Image Processing"- A.K.Jain, Prentice Hall,India.
3. Image Processing analysiss and Machine Vision, Cengage

Category of Course	Course Title	Course Code	Credits-			Theory Papers
			L	T	P	
	CORBA Architecture	MCSE-205 (F)	3	-	-	Max. Marks-100 Min. Marks-40 Duration: 3 hrs.

UNIT 1

Support for analysis and design : Unified Modelling Language (UML) and the Meta-Object Facility (MoF)

UNIT 2

Basic Object-Oriented Computing model : The Object Request Broker (ORB); Interface Definition Language (IDL) and its mapping to C, C++, Java, smalltalk, Cobol, and Ada.

UNIT 3

Distribution : The protocol content specification General Inter-ORB Protocol (GIOP) and its mapping to TCP/IP, Internet Inter ORB Protocol (IIOP) Component Model : CORBA components and scripting, multiple interfaces, objects by value. Specialized modes : Support for Real-Time, Fault tolerant, and Embedded CORBA.

UNIT 4

CORBA services : basic services for distributed Object - Oriented applications : naming and trader services, the event and notification services, the Object Transaction service (OTS), and the security service.

UNIT 5

Horizontal CORBA facilities : systems management, print spooling. Vertical market CORBA facilities : Support for enterprise, a currency facility from finance, person identifier service, the lexicon query service, an audio/visual stream control object CORBA-based Network-management.

Reference Books :

1. The CORBA Reference Guide- Pope. A, Addison-Wesley.
2. CORBA fundamentals & Programming - Siegel, J., Wiley.
3. Java Programming with CORBA - Nogel. A, Wiley.

Category of Course	Course Title	Course Code	Credits-			Theory Papers
			L	T	P	
	Data Mining and Warehousing	MCSE-301 (A)	3	-	-	Max. Marks-100 Min. Marks-40 Duration: 3 hrs.

Introduction : Data Mining: Definitions, KDD v/s Data Mining, DBMS v/s Data Mining , DM techniques, Mining problems, Issues and Challenges in DM, DM Application areas.

Association Rules & Clustering Techniques: Introduction, Various association algorithms like A Priori, Partition, Pincer search etc., Generalized association rules. Clustering paradigms; Partitioning algorithms like K-Medoid, CLARA, CLARANS; Hierarchical clustering, DBSCAN, BIRCH, CURE; categorical clustering algorithms, STIRR, ROCK, CACTUS.

Other DM techniques & Web Mining: Application of Neural Network, AI, Fuzzy logic and Genetic algorithm, Decision tree in DM. Web Mining, Web content mining, Web structure Mining, Web Usage Mining.

Temporal and spatial DM: Temporal association rules, Sequence Mining, GSP, SPADE, SPIRIT, and WUM algorithms, Episode Discovery, Event prediction, Time series analysis.

Spatial Mining, Spatial Mining tasks, Spatial clustering, Spatial Trends.

Data Mining of Image and Video : A case study. Image and Video representation techniques, feature extraction, motion analysis, content based image and video retrieval, clustering and association paradigm, knowledge discovery.

Reference Books :

1. Data Mining Techniques ; Arun K.Pujari ; University Press.
2. Data Mining; Adriaans & Zantinge; Pearson education.
3. Mastering Data Mining; Berry Linoff; Wiley.
4. Data Mining; Dunham; Pearson education.
5. Text Mining Applications, Konchandy, Cengage

Category of Course	Course Title	Course Code	Credits-			Theory Papers
			L	T	P	
	Web Engineering	MCSE-301 (B)	3	-	-	Max. Marks-100 Min. Marks-40 Duration: 3 hrs.

Introduction: layering, DNS - encapsulation, de-multiplexing, client /server model, port numbers, standardization process, the Internet.

Link layer: introduction, Ethernet and IEEE 802 encapsulation, trailer encapsulation, SLIP, PPP- Loop back interface, MTU.

Internet protocol: introduction, IP header, IP routing, subnet addressing, subnet mask- special case of IP addresses, a subnet example.

Address Resolution Protocol: Introduction, an example, ARP cache, ARP packet format, ARP examples, Proxy ARP, ARP command.

RARP: Introduction, RARP packet format, RARP examples, RARP server design.

ICMP: Introduction, ICMP message types, ICMP address mask request and reply- ICMP timestamp request and reply- 4.4 BSD processing of ICMP Messages.

Ping Program: Introduction, ping program, IP record route option, IP time stamp option. Trace route program: Introduction, trace route program operation, LAN output, and WAN output- IP source routing option. IP routing: Introduction, routing principles, ICMP host, and ICMP redirect errors. Dynamic Routing protocols: introduction, dynamic routing, RIP-OSPF, BGP, CIDR.

UDP: introduction, UDP header, UDP checksum, IP Fragmentation, UDP Server design. DNS Introduction- basics, message format, simple example, pointer queries, resource records, caching, UDP. TFTP: introduction, protocol, security. BOOTP: introduction, packet format, server design, through router.

TCP: Introduction, services, headers, connection establishment and termination, timeout of connection establishment- maximum segment size- half, close, state transition diagram, reset segments, simultaneous open and close- options, server design.

SNMP Introduction, protocol, structure of management information, object identifiers, management information base, instance identification.

Telnet: rlogin protocols, examples, telnet protocol and examples. FTP, protocol, examples, SMTP protocols, examples, NFS, TCP/IP Applications.

Reference Books :

1. W. Richard Stevens, TCP/IP Illustrated Volume-I "The Protocols ", Addison W 2. Jaiswal .S, TCP\IP Principles, Architecture, Protocols And Implementation, First Edition, Galgotia Publications Pvt Ltd.

Category of Course	Course Title	Course Code	Credits-			Theory Papers
			L	T	P	
	Real time & Fault Tolerant Systems	MCSE-301 (C)	3	-	-	Max. Marks-100 Min. Marks-40 Duration: 3 hrs.

Fault detection and diagnosis. System Reliability and methods of improving it. Theory of redundant system design. Fault tolerant circuit design. Fault tolerant architectures.

Components of a real time system. Real time operating system., tasks and task scheduling, task synchronization and data transfer factors in selecting a real time operating system.The design specifications, the development environment,ASM Diagram and Data flow analysis. Response time specification.

Reference Books :

1. " Real Time System"-C.M Krishna and Kang G.Shin, TMH.
2. "Software Design for Real Time Systems"- J.E.Cooling, Chapman & Hall Pub.

Category of Course	Course Title	Course Code	Credits-			Theory Papers
			L	T	P	
	Mechatronics	MCSE-301 (D)	3	-	-	Max. Marks-100 Min. Marks-40 Duration: 3 hrs.

Introduction to Mechatronics, Mechatronics tools, Mechatronics sensitivity analysis and stress analysis for hydraulic systems, feed back control. Use of mechatronics for designing and manufacturing of: surface mount component, assembling & testing mix technology board.

Basic components of a Robotics system; Robot kinematics: Homogeneous transformations, Denavit-Hartenberg representation; Inverse Kinematics; Euler angles, Euler angle solution to inverse Kinematics, Dynamics: Lagrange-Euler, Newton euler formulations, path planning: Joint interpolated and cartesian path planning, collision avoidance, Sensing mechanisms; Range and proximity sensing, Touch, force & torque sensors:

Transducers: Solenoid valve, differential voltage transformers, flow meters, pressure sensors, thermo couple.

Case study: Electronic braking system, (hydraulics based)

Reference Books:

1. Mechanotronics system design, Shetty, Cengage

Category of Course	Course Title	Course Code	Credits-			Theory Papers
			L	T	P	
	Network Security	MCSE-302 (F)	3	-	-	Max. Marks-100 Min. Marks-40 Duration: 3 hrs.

Conventional Encryption

Conventional Encryption : Conventional Encryption Model , Steganography , Classical Encryption Techniques, Simplified DES , Block Cipher Principles , The Data Encryption Standard, The Strength of DES , Differential and Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher Modes of operation, Conventional Encryption algorithms

Public Key Encryption And Hash Functions

Public Key Cryptography , Principles of Public Key Cryptosystems , The 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 , Security of Hash Functions

Hash And Mac Algorithms

MD5 Message Digest Algorithm , Secure Hash Algorithm (SHA-I) , RIPEMD , HMAC
Digital Signatures and Authentication Protocols
Digital Signatures , Authentication Protocols -Digital Signature Standard

Authentication Applications , IP Security , Web Security

Intruders, Viruses and Worms

Intruders , Viruses and Related Threats

Firewalls

Firewall Design Principles , Trusted Systems

Reference Books :

1. William Stallings, " Cryptography and Network Security", Second edition, Prentice Hall, 1999.
2. Atul Kahate, " Cryptography and Network Security," TMH
3. William Stallings, "Cryptography and Network Security", Third Edition, Pearson Ed
4. Introduction to network security, Krawetz, Cengage