UTTAR PRADESH TECHNICAL UNIVERSITY LUCKNOW

Modified Syllabus

For

Master of Computer Applications
of

Second Year

(Effective from the Session: 2014-15)

STUDY AND EVALUATION SCHEME
MCA (Master of Computer Application)
(Effective from Session: 2014-15)
YEAR II, SEMESTER –III

S. No.	COURSE CODE	SUBJECT	PERIODS			EVALUATION SCHEME				Subject Total
						SESSIONAL EXAM			ESE	
			L	T	P	CT	TA	Total		
1.	NMCA-311	Operating Systems	3	1	0	30	20	50	100	150
2.	NMCA-312	Design & Analysis of Algorithms	3	1	0	30	20	50	100	150
3.	NMCA-313	Database Management System	3	1	0	30	20	50	100	150
4.	NMCA-314	Internet & Java Programming	3	1	0	30	20	50	100	150
5.	NMCA-315	Computer Based Optimization Techniques	3	1	0	30	20	50	100	150
6	AUC-001/ AUC-002	Human Values & Professional Ethics/ Cyber Security	2	0	0	15	10	25	50	75*
PARCTICALS										
6.	NMCA-351	DBMS Lab	0	0	3	30	20	50	50	100
7.	NMCA-352	Java Programming Lab	0	0	3	30	20	50	50	100
8.	NGP-301	General Proficiency	0	0	0	-	-	50	-	50
		Total	**15**	**5**	**6**	**-**	**-**	**-**	**-**	**1000**

YEAR-II   **SEMESTER-IV**

S. No.	COURSE CODE	SUBJECT	PERIODS			EVALUATION SCHEME				Subject Total
						SESSIONAL EXAM			ESE	
			L	T	P	CT	TA	Total		
1	NMCA-411	Management Information Systems	3	1	0	30	20	50	100	150
2	NMCA-412	Web Technology	3	1	0	30	20	50	100	150
3	**Elective-I**		3	1	0	30	20	50	100	150
4	NMCA-413	Artificial Intelligence	3	1	0	30	20	50	100	150
5	NMCA-414	Mobile Computing	3	1	0	30	20	50	100	150
6	AUC-002/ AUC-001	Cyber Security / Human Values & Professional Ethics	2	0	0	15	10	25	50	75*
PRACTICALS										
7	NMCA-451	Web Technology Lab	0	0	3	30	20	50	50	100
8	NMCA-452	Mini Project	0	0	3	30	20	50	50	100
9	NGP-401	General Proficiency	0	0	0	-	-	50	-	50
		Total	**15**	**5**	**6**					**1000**

* Human values & Professional Ethics /Cyber Security will be offered as a compulsory audit course for which passing marks are 30% in End Semester Examination and 0% in aggregate.

List of Electives for MCA
MCA-Elective-I
NMCAE11	Compiler Design
NMCAE12	Client Server Computing
NMCAE13	Data Warehousing & Mining
NMCAE14	Advance Computer Architecture
NMCAE15	Distributed system

Note:- To be opted by the students who did not study these courses in earlier semesters.

OPERATING SYSTEMS   L T P
NMCA 311   3 1 0

Unit-I

Introduction: Definition and types of operating systems, Batch Systems, multi programming, time–sharing parallel, distributed and real-time systems, Operating system structure, Operating system components and services, System calls, system programs, Virtual machines.

Unit-II

Process Management: Process concept, Process scheduling, Cooperating processes, Threads, Interprocess communication, CPU scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real-time scheduling and Algorithm evaluation.

Unit-III

Process Synchronization and Deadlocks: The Critical-Section problem, synchronization hardware, Semaphores, Classical problems of synchronization, Critical regions, Monitors, Deadlocks-System model, Characterization, Deadlock prevention, Avoidance and Detection, Recovery from deadlock, Combined approach to deadlock handling.

Unit-IV

Storage management: Memory Management-Logical and Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation with paging in MULTICS and Intel 386, Virtual Memory, Demand paging and its performance, Page replacement algorithms, Allocation of frames, Thrasing, Page Size and other considerations, Demand segmentation, File systems, secondary Storage Structure, File concept, access methods, directory implementation, Efficiency and performance, recovery, Disk structure, Disk scheduling methods, Disk management, Recovery, Disk structure, disk scheduling methods, Disk management, Swap-Space management, Disk reliability.

Unit-V

Security & Case Study: Protection and Security-Goals of protection, Domain of protection, Access matrix, Implementation of access Matrix, Revocation of Access Rights, language based protection, The Security problem, Authentication, One Time passwords, Program threats, System threats, Threat Monitoring, Encryption.

Windows NT-Design principles, System components, Environmental subsystems, File system, Networking and program interface, Linux system-design principles, Kernel Modules, Process Management, Scheduling, Memory management, File Systems, Input and Output, Interprocess communication, Network structure, security

References
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1.   Abraham Siberschatz and Peter Baer Galvin, "Operating System Concepts", Addision-Wesley

2. Milan Milankovic, "Operating Systems, Concepts and Design", Tata McGraw-Hill.

3.   Harvey M Deital, "Operating Systems", Addison Wesley

4.   Richard Peterson, "Linux: The Complete Reference", Osborne Tata McGraw-Hill.

5.   SibsankarHalder and Alex A Aravind, "Operating Systems", Pearson Education

6.   D M Dhamdhere, "Operating Systems : A Concept basedApproach", McGraw Hill.

7.   Charles Crowley, "Operating Systems: A Design-Oriented Approach", Tata McGraw Hill
        Education".

8. Stuart E. Madnick & John J. *Donovan. Operating Systems.* McGraw Hill.

DESIGN AND ANALYSIS OF ALGORITHMS
NMCA 312

L T P
3 1 0

Unit-I

Introduction: Algorithms, Analysis of Algorithms, Design of Algorithms, Complexity of Algorithms, Asymptotic Notations, Growth of function, Recurrences and their solution methods.

Sorting in polynomial Time: Insertion sort, Merge sort, Heap sort, and Quick sort

Sorting in Linear Time: Counting sort, Radix Sort, Bucket Sort, Medians and order statistics

Unit-II

Advanced Data Structure: Red Black Trees, Augmenting Data Structure, Binomial Heap, B-Tree, Fibonacci Heap, and Data Structure for Disjoint Sets, All kinds of Algorithms on these data structures, Dictionaries and priority Queues, mergeable heaps, concatenable queues

Unit-III

Advanced Design and Analysis Techniques: Dynamic programming, Greedy Algorithm, Backtracking, Branch-and-Bound, Amortized Analysis

Unit-IV

Graph Algorithms: Elementary Graph Algorithms, Breadth First Search, Depth First Search, Minimum Spanning Tree, Kruskal's Algorithms, Prim's Algorithms, Single Source Shortest Path, All pair Shortest Path, Maximum flow and Traveling Salesman Problem

Unit-V

Randomized Algorithms, String Matching, NP-Hard and NP-Completeness, Approximation Algorithms, Sorting Network, Matrix Operations, Polynomials and FFT, Number Theoretic Algorithms

References

1. Thomas H Cormen Leiserson "Introduction to Algorithms", PHI Learning Private Limited, Delhi India.
2. Sara Baase and Allen Van Gelder ,Computer Algoritms : "Introduction to Design and Analysis", Pearson Education
3. Jon Kleinberg and Eva Tardos "Algorithm Design", Pearson Education
4. Brassard Bratley "Fundamental of Algorithms", PHI Learning Private Limited, Delhi India.
5. M T Goodrich "Algorithms Design", John Wiley
6. Aho, "Design and Analysis of Computer Algorithms", Pearson Education.
7. Horowitz and Sahani ,"Fundamentals of Computer Algorithms", Galgotia Publications Pvt Ltd Delhi India.

DATABASE MANAGEMENT SYSTEMS
NMCA 313

L T P
3 1 0

Unit- I

Introduction: An overview of database management system, Database System Vs File System, Database system concepts and architecture, data models schema and instances, data independence and data base language and interfaces, Data definitions language, DML, Overall Database Structure.

Data Modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationships of higher degree.

Unit- II

Relational data Model and Language: Relational data model concepts, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus.

Introduction to SQL: Characteristics of SQL, Advantages of SQL, SQL data types and literals, Types of SQL commands, SQL operators and their procedure, Tables, views and indexes, Queries and sub queries, Aggregate functions, Insert, update and delete operations, Joins, Unions, Intersection, Minus, Cursors in SQL.
PL/SQL, Triggers and clusters.

Unit- III

Data Base Design & Normalization: Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependencies, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.

Unit- IV

Transaction Processing Concepts: Transaction system, Testing of serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, checkpoints, deadlock handling.

Unit- V

Concurrency Control Techniques: Concurrency control, locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Multi-version schemes, Recovery with concurrent transaction. Transaction Processing in Distributed system, data fragmentation. Replication and allocation techniques for distributed system, overview of concurrency control and recovery in distrusted database.

References

1. Date C J, "An Introduction To Database System", Addision Wesley
2. Korth, Silbertz, Sudarshan, "Database Concepts", Tata Mcgraw-hill Education (India) Pvt. Ltd.
3. Elmasri, Navathe, "Fundamentals Of Database Systems", Pearson Education New Delhi India.
4. G.K. Gupta, "Database Management System", Tata Mcgraw-hill Education (India) Pvt. Ltd.
5. Bipin C. Desai, "An introduction to Database Systems", Galgotia Publication Pvt. Ltd. New Delhi.
6. Majumdar & Bhattacharya, "Database Management System", Tata Mcgraw-hill Education (India) Pvt. Ltd.
7. Ramakrishnan, Gehrke, "Database Management System", McGraw Hill (India) Pvt Ltd. New Delhi.
8. Chakravarti, "Advanced Database Mnagement System" Wiley Dreamtech Publications.

References

Unit-1

Internet: Internet, Connecting to Internet: Telephone, Cable, Satellite connection, Choosing an ISP, Introduction to Internet services, E-Mail concepts, Sending and Receiving secure E-Mail, Voice and Video Conferencing.

Unit-2

Core Java: Introduction, Operator, Data type, Variable, Arrays, Control Statements, Methods & Classes, Inheritance, Package and Interface, Exception Handling, Multithread programming, I/O, Java Applet, String handling, Networking, Event handling, Introduction to AWT, AWT controls, Layout managers, Menus, Images, Graphics.

Unit-3

Java Swing: Creating a Swing Applet and Application, Programming using Panes, Pluggable Look and feel, Labels, Text fields, Buttons, Toggle buttons, Checkboxes, Radio Buttons, View ports, Scroll Panes, Scroll Bars, Lists, Combo box, Progress Bar, Menus and Toolbars, Layered Panes, Tabbed Panes, Split Panes, Layouts, Windows, Dialog Boxes, Inner frame.
JDBC: The connectivity Model, JDBC/ODBC Bridge, (5) java.sql package, connectivity to remote database, navigating
through multiple rows retrieved from a database.

Unit-4

Java Beans: Application Builder tools, The bean developer kit(BDK), JAR files, Introspection, Developing a simple bean, using Bound properties, The Java Beans API, Session Beans, Entity Beans, Introduction to Enterprise Java beans (EJB),
Introduction to RMI (Remote Method Invocation): A simple client-server application using RMI.

Unit-5

Java Servlets: Servlet basics, Servlet API basic, Life cycle of a Servlet, Running Servlet, Debugging Servlets, Thread-safe Servlets, HTTP Redirects, Cookies, Introduction to Java Server pages (JSP).

References:
1. Margaret Levine Young, "The Complete Reference Internet", Tata Mcgraw-hill Education Pvt. Ltd.
2. Thampi, "Object Oriented Programming in JAVA" Wiley Dreamtech Publication.
3. Balagurusamy E, "Programming in JAVA", Tata Mcgraw-hill Education Pvt. Ltd.
4. Dustin R. Callway, "Inside Servlets", Addison Wesley.
5. Mark Wutica, "Java Enterprise Edition", QUE.
6. Steven Holzner, "Java2 Black book", Wiley Dreamtech Publication.
7. Liang, "Introduction to Java Programming, Comprehensive Version", Pearson Education.
8. Deitel and Deitel, "Java: How to Program" PHI Learning Private Limited, Delhi India.

COMPUTER BASED OPTIMIZATION TECHNIQUES
NMCA 315

L T P
3 1 0

Unit I
Preliminaries: Inventory Models and Replacement problems: Inventory models –various costs-deterministic inventory models, Single period inventory model with shortest cost, stochastic models, Application of inventory models, Economic lot sizes-price breaks, Replacement problems-capital equipment-discounting costs-replacement in anticipation of failure- group replacement-stochastic nature underlying the failure phenomenon.

Unit II
Linear Programming Problems (LPP): Definition of LPP, Graphical Solutions of Linear Programming Problems, Simplex Method, and Artificial Variable Method, Two Phase Method, Charnes' Big-M Method, Sensitivity Analysis, Revised Simplex Method, Duality, Dual Simplex Method

Unit III
Integer Linear Programming Problems: Integer Linear Programming Problems, Mixed
Integer Linear Programming Problems, Cutting Plane Method, Branch and Bound Method, 0-1 integer linear programming problem.
Transportation Problems: Introduction to Transportation Model, Matrix Form of TP, Applications of TP Models, Basic Feasible Solution of a TP, Degeneracy in TP, Formation of Loops in TP, Solution Techniques of TP, Different Methods for Obtaining Initial Basic Feasible Solutions viz. Matrix Minima Method, Row Minima Method, Column Minima Methods, Vogel's Approximation Method, Techniques for Obtaining Optimal Basic Feasible Solution.
Assignment Problems: Definition, Hungarian Method for AP.

Unit IV
Introduction to NLP: Definition of NLP, Convex Programming Problems, Quadratic Programming Problems, Wolfe's Method for Quadratic Programming, Kuhn-Tucker Conditions, Geometrical Interpretation of KT-Conditions, KT-Points etc.
Dynamic Programming: Bellman's Principle of optimality of Dynamic Programming, Multistage decision problem and its solution by Dynamic Programming with finite number of stages, Solution of linear programming problems as a Dynamic Programming problem

Unit V

Queuing Theory Introduction to Queues, Basic Elements of Queuing Models, Queue Disciplines, Memoryless Distribution, Role of Exponential and Poisson Distributions, Markovian Process, Erlang Distribution, Symbols and Notations, Distribution Of Arrivals, Distribution of Service Times, Definition of Steady and Transient State, Poisson Queues.

References:
1. Hadley, G.,"Linear Programming, and Massachusetts", Addison-Wesley .
2. Taha, H.A, "Operations Research – An Introduction", Macmillian
3. Hiller, F.S., G.J. Lieberman, " Introduction to Operations Research", Holden-Day.
4. Harvey M. Wagner, "Principles of Operations R esearch with Applications to Managerial Decisions", Prentice Hall of India Pvt. Ltd.
5. Swarup K , "Operation Research", S. Chand New Delhi.

NMCA -351 : DBMS

L T P
0 0 3

The programme to be implemented using SQL

1. Create Table, SQL for Insertion, Deletion, Update and Retrival using aggregating functions.

2. Write Programs in PL/SQL, Understanding the concept of Cursors.
3. Write Program for Join, Union & intersection etc.
4. Creating Views, Writing Assertions, Triggers.
5. Creating Forms, Reports etc.
6. Writing codes for generating read and update operator in a transaction using different situations.
7. Implement of 2PL concerning central algorithm.
8. Developing code for understanding of distributed transaction processing.

Students are advised to use Developer 2000 Oracle 8+ version for above experiments. However, depending on the availability of Software's students may use power builder/SQL Server/DB2 etc. for implementation.

Java Programming Lab

NMCA-352

L T P
0 0 3

1. Write a program in Java for illustrating, overloading, over riding and various forms of inheritance.
2. Write programs to create packages and multiple threads in Java.
3. Write programs in Java for event handling Mouse and Keyboard events.
4. Using Layout Manager create different applications.
5. Write programs in Java to create and manipulate Text Area, Canvas, Scroll Bars, Frames and Menus using swing/AWT.
6. Using Java create Applets.
7. Use Java Language for Client Server Interaction with stream socket connections.
8. Write a program in java to read data from disk file.

MANAGEMENT INFORMATION SYSTEMS   **L T P**
NMCA 411   **3 1 0**

Unit 1: Foundation of Information Systems: Introduction to information system in business, fundamentals of information systems, Solving business problems with information systems, Types of information systems, Effectiveness and efficiency criteria in information system.

Unit 2: An overview of Management Information Systems: Definition of a management information system, MIS versus Data processing, MIS & Decision Support Systems, MIS & Information Resources Management, End user computing, Concept of an MIS, Structure of a Management information system.

Unit 3: Concepts of planning & control: Concept of organizational planning, The Planning Process, Computational support for planning, Characteristics of control process, The nature of control in an organization.

Unit 4: Business applications of information technology: Internet & electronic commerce, Intranet, Extranet & Enterprise Solutions, Information System for Business Operations, Information System for Managerial Decision Support, Information System for Strategic Advantage.

Unit 5: Managing Information Technology: Enterprise & global management, Security & Ethical challenges, Planning & Implementing changes.

Advanced Concepts in Information Systems: Enterprise Resource Planning, Supply Chain Management, Customer Relationship Management, and Procurement Management.

References
1. Brian, "Management Information System", Tata Mcgraw-hill Education Pvt. Ltd.
2. Gordon B. Davis & Margrethe H. Olson, "Management Information System", Tata Mcgraw-hill Education Pvt. Ltd.
3. Brian, "Introduction to Information System", Tata Mcgraw-hill Education Pvt. Ltd.
4. Murdick, "Information System for Modern Management", PHI Learning Private Limited, Delhi India.
5. Jawadekar, " Management Information System", Tata Mcgraw-hill Education Pvt. Ltd.
6. Jain Sarika, "Information System", PPM Publication.
7. Davis, "Information System", Palgrave Macmillan.

WEB TECHNOLOGY
NMCA-412

L T P

3 1 0

Unit I: Introduction:

Introduction to web, protocols governing the web, web development strategies, Web applications, web project, web team.

Unit II: Web Page Designing:

HTML: list, table, images, frames, forms, CSS;

XML: DTD, XML schemes, presenting and using XML

Unit III: Scripting:

Java script: Introduction, documents, forms, statements, functions, objects; event and event handling; introduction to AJAX, VB Script

Unit IV: Server Site Programming:

Introduction to active server pages (ASP),ASP.NET, java server pages (JSP), JSP application design, tomcat server, JSP objects, declaring variables, and methods, debugging, sharing data between JSP pages, Session, Application: data base action , development of java beans in JSP, introduction to COM/DCOM.

Unit V: PHP (Hypertext Preprocessor):

Introduction, syntax, variables, strings, operators, if-else, loop, switch, array, function, form ,mail, file upload, session, error, exception, filter, PHP-ODBC.

References

1.Xavier, C, " Web Technology and Design" , New Age International.
2.Ivan Bayross," HTML, DHTML, Java Script, Perl & CGI", BPB Publication.
3.Ramesh Bangia, "Internet and Web Design" , New Age International
4.Bhave, "Programming with Java", Pearson Education
5.Ullman, "PHP for the Web: Visual QuickStart Guide", Pearson Education
6.Deitel, "Java for programmers", Pearson Education

ARTIFICIAL INTELLIGENCE
NMCA 413   L T P
3 1 0

Unit-I

Introduction : Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents. Computer vision, Natural Language Possessing.

Unit-II

Introduction to Search : Searching for solutions, Uniformed search strategies, Informed search strategies, Local search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha - Beta pruning.

Unit-III

Knowledge Representation & Reasoning: Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks.

Unit-IV

Machine Learning : Supervised and unsupervised learning, Decision trees, Statistical learning models, Learning with complete data - Naive Bayes models, Learning with hidden data - EM algorithm, Reinforcement learning,

Unit-V

Pattern Recognition : Introduction, Design principles of pattern recognition system, Statistical Pattern recognition, Parameter estimation methods - Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA), Classification Techniques – Nearest Neighbor (NN) Rule, Bayes Classifier, Support Vector Machine (SVM), K – means clustering.

References*:*

1. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", Pearson Education
2. Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata Mcgraw-hill Education Pvt. Ltd.
3. E.Charniak and D McDermott, "Introduction to Artificial Intelligence", Pearson Education
4. Dan W. Patterson, "Artificial Intelligence and Expert Systems", Prentice Hall of India.

MOBILE COMPUTING
NMCA-414

L T P
3 1 0

Unit – I

Introduction, issues in mobile computing, overview of wireless telephony: cellular concept, GSM:air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS.

Unit - II

Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP: Architecture, protocol stack, application environment, applications.

Unit – III

Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system, Disconnected operations.

Unit - IV

Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment.

Unit – V

Adhoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks, applications.

References:

1. J. Schiller, "Mobile Communications", Addison Wesley.
2. Charles Perkins, "Mobile IP", Addison Wesley.
3. Charles Perkins, "Ad hoc Networks", Addison Wesley**.**
4. Upadhyaya, "Mobile Computing", Springer New York.

Elective I

NMCAE11 : COMPILER DESIGN

L T P
3 1 0

Unit-1
Compiler Structure: Compilers and Translators, Various Phases of
Compiler, Pass Structure of Compiler, Bootstrapping of Compiler
Programming Languages: High level languages, The lexical and syntactic structure of a language, Data elements, Data Structure, Operations, Assignments, Program unit, Data Environments, Parameter Transmission.
Lexical Analysis: The role of Lexical Analyzer, A simple approach to the design of
Lexical Analyzer, Regular Expressions , Transition Diagrams, Finite state Machines, Implementation of Lexical Analyzer, Lexical Analyzer Generator: LEX, Capabilities of Lexical Analyzer
Unit-II
The Syntactic Specification of Programming Languages: CFG, Derivation and Parse tree, Ambiguity, Capabilities of CFG.
Basic Parsing Techniques: Top-Down parsers with backtracking, Recursive Descent Parsers, Predictive Parsers, Bottom–up Parsers, Shift-Reduce Parsing, Operator Precedence Parsers, LR parsers (SLR, Canonical LR, LALR)
Syntax Analyzer Generator: YACC
Unit-III
Intermediate Code Generation: Different Intermediate forms: three address code, Quadruples & Triples. Syntax Directed translation mechanism and attributed definition.
Translation of Declaration, Assignment, Control flow, Boolean expression, Array References in arithmetic expressions, procedure calls, case statements, postfix translation.
Unit-IV
Run Time Memory Management: Static and Dynamic storage allocation, stack based memory allocation schemes, Symbol Table management
Error Detection and Recovery: Lexical phase errors, Syntactic phase errors, Semantic errors.
Unit-V
Code Optimization and Code Generation: Local optimization, Loop optimization, Peephole optimization, Basic blocks and flow graphs, DAG, Data flow analyzer, Machine Model, Order of evaluation, Register allocation and code selection

References*:*
1. Alfred V Aho , Jeffrey D. Ullman, "Principles of Compiler Design", Narosa
2. A.V. Aho, R. Sethi and J.D Ullman, "Compiler: principle, Techniques and Tools", AW
3. H.C. Holub "Compiler Design in C", PHI Learning Private Limited, Delhi India..
4. Apple, "Modern Computer Implementation in C: Basic Design", Cambridge press.

Elective I

NMCAE12 : CLIENT SERVER COMPUTING

L T P
3 1 0

Unit I
Client/Server Computing: DBMS concept and architecture, Single system image, Client Server architecture, mainframe-centric client server computing, downsizing and client server computing, preserving mainframe applications investment through porting, client server development tools, advantages of client server computing.

Unit II
Components of Client/Server application: The client: services, request for services, RPC, windows services, fax, print services, remote boot services, other remote services, Utility Services & Other Services, Dynamic Data Exchange (DDE), Object Linking and Embedding (OLE), Common Object Request Broker Architecture (CORBA).
The server: Detailed server functionality, the network operating system, available platforms, the network operating system, available platform, the server operating system.

Unit III
Client/Server Network: connectivity, communication interface technology, Interposes communication, wide area network technologies, network topologies (Token Ring, Ethernet, FDDI, CDDI) network management, Client-server system development: Software, Client–Server System Hardware: Network Acquisition, PC-level processing unit, Macintosh, notebooks, pen, UNIX workstation, x-terminals, server hardware.

Unit IV
Data Storage: magnetic disk, magnetic tape, CD-ROM, WORM, Optical disk, mirrored disk, fault tolerance, RAID, RAID-Disk network interface cards.
Network protection devices, Power Protection Devices, UPS, Surge protectors.
Client Server Systems Development: Services and Support, system administration, Availability, Reliability, Serviceability, Software Distribution, Performance, Network management, Help Disk, Remote Systems Management Security, LAN and Network Management issues.

Unit V
Client/Server System Development: Training, Training advantages of GUI Application, System Administrator training, Database Administrator training, End-user training.
The future of client server Computing Enabling Technologies, The transformational system.

References:
1. Patrick Smith & Steave Guengerich, "Client / Server Computing", PHI Learning Private Limited, Delhi India.
2. Dawna Travis Dewire, "Client/Server Computing", Tata Mcgraw-hill Education Pvt. Ltd.
3. Majumdar & Bhattacharya, "Database management System", Tata Mcgraw-hill Education Pvt. Ltd.
4. Korth, Silberchatz, Sudarshan, "Database Concepts", Tata Mcgraw-hill Education Pvt. Ltd.
5. Elmasri, Navathe, S.B, "Fundamentals of Data Base System", Addison Wesley

Elective I

NMCAE13 : DATA WAREHOUSING & MINING

L T P
3 1 0

Unit – I
Dss-Uses, definition, Operational Database. Introduction to DATA Warehousing. Data-Mart, Concept of Data-Warehousing, Multi Dimensional Database Structures. Client/Server Computing Model & Data Warehousing. Parallel Processors & Cluster Systems. Distributed DBMS implementations.

Unit – II
DATA Warehousing. Data Warehousing Components. Building a Data Warehouse. Warehouse Database. Mapping the Data Warehouse to a Multiprocessor Architecture. DBMS Schemas for Decision Support. Data Extraction, Cleanup & Transformation Tools. Metadata.

Unit – III
Business Analysis. Reporting & Query Tools & Applications. On line Analytical Processing(OLAP). Patterns & Models. Statistics. Artificial Intelligence.

Unit – IV
Knowledge Discovery, Data Mining. Introduction to Data-Mining. Techniques of Data-Mining. Decision Trees. Neural Networks. Nearest Neighbor & Clustering. Genetic Algorithms. Rule Introduction. Selecting & Using the Right Technique.

Unit – V
Multimedia Data-Mining, Multimedia-Databases, Mining Multimedia Data, Data-Mining and the World Wide Web, Web Data-Mining, Mining and Meta-Data. Data Visualization & Overall Perspective. Data Visualization. Applications of Data-Mining.

References:
1. Berson, "Data Warehousing, Data-Mining & OLAP", Tata Mcgraw-hill Education Pvt. Ltd.
2. Mallach, "Decision Support and Data Warehousing System", Tata Mcgraw-hill Education Pvt. Ltd.
3. Bhavani Thura-is-ingham, "Data-Mining Technologies, Techniques Tools & Trends", CRC Press
4. Navathe, "Fundamental of Database System", Pearson Education.
5. Margaret H. Dunham, "Data-Mining. Introductory & Advanced Topics", Pearson Education
6. Pieter Adriaans, Dolf Zantinge, "Data-Mining", Pearson Education.

Elective I

NMCAE14: ADVANCED COMPUTER ARCHITECTURE

Unit - I:
Introduction
Parallel Computing, Parallel Computer Model, Program and Network Properties, Parallel Architectural Classification Schemes, Flynn's & Feng's Classification, Performance Metrics and Measures, Speedup Performance Laws: Multiprocessor System and Interconnection Networks; IEEE POSIX Threads: Creating and Exiting Threads, Simultaneous Execution of Threads, Thread Synchronization using Semaphore and Mutex, Canceling the Threads.

Unit – II:
Pipelining and Memory Hierarchy
Basic and Intermediate Concepts, Instruction Set Principle; ILP: Basics, Exploiting ILP, Limits on ILP; Linear and Nonlinear Pipeline Processors; Super Scalar and Super Pipeline Design; Memory Hierarchy Design: Advanced Optimization of Cache Performance, Memory Technology and Optimization, Cache Coherence and Synchronization Mechanisms.

Unit – III:
Thread and Process Level Parallel Architecture
Introduction to MIMD Architecture, Multithreaded Architectures, Distributed Memory MIMD Architectures, Shared Memory MIMD Architecture, Clustering, Instruction Level Data Parallel Architecture, SIMD Architecture, Fine Grained and Coarse Grained SIMD Architecture, Associative and Neural Architecture, Data Parallel Pipelined and Systolic Architectures, Vector Architectures.

Unit – IV:
Parallel Algorithms
PRAM Algorithms: Parallel Reduction, Prefix Sums, Preorder Tree Traversal, Merging two Sorted lists; Matrix Multiplication: Row Column Oriented Algorithms, Block Oriented Algorithms; Parallel Quicksort, Hyper Quicksort; Solving Linear Systems: Gaussian Elimination, Jacobi Algorithm; Parallel Algorithm Design Strategies.

Unit –V:
Developing Parallel Computing Applications
OpenMP Implementation in 'C': Execution Model, Memory Model; Directives: Conditional Compilation, Internal Control Variables, Parallel Construct, Work Sharing Constructs, Combined Parallel Work-Sharing Constructs, Master and Synchronization Constructs; Run-Time Library Routines: Execution Environment Routines, Lock Routines, Timing Routines; Simple Examples in 'C'. Basics of MPI.

Books:-
1. Kai Hwang," Advance Computer Architecture", TMH
2. Matthew, "Beginning Linux Programming", SPD/WROX
3. Hennessy and Patterson," Computer Architecture: A Quantitative Approach", Elsevier
4. Dezso and Sima, "Advanced Computer Architecture", Pearson
5. Quinn, "Parallel Computing: Theory & Practice", TMH
6. Quinn, "Parallel Programming in C with MPI and Open MP", TMH

Elective I

NMCAE15 : DISTRIBUTED SYSTEM

Unit–I

Characterization of Distributed Systems: Introduction, Examples of distributed Systems, Resource sharing and the Web Challenges. Architectural models, Fundamental Models.

Theoretical Foundation for Distributed System: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport's & vectors logical clocks.

Concepts in Message Passing Systems: causal order, total order, total causal order, Techniques for Message Ordering, Causal ordering of messages, global state, termination detection.

Unit-II

Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms, performance metric for distributed mutual exclusion algorithms.

Distributed Deadlock Detection: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms.

Unit–III

Agreement Protocols: Introduction, System models, classification of Agreement Problem, Byzantine agreement problem, Consensus problem, Interactive consistency Problem, Solution to Byzantine Agreement problem, Application of Agreement problem, Atomic Commit in Distributed Database system.

Distributed Resource Management: Issues in distributed File Systems, Mechanism for building distributed file systems, Design issues in Distributed Shared Memory, Algorithm for Implementation of Distributed Shared Memory**.**

Unit–IV

Failure Recovery in Distributed Systems: Concepts in Backward and Forward recovery, Recovery in Concurrent systems, Obtaining consistent Checkpoints, Recovery in Distributed Database Systems.

Fault Tolerance: Issues in Fault Tolerance, Commit Protocols, Voting protocols, Dynamic voting protocols.

Unit –V

Transactions and Concurrency Control: Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control.

Distributed Transactions: Flat and nested distributed transactions, Atomic Commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery.

Replication: System model and group communication, Fault - tolerant services, highly available services, Transactions with replicated data.

References:

1. Singhal & Shivaratri, "Advanced Concept in Operating Systems", McGraw Hill
2. Ramakrishna,Gehrke," Database Management Systems", Mc Grawhill
3. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design", Pearson Education
4. Tenanuanbaum, Steen," Distributed Systems", PHI
5. Gerald Tel, "Distributed Algorithms", Cambridge University Press