NIT SCHEME
COURSE OF STUDY AND SCHEME OF EXAMINATION OF B.TECH./B.ARCH./M.TECH/M.C.A.
NATIONAL INSTITUTE OF TECHNOLOGY OF RAIPUR

Branch:- **Master of Computer Applications (M.C.A.)**   Course:- **P.G.**

Semester:- **IInd Sem.**

S. No.	Board of Study	Subject Code	Subject Name	Period Per Week			Scheme of Examination			Total Marks	Credit [L+(T+P)/2]
				L	T	P	ESE	CT	TA		
1.	MASTER OF COMP. APP.	CA40211(CA)	Operating Systems	4	1	0	100	20	20	140	5
2.	MASTER OF COMP. APP.	CA40212(CA)	Data Base Management Systems	4	1	0	100	20	20	140	5
3.	MASTER OF COMP. APP.	CA40213(CA)	Data Structure	4	1	0	100	20	20	140	5
4.	MATHS	MA40214(CA)	Computer Oriented Numerical Analysis	4	1	0	100	20	20	140	5
5.	HUMANITIES & SOCIAL SCIENCES	HS40215(CA)	Oral & Written Communication	4	1	0	100	20	20	140	5
6.	MASTER OF COMP. APP.	CA40221(CA)	Programming Laboratory in RDBMS	0	0	6	75	-	50	125	3
7.	MASTER OF COMP. APP.	CA40222(CA)	Data Structure Lab	0	0	6	75	-	50	125	3
8.	HUMANITIES & SOCIAL SCIENCES	HS40223(CA)	Oral & Written Communication & Group Discussion Lab	0	0	2	-	-	50	50	1
			Total	**20**	**5**	**14**	**650**	**100**	**250**	**1000**	**32**

NATIONAL INSTITUTE OF TECHNOLOGY, RAIPUR (C.G.)
Semester - IInd Semester MCA   Code : CA40211(CA)

OPERATING SYSTEM

UNIT-1

Introduction to operating system, Functions provided by operating system, Introduction to multiprogramming. Time sharing and real time systems. Introduction to file systems, Access and allocation methods of file systems, Directory structure of a file system on a disk and tape, File protection.

UNIT-2

Introduction to scheduling, CPU scheduling, Various types of CPU scheduling algorithms and their evaluation. Meaning of disk and drum scheduling, Various types of disk and drum scheduling algorithms like FCFS, SCAN etc., CPU protection.

UNIT-3

Introduction to memory management. Various types of memory management schemes like paging, Segmentation etc. Concept of virtual memory, Meaning of demand paging, Various page replacement algorithms, Meaning of thrashing and methods to tackle it, Memory protection.

UNIT-4

Meaning of deadlocks, Various methods to avoid deadlocks like deadlock avoidance, Deadlock prevention etc., Banker's algorithm for deadlock avoidance. Introduction to concurrent processing, Precedence graphs, Critical section problem, Semaphore concept, Study of classical process co-ordination problem.

UNIT-5

Introduction to distributed systems and I/O Subsystem
Principles of I/O Hardware: I/O   devices, device controllers, direct memory access. Principles of I/O Software: Goals, interrupt handles, device drivers, device independent I/O Software. User space I/O software, I/O protection. Distributed file systems: Design, Implementation, and trends. Performance Measurement, important trends affecting performance issues, performance measures evaluation techniques, bottlenecks and saturation feedback loops. Case study of UNIX and DOS operating systems.

Text Book :
1. Operating System Concepts by James L. Peterson, Abraham Silberschatz (Addison-Wesley)
2. Operating System Concepts &. Design by Milan Milenkovic (MGH)

Reference:
1. Modern Operating System by Andrew .S. Tanenbaum (PHI)
2. An Introduction to Operating Systems by Haevey M Dietel(Addison V/esley)

NATIONAL INSTITUTE OF TECHNOLOGY, RAIPUR (C.G.)
Semester - IInd Semester MCA   Code : CA40212(CA)

DATA BASE MANAGEMENT SYSTEM

UNIT-1 Basic concepts. Database & Database Users. Characteristics of the Database Approach advantages of usine DBMS. Data Models, Schemas & Instances. DBMS Architecture & Data Independence. System Architecture for DBMS and Data Dictionary, Database Users Data Base languages & Interfaces. Data Modeling using the Entity-Relationship Model -Entity types, Entity Sets, Attributes and Keys, Relationship, Relationship Types, Week Entity Types, Structural Constraints, Enhanced ER Model- Specialization Generalization, Constraints on Specialization Generalization.

UNIT-2 Relational Model, Languages & Systems.
Relational Data Model Concepts and Constraints.   Relational Algebra - select, project, set theoretic, join operations. Overview of Relational Calculas. SQL - A Relational Database Language. Data Definition commands, View and Queries , transaction commands,Specifying Constraints & Indexes in SQL.

UNIT-3 Relational Data Base Design.
Function Dependencies & Normalization for Relational Databases. Informal design guidelines for relation schemas, Functional Dependencies. Normal forms based on primary keys (INF, 2NF, 3NF& BCNF). Lossless join & Dependency preserving decomposition. Multivalued dependencies, join dependencies (4NF & 5NF), Denormalization.

UNIT-4 Transactions, Concurrency Control, Recovery Techniques.
Basic concept; ACID properties; transaction state; implementation of atomicity and durability; concurrent executions; basic idea of serializability; view and conflict serializabllity Recovery Techniques Failure Classification , Storage Structure, Recovery and Atomicity Log Based Recovery,   Shadow Paging ,stable storage implementation, data access; recovery and atomicity - log based recovery, deferred database modification, immediate database modification, checkpoints.

UNIT-5 Emerging fields in DBMS
Distributed databases; Basic idea; distributed data storage; data replication; data fragmentation horizontal, vertical and mixed fragmentation. Concepts of Multimedia databases, Object oriented data base management systems. Data Warehousing & mining.

Text Book:-
1. Elmsari and Navathe, "Fundamental of Database System", Addison
Wesley. New York.
2. H.Korth & A. Silberschatz, "DATABASE SYSTEM CONCEPTS", TMH.

References:-
1. Date. CJ, "An Introduction to Database System", Narosa Publishing
House. New Delhi.
2. Desai, B, "An Introduction to Database Concepts", Galgotia
Publications. New Delhi.
3. Ullman. J.D, "Principles of Database Systems", Galgotia Publications, New Delhi.

NATIONAL INSTITUTE OF TECHNOLOGY, RAIPUR (C.G.)
Semester - IInd Semester MCA   Code : CA40213(CA)

DATA STRUCTURE

UNIT-1 Stack & Queue:
>   Contiguous implementation of stack; Various operation on stack; various Polish Notations- prefix, postfix, infix, Conversion from one to another - using stack; Evaluation of post & prefix expression. Contiguous implementation of Queue; Linear queue, its drawback;
>   Circular queue; Various operations on queue; Linked implementation of Stack &: Queue- operations.

UNIT-2 General List:
>   List and its contiguous implementation, its drawback; Singly linked list-operations on it; doubly linked list- operations on it; Circular linked lists: Josephoes Problem; Linked list using arrays, polynomial Arithmetic: addition, Subtraction and Evaluation, Linked Stack and Queues.

UNIT-3 Trees and Its Representation:
>   Definitions- Height, depth, order, degree, parent & children relationship etc; Binary Tree-Various theorems, complete binary tree, almost complete binary tree; Tree Traversals-preorder, in order & post order traversals, their recursive and non recursive implementations;
>   Expression tree-evaluation; Linked representations of binary tree operations. Threaded binary trees; Forrest, Conversion of forest into ^ tree Heap definition.

UNIT-4 Searching, Hashing & Sorting: -
>   Requirements of a search algorithm; sequential search, binary search, indexed sequential search, interpolation search, Hashing- Basics, methods, collision, resolution of collision, chaining; Internal Sorting-bubble sort, selection sort, insertion sort, quick sort, merge sort on linked and contiguous lists, shell sort, heap sort, tree sort.

UNIT-5 Graph:
>   Related definitions; Graph representations- adjacency matrix, adjacency list, adjacency multi-list; Traversal schemes - depth first search, breadth first search; Minimum spanning tree; Shortest path algorithm; Kruskal & Dijkstra algorithms. Miscellaneous features: Basic idea of AVL Tree- Definition, insertion & deletion operation; Basic idea of B-tree definition, order, degree, insertion & deletion operations; B+-tree-definition, comparison with B-tree; Basic idea of string processing.

Text books:
1. Kruse R.L.: Data Structures and Program Design in C; PHI
2. Tennenbaum A.M. & others: Data Structures using C & C++; PHI

References
1. Horowitz & Sawhaney: Fundamentals of Data Structures, Galgotia Publishers.
2. Schaum Series Data Structure

NATIONAL INSTITUTE OF TECHNOLOGY, RAIPUR (C.G.)
Semester - IInd Semester MCA   Code : MA40214(CA)

Computer Oriented Numerical Analysis

Unit – I: - Numerical Solution of Algebraic & Transcendental Equations
Bisection Method, Regula Falsi Method, Newton- Raphson Method, Secant Method, Birge-Vieta Method, Errors in numerical computation, Error type, Analysis and Estimation, Error Propagation.

Unit - II: -System of Linear Algebraic Equations
Solution of simultaneous algebraic equations by Gauss elimination method, Gauss-Jordan method, Crout's triangularization method, iterative methods of solutions, Jacobi method, Gauss- Siedel method, relaxation method.

Unit – III: - Interpolation with Equal and Unequal Intervals
Finite difference, difference of polynomial in Factorial notation, Other difference operator, Newton's Forward and Backward interpolation formula, Central interpolation formula, Stirling's formula, Bessel's formula, Lagrange's formula and Newton's Divided difference interpolation formula.

Unit – IV: -Numerical Differentiation, Integration & Curve fitting
Numerical differentiation, Numerical integration – Newton-Cote's Quadrature Formula, Trapezoidal Rule, Simpson's Rules, Weddle's Rule, Principle of least square, Curve Fitting Linear & non linear, exponential, logarithmic curve.

Unit - V: - Numerical Solution of Ordinary Differential Equation
Picard's method, Taylor's series method, Euler's methods, Euler's modified method, Runge-kutta fourth order method, **Predictor**-corrector method, Adams- Bashforth Method, Milne's method.

TEXT BOOKS:
1. Jain M. K. & Iyenger R.K. "Numerical Methods for Scientific & Engg. Computation," New-Age, International Pub. 4th Edition.
2. Grewal B.S. "Numerical Methods", Khanna Pub.

REFERENCE BOOKS:
1. Burden, Richard L., Fairs,J. Douglas Fairs, "Numerical Analysis", Thomson Asia. PTE, 7th Edition.
2. Gourdin A., Boumahrat M. "Applied Numerical Method", PHI.
3. Rajasekaran , S. " Numerical Method in Science & Engineering, A Practical Approach" S.Chand & Co Ltd., II Edition.

NATIONAL INSTITUTE OF TECHNOLOGY, RAIPUR (C.G.)
Semester - IInd Semester MCA   Code : HS40215(CA)

Oral & Written Communication

Unit - I: - Presentation Skills.

Presentation Nature and importance of oral presentation; Planning the presentation; Preparing the presentation; Organising presentation: Introduction body & conclusion, rehearsal, improving delivery, handling stage fright, checklist for making whole presentation..

Unit – II: - Towards better Oral Communication:

Common errors in parts of speech, Phonetics- British pronunciation, Vowel sounds, consonant sounds phonetic transcription, Intonation, Pitch variation, Difference between British & American English, Non-verbal communication, Soft skills in oral communication.

Unit – III: - Group Discussion

Nature, difference between GD & debate, importance of group discussion, characteristics of successful GD, Selection of GD, subject knowledge, oral communication skills, leadership skills, team management, Group Discussion Strategies: Technique for individual contribution in GD: Topic analysis, discussion of opinions, discussing problems, discussing case studies & Group interaction Strategies.

Unit – IV: - Note Making

Mechanics of note making: Reading strategy, note writing technique, topicalising, schematizing, reduction devices, organization techniques, methods of sequencing; summarizing and paraphrasing: mechanics of summarizing – selection, rejection, substitution; Outlining and paraphrasing: Do's and Don'ts of paraphrasing, techniques of paraphrasing.

Unit – V: - Ethical Skills in Behaviour

The illusion of communication: Failing to confirm the message, Forgetting the call to action, Fearing to disagree, Ignoring the beauty of arguments, choosing the wrong medium, Danger of half-baked ideas, the Art of explanation; word selection, Game played people with truth, Faces of 'no'.

Reference:-
1) Effective Technical Communication – M Ashraf Rizvi,
   Tata Mc Graw – Hill publishing company Ltd. New Delhi 2008
2) A Text Book of English Phonetics for Indian Students,
   T. Bala Subramanian Macmillan India Ltd. Delhi 2008.
3) Communication Skills – Leena Sen,
   Prentice – Hall of India New Delhi. 2005
4) Mc Cormack on communicating – Mark,
H. Mc Cormack Arrow Book Limited London 1997.

NATIONAL INSTITUTE OF TECHNOLOGY, RAIPUR (C.G.)
Semester - IInd Semester MCA   Code : CA40221(CA)

PROGRAMMING LABORATORY IN RDBMS

- Definition of Database (create, desc, alter, creating duplicate tables, constraints (primary key, foreign key, check, not null)
- Creation and modification of Database (insert & interactive input, update, delete)
- Retrieval of Database - select: where, distinct, in, between-and, like, is null, group by-having, order by, column: (format, heading, justify, wrap trunc), nested queries: (any, all, in, not in, exists), joins: (simple, selfjoin, outer join, between joins)
- Views(create,update,drop),sequences(create,alter,drop), synonyms(create, drop), index(create, drop)
- Transaction control (commit, rollback, save point)
- Data control (grant, revoke)
- PL/SQL programming:
  (Exceptions, cursors, records, tables, triggers, procedures, functions)

NATIONAL INSTITUTE OF TECHNOLOGY, RAIPUR (C.G.)
Semester - IInd Semester MCA   Code : CA40222(CA)

DATA STRUCTURES LAB

- Programs for implementation and operations on Arrays - one-dimensional, two-dimensional, Multidimensional: Creation, Insertion, and deletion of information elements from various array locations.

- Concept of C - Structures, Nested Structures, Recursion & Iteration Loops.

- Programs for implementation and operations on STACKS & QUEUES -Initializing Stack Structures using Arrays, Creation, Insertion, deletion of information elements from array locations in stacks, Implementation of Double-ended stacks, Double-ended queues, Elementary application programs: (stacks) postfix/ prefix expression evaluation, conversion of infix - to - postfix/ prefix expressions; (queues) - Airport Simulation program.

- Programs for implementation and operations on LINKED LISTS -Initializing node structures for Linear, Circular, Doubly- linear, Doubly-circular lists (with / with out header nodes), creation, insertion, deletion, sorting, reversal, of information nodes from any location in the lists, Elementary application programs: long integer addition / subtraction, Polynomial arithmetic, Classical Josephus problem.

- Programs for implementation and operations on TREES - Initializing node structures for Binary trees, Binary search trees, Expression trees, Threaded binary trees. General trees & forests and their traversal algorithms.

- Programs for implementation and operations on GRAPHS - Initializing node structures forming adjacency matrices & adjacency lists, traversal algorithms - depth-first search, breadth-first search, Construction of minimal spanning trees, shortest-paths from given graphs.

- Programs to implement SEARCHING: Sequential, Binary, **Hashing** algorithms.

- Programs to implement SORTING: Selection-sort, Bubble-sort, Insertion-sort, Quick-sort, Binary-tree, Heap-sort, Shell-sort, Merge-sort & Radix-sort algorithms.