

## Minutes

A meeting of *Board of Studies (BOS)* held on 04/09/2010 at 11:30 am in the Department of Computer Science & IT, MJP Rohilkhand University, Bareilly. The following members were present in the meeting.

1. Prof. Neelima Gupta	Member
2. Dr. Ravendra Singh	Internal Member & chairman
3. Mr. Brajesh Kumar	Internal Member
4. Mr. Ashutosh Gupta	Internal Member
5. Mr. S. S. Bedi	Internal Member
6. Mr. Vinay Rishiwal	Internal Member
7. Mr. Akhtar Husain	Internal Member
8. Dr. Karamjeet Bhatia G.K.U., Hardwar	External Member
9. Mr. Brajesh Kumar	Convener

Following points were discussed and resolved.

1. The list of examiners for *B.Tech.* theory and lab exams for academic session 2010-2011.
2. The list of examiners for *MCA* theory and lab exams for academic session 2010-2011.
3. The list of examiners for *BCA* theory and lab exams for academic session 2010-2011.
4. It has been noticed that some colleges do not contact the examiners whose names are sent by the University, instead they invite other examiners of their choice to conduct the exam. University also does not object this illegal practice and usually such exams are considered genuine, which is wrong. It is resolved by the BOS that colleges can not overlook the internal examiner appointed by the University unless they have written refusal from that internal examiner.
5. It has been observed that sometimes people from different universities/departments who never taught computer science subjects and even non-teaching people, who are not in the approved list of examiners, are appointed as external examiners by the University, which is not legal. These people cannot make fair assessment of the students because they do not have the knowledge of the subject. To maintain the quality of the exam in the interest of the students such people cannot be appointed as examiners.
6. There is no branch named Computer Sc. & IT in the list of AICTE, and The AICTE has given approval of the course by the name B.Tech.(Computer Sc. & Engineering) this

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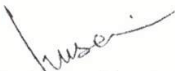
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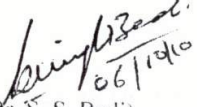
time. Therefore the existing course B.Tech.(Computer Sc. & IT) must be changed to B.Tech.(Computer Sc. & Engineering). As admissions are being made through UPTU counseling, and there is no option by the name "Computer Science & IT" in the list of choices. It would be beneficial to change the branch name from this point also. It is resolved by the BOS that existing branch "Computer Science & IT" must be changed to "Computer Science & Engineering".

7. The proposal for starting M.Tech. (Computer Science & Engineering) has been approved by faculty board in the earlier meeting. As directed by Faculty Board the course structure of M.Tech. is prepared and it is approved by the BOS.
8. The MCA course is being run by the Department of CSIT and AICTE has given its approval for this course in the Faculty of Engineering. The course structure and syllabi of MCA is designed and regularly revised by the Department of CSIT. But ~~P~~ the University statute this course is being considered under the Faculty of Applied Sciences. BOS recommends that this necessary action must taken to remove this anomaly and MCA should be mentioned as a course being run under Faculty of Engineering & Technology in the University statue.


The faculty members of Department of CS&IT were also present in the meeting. The convener is very thankful to all the BOS members and all the faculty members for their valuable suggestions.

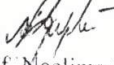
  
(Mr. Akhtar Husain)  
Internal Member

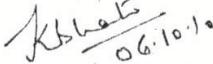
  
(Mr. Vinay Rishiwal)  
Internal Member

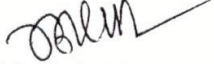
  
(Dr. S. S. Bedi)  
Internal Member

  
(Dr. Ashutosh Gupta)  
Internal Member

  
(Dr. Ravendra Singh)  
Internal Member

  
(Prof. Neelima Gupta)  
Member

  
(Dr. Karamjeet Bhatia)  
External Member

  
(Mr. Brajesh Kumar)  
Convener

**MCA COURSE STRUCTURE**

**Department of Computer Science & Information  
Technology**

**Institute of Engineering and technology,**

**MJP Rohilkhand University, Bareilly.**

### I SEMESTER

S.No	Course No.	Subject	Credits	Teaching Schedule			Total Hrs.
				L	T	P	
<b>THEORY COURSES</b>							
1.	MC-101	Computer Fundamentals and programming in C	4	3	1	0	4
2.	MC-103	Discrete Mathematics	4	3	1	0	4
3.	MC-105	Computer Accounting in Strategic Management	4	3	1	0	4
4.	MC-107	Management Information System	4	3	1	0	4
5.	MC-109	Digital Electronics	4	3	1	0	4
<b>LABORATORY COURSES</b>							
6.	MC-101P	C-Programming Lab	2	-	-	3	3
7.	MC-109P	Digital Electronics Lab	2	-	-	3	3
<b>Total Credits=24</b>							

### II SEMESTER

S.No	Course No.	Subject	Credits	Teaching Schedule			Total Hrs.
				L	T	P	
<b>THEORY COURSES</b>							
1.	MC-102	Data Structure	4	3	1	0	4
2.	MC-104	Computer Organization	4	3	1	0	4
3.	MC-106	Computer Oriented Numerical Methods	4	3	1	0	4
4.	MC-108	Database Management System	4	3	1	0	4
5.	MC-110	Principles of Programming Language	4	3	1	0	4
<b>LABORATORY COURSES</b>							
6.	MC-102P	Data Structure Lab	2	-	-	3	3
7.	MC-108P	Database Lab	2	-	-	3	3
<b>Total Credits=24</b>							

### III SEMESTER

S.No	Course No.	Subject	Credits	Teaching Schedule			Total Hrs.
				L	T	P	
<b>THEORY COURSES</b>							
1.	MC-201	Operating System	4	3	1	0	4
2.	MC-203	Analysis and Design of Algorithm	4	3	1	0	4
3.	MC-205	Object Oriented Programming	4	3	1	0	4
4.	MC-207	Theory of computation	4	3	1	0	4
5.	MC-***	Elective 1	4	3	1	0	4
<b>LABORATORY COURSES</b>							
6.	MC-203P	Algorithm Lab	2	-	-	3	3
7.	MC-201P	Operating System Lab	2	-	-	3	3
<b>Total Credits=24</b>							

### IV SEMESTER

S.No	Course No.	Subject	Credits	Teaching Schedule			Total Hrs.
				L	T	P	
<b>THEORY COURSES</b>							
1.	MC-202	Computer Network	4	3	1	0	4
2.	MC-204	Software Engineering	4	3	1	0	4
3.	MC-206	Computer Graphics	4	3	1	0	4
4.	MC-208	Advance Programming	4	3	1	0	4
5.	MC-***	Elective II	4	3	1	0	4
<b>LABORATORY COURSES</b>							
6.	MC-206P	Graphics Lab	2	-	-	3	3
7.	MC-208P	JAVA Lab	2	-	-	3	3
<b>Total Credits=24</b>							

### V SEMESTER

S.No	Course No.	Subject	Credits	Teaching Schedule			Total Hrs.
<b>THEORY COURSES</b>				<b>L</b>	<b>T</b>	<b>P</b>	
1.	MC-301	Advance Computer Networks	4	3	1	0	4
2.	MC-***	Elective-III	4	3	1	0	4
3.	MC-***	Elective-IV	4	3	1	0	4
4.	MC-303	Independent Study and Seminar	4	3	1	0	4
<b>LABORATORY COURSES</b>							
5.	MC-305P	Project	6	-	-	3	3
6.	MC-302P	Network Programming Lab	2	-	-	3	3
<b>Total Credits=24</b>							

### VI SEMESTER

S.No	Course No.	Subject	Credits
1.	MC-402	Industrial Training	24
<b>Total Credits=24</b>			

## **LIST OF ELECTIVES FOR MCA COURSE**

<b>MC-531</b>	<b>Artificial Neural Network</b>
<b>MC-532</b>	<b>Data Mining</b>
<b>MC-533</b>	<b>Parallel Computing And Algorithm</b>
<b>MC-534</b>	<b>Topics in Distributed System</b>
<b>MC-536</b>	<b>Fault Tolerance Computing</b>
<b>MC-537</b>	<b>Advance Database Management System</b>
<b>MC-538</b>	<b>Cryptography</b>
<b>MC-539</b>	<b>Network Management System</b>
<b>MC-540</b>	<b>Object Modeling Technique and UML</b>
<b>MC-541</b>	<b>Mobile Computing</b>
<b>MC-542</b>	<b>Internet Programming with .net framework</b>
<b>MC-543</b>	<b>Compiler Design</b>
<b>MC-544</b>	<b>Advance Computer Architecture</b>
<b>MC-545</b>	<b>Linux System Administration</b>
<b>MC-546</b>	<b>Digital Image Processing</b>
<b>MC-547</b>	<b>Web Technology</b>
<b>MC-548</b>	<b>Distributed Database System</b>

**Note:- The above list is subject to modified depending on the availability of the members and the contents of the syllabi shall be decided by the faculty.**

## MCA I SEMESTER THEORY COURSES

### MC -101 Computer Fundamentals

**Credits 4(3-1-0)**

**1. Introduction:** Basic definition, generation, Classification of Computer, introduction to computer architecture.

**2. Number System:** Introduction, classification -Decimal, Binary, octal, Hexadecimal and their inter convertibility. Data Representation- ASCII, BCD, Gray Code.

**3. Input/Output Units:** Input system, Input devices- keyboard, mouse, joystick, light pen, MCR, MICR; touch screen, Graphic tablet, Voice input system. Output system: output device, VDU, Printers, Plotters etc.

**4. Planning the computer program:** purpose of program planning, algorithms, flowcharts, decision tables, Pseudo code.

**5. Memory:** Introduction, Characteristic, Main memory, Secondary memory, Backup memory, cache memory. Primary Memory, Semiconductor Memory, Memory Management Unit.

**6. Basic operating system concepts:** MS-DOS, WINDOWS, Introduction to basic components of DOS, Evolution of operating system, Batch processing, Spooling, Multiprogramming, Multiprocessing, Time sharing, On-line processing, Real time processing, Introduction to internet, Basic terms related with internet.

**7. Computer Software:** Introduction to software relationship between hardware and software, Type of software, Acquiring software, Firmware.

**8. Programming in C:** History, Introduction to C Programming, Language, structure of C programs, compilation and execution of C programs, debugging techniques, data types and sizes, declaration of variables, modifiers, identifiers and keywords, symbolic constants, storage classes (global, automatic, external, register and static) enumerations, command line arguments, macros, the C preprocessor.

**(a) Operators: unary operators,** Arithmetic and logical operators, bit wise operators, assignment operators.

**(b) Control statements:** IF-ELSE statement, Switch statement, break, continue, the command operator, goto operator.

**(c) loops:** while, do, for

**(d) Functions:** built in and user defined, function declaration, definition and function calls, parameter passing, call by value and call by reference, recursive functions, multiple programs.

**(e) Arrays:** Linear Arrays, multidimensional Arrays, array of strings, passing array to functions. (f) Structure and unions: definition and difference, self referential structures.

**(g) Pointers:** Introduction, Accessing the address of a variable , Declaring & initializing pointers, Accessing a variable through pointer, pointers & Arrays, pointers & character strings, pointers & functions.

### References:

1. V. Rajaraman "Computer Fundamentals"
2. B. Ram "Computer Fundamentals"
3. E. Balagurusamy, "Programming in C" TMH.
4. Yashwant kanetkar, "Let us C", Narosa publications.
5. Gottfried, "Schaums outline series", TMH

**MC - 103 Discrete Mathematics**

**Credits 4 (3-1-0)**

1) **Logic:** Propositions, Conditional and Bi-conditional Disjunctive normal, Form and Simplification, Predicates, Valid Arguments And Proofs.

2) **Set Theory:** Sets, Set Relations, Set operations, Infinite Collection of sets, Power sets, Cartesian Products, Inductively defined sets, Formal Languages, Proofs By induction.

3) **Functions :** Functions, Injective and Surjective, Composition of functions, Inverse function, Functions and Set operations.

4) **Counting And Countability:** Counting Principles, Functions and Counting, Permutations and combinations, Combinatorial arguments, infinite Sets and Countability.

5) **Relations:** Relations, Compositions of Relations, Equivalence Relations, Equivalence Classes, Order Relations, Recurrence Relations, Lattice.

6) **Graph Theory:** Basic Concepts, Paths and Connectivity, Planar Graphs, Trees, Rooted Trees, Shortest path algorithm.

7) **Introduction To Algebra:** Binary operations, Semi groups, Groups, Subgroups, Cosets and Lagrange's Theorem.

**References:**

1. Olympia Nicodemi , " Discrete Mathematics", CBS Publications, Delhi.
2. Trembley & R. Manohar, "Discrete Mathematical Structure", Mc GrawHill.
3. B. Kolman, R.c. Busby & S.Ross," Discrete Mathematical Structures", PHI.

## **MC -105 Computer Accounting in Strategic Management Credits 4(3-1-0)**

**1.Business System and its environment:** Major business functions including production, marketing personnel and finance: Management Principles of Organization: Planning, Organizing and staffing, Directing and Controlling.

**2.Principles of Accounting:** Financial structure of organization centers, responsibility, reporting, Assets and liabilities, Accounting records: Assets and working capital.

**3.Cash flow operation statements balance sheet:** Influence of computer techniques on standard cost accounting functions.

**4.Financial Management:** Marginal costing; Important of Marginal costing, Break-even-cost volume, profit relationship, budget and budgetary control.

**5.Introduction to control of Projects:** Meaning of project management, objectives, contents and appraisal of project, capital budgeting, nature of investment decision, investment evolution criteria, payback period, discount payback area, Net Present value method, internal rate of return method.

### **References:**

1. Financial Management by S.N. Maheshwari, Sahitya Publishers, New Delhi.
2. Financial Management and Accounting by I. M. Pandey, Vikas Publishing House, New Delhi.

**1. Introduction to information system:** What is information system. types of information system:

**i. Operational Information system (OIS) :** office Automation system (OAS), Process Control System (PCS), Transaction processing system (TPS),

**ii. Management information system (MIS) :** Information Reporting systems (IRS), Decision Support system (DSS), Executive Information system. (EIS), Knowledge based system (KBS).

**2. Introduction and types of MIS:** Meaning of Management information system, Major types of Management information system, Information Reporting systems (IRS), Decision Support system (DSS), Executive Information system. (EIS), Relationship of Management Information system and operation information system in any organization.

**3. Features & Structures of MIS:** Features of MIS, Elements of MIS, Requirements for a successful MIS, Limitations of MIS, Structures of MIS

**4. Levels of MIS and Management System for Decision making:** Levels of MIS, Planning, Forecasting, Control, modeling, computing, database administration. MIS in context of decision Making: Programmed and Non- Programmed Decision.

**5. Planning and Organizing for MIS:** Information planning, Information needs of an organization. Parts of Planning function. Steps in Process of Strategic Planning, Organization Systems.

**6. Implementation, Evaluation and Maintenance of the MIS:** Implementation of MIS, implementation steps of MIS, Method of implementation of MIS, Documentation. Evaluation of MIS, Structure for evaluation of MIS, Problems Related to the maintenance of MIS.

**References:**

1. Management Information System by G.B. Davis & M.H.Olson, TataMcGrawHill.
2. Management Information System by Laudon & Laudon, PHI.
3. Management Information System by James A.O' Brien, Galgotia ND.

**MC - 109      Digital Electronics      Credits 4(3-1-0)**

**1. Introduction:** Number System, ASCII & EBCDIC codes, Logic gates, Introduction of NAND and NOR, Brief review of Boolean algebra; Minimization of switching functions;

**2. IC logic families:** RTL, TTL, NMOS, CMOS, ECL, IIL; Simplification of Boolean functions using different approaches;

**3. Combinational logic;** Design of combinational logic circuit using different chips (different gates): Code converter, encoders, decoders, multiplexers, demultiplexers, 7-segment decoder/driver, ROM, PLA, etc,

**4. Sequential logic circuits:** Circuit integration, counters, and the memory unit. Analog to digital converter, digital to analog converter.

**5. Introduction to Microprocessor:**

CPU organization, ALU, Control Unit, Registers, Instruction, formats, Classification of Instructions, Classification of processors, Addressing modes, block diagram and architecture of 8085, pin configuration of 8085, and description of each pin.

**References:**

1. Digital Logic and Computer Design by M. Morris Mano, PHI. 2. Digital Principles and Applications by Malvino & Leach, McGraw- Hill. 3. Digital Computer Fundamental by Bartee T., Mc Graw Hill.

**MCA I SEMESTER**

**LAB COURSES**

**MC-101P "C Programming Lab" (Based on MC-101) Credits 2**  
**MC-109P "Digital Electronics Lab" (Based on MC-109) Credits 2**

## MCA II SEMESTER

## THEORY COURSES

### MC -102 Data Structures

Credits 4(3-1-0)

1. **Basic Concepts & Notations:** Introduction to data structure , Binary and decimal integers , Real numbers ,abstract data types (ADT), Abstract Data Type for varying length character strings .

2. **Arrays:** The array as an ADT , Using one dimensional array , implementing one dimensional array ,two dimensional array , multidimensional array

3. **Stacks :** Definition and examples , primitive operations ,Array representation of stacks , Example : Infix , Postfix, Prefix : Basic definitions and Examples ,Evaluating a postfix expression, Converting an expression from infix to postfix ,

4. **Queues and Link Lists:** The Queue and its sequential Representation , Priority Queue ;Linked Lists : inserting and removing nodes from the list, Linked list as a data structure , Other List structures : Circular Lists, Doubly Linked Lists

5. **Trees:** Binary Trees : Operation on Binary Trees, Traversal : Inorder , Preorder , Postorder ;Application Binary Tree: Binary search tree, Expression Tree; Binary Tree Representation: Array representation , Link List representation ;Example :Huffman Algorithm

6. **Sorting:** Introduction, Selection sort, bubble sort, insertion sort, quick sort, and merge sort.

7. **Search:** Basic search Techniques :Sequential Searching ,Indexed Sequential Search , Binary Search , Interpolation Search ; Tree searching : inserting into Binary Search Tree(BST) , Deleting from a BST , Balanced (AVL) Tree, Multiway Search Tree and B-Tree .

8. **Hashing :** Introduction , Hash function : Division Method , Mid-square Method , Folding method, hash table.

9. **Graphs And Their Applications :**Introduction , Warshall's algorithm , Dijkstra's algorithm, Graph traversal : Depth First , Breadth First .

#### References:

- 1.Data Structures using C/C++: Tennenbaum , PHI
- 2.Introduction To Data Structures: Schaum Series. By Lipetu Mc GrawHill
- 3.Data structures by Augenstein & Tenenbaum, PHI. 4.Data structures Kruse

**MC -104      Computer Organization      Credits 4(3-1-0)**

1. **Introduction:** Review of digital logic; Logic gates, design of Adder and Subtractor using gates & K-MAP. Functioning of multiplexer, demultiplexer, flip-flops.

2. **Arithmetic for computers:** Introduction to number systems, negative numbers, addition and subtraction, logical operation, constructing an ALU, multiplication & division (with algorithms), floating point arithmetic.

3. **Processor Design:** Processor organization, information representation, Instruction format, Addressing Modes (Implied mode, immediate mode, register indirect mode, auto increment or Auto decrement mode, direct addressing mode, indirect addressing mode, relative addressing mode, Index Addressing mode), instruction types.

4. **Control Design:** Control memory Address sequencing, microinstruction interpretation, CPU control unit. Basic concepts of micro programmed control, micrpprogram sequencer for a control memory. microinstruction formats.

5. **Memory Organization:** Classification of memories, Memory Hierarchy, Optimization of memory hierarchy, addressing scheme for main memory, segmented memory system, paged segment memory, memory management policies. High speed memories, Characteristics of Cache memory, Cache memory organization, Block replacement policies interleaved memories. Word organized Associated memories.

6. **System Organization:** Bus arbitration, Programmed I/O (IO addressing, IO instruction), DMA (Type & procedure), interrupts (procedure, interrupt selection, vectored interrupts)

**References:**

1. Computer Architecture and Organization, By John P. Hayes, McGraw Hill.
2. Computer Organization and Design, by John L. Hennessy & David A. Patterson, Morgan Kaufman.
3. Computer System Architecture, By. M. Morris Mano, PHI.

**MC 106 Computer Oriented Numerical Methods      Credits 4(3-1- 0)**

**1. Numerical Solution of Algebraic & Transidental Equation:** Bisection method, iteration method , Newton Raphson method, Regula Falsi Method.,

**2. Numerical Solution of System of Equations:**LINEAR EQUATIONS: Direct method Matrix inversion, Gauss Elemination, Gauss Jordon, In-teractive method-Jacobi, Gauss scidel, and their error analysis.  
NON-LINEAR EQUATIONS: Method of iteration, Newton Raphson Method, Eigen values & Eigen vectors, and their error analysis.  
Programming assignment based on above methods.

**3. Interpolation & Extrapolation:** Finite differences, above Methods Newton interpolation formula, Languages, Hermite interpolation and their error analysis.

**4.Numerical Differentiation & Integration:** Trapezoidal, Simpson's 1/ 3 & 3/8 rule, Gauss quadridature, Conte formula.

**5.Numerical Solution to Ordinary Differential Equations:** Taylor series Method , Picond Method, Euler Method, Runge Kutta methods & their error analysis.

**References:**

1. Introductory Methods to Numerical Analysis by S.S. Sastry, PHI.
2. Numerical Mathematical Analysis by Scarborough, Jonhs Hopkins press.
3. Computer Oriented Numerical Methods by V. Rajaraman, PHI.
4. Elementary Numerical Analysis by Conte S.D. & Carle de Bour, Mc Graw Hill.
5. Introduction to Numerical Analysis by Gupta & Bose, Academic Pub lishers, Calcutta.

## **MC -108 Data Base Management Systems Credits 4(3-1-0)**

**1. Introduction:** Data Base System Concepts and architecture, Data models, scheme and instances, Data Independence Data Base Languages and Interfaces, Network Model. Hierarchical Model.

**2. Data Modeling Using the Entity-Relationship Model:** ER model concepts, Notations for ER diagram, Extended E-R diagram. Extended E-R model, Relationships of higher degree.

**3. Relational Data Model and Languages:** Relational model concepts, constraints, Relational Algebra, Relational Calculus, Tuple and Domain calculus, SQL: Data definitions queries, Basic structure, set operators, Aggregate function, Derived Relations. Modification of the Database, Joined relations and up-dates in SQL.

**4. Protecting The Database Against Misuse:** Integrity constraints, Views, security, Encryption, security in statistical databases.

**5. Database Design:** Functional dependencies, Normal forms, First second, and third functional normal forms. BCNF. Multi-valued dependencies Fourth Normal form. Join Dependencies and Fifth Normal form, Inclusion Dependencies.

**6. Transaction Processing concepts:** Transaction and system concepts, schedules and Recoverability, serializability of schedules.

**7. Concurrency Control Techniques:** Locking Techniques for Concurrency control. Time stamping and Concurrency control.

**8. Case study:** Object oriented DBMS

### **References:**

1. Abraham Silberschatz. Henry F. Korth S.Sudarshan," Database System Concepts", McGrawHill Book co. 1997.
2. Date, C.J; "An introduction to database system volume I & II ", AddisonWesley, 1983.
3. Ullman, Jeffrey D," Principles of database systems 2nd Edn", Galgotia Publ. Pvt. Ltd. 1982.
4. An Introduction to database system by Bipin C. Desai, Galgotia Publication

**1. Introduction:** Why study programming language?

**2. Virtual computer and actual computer :** Definition, syntax and semantics

**3. Data objects,** variables and constant: Data types , specification of elementary data types, types checking ( Static and dynamic)

**4. Vectors and arrays :** implementation of one and multidimensional arrays, records and structures, Their implementation, Record and arrays with structured component, pointer.

**5. Parallel programming :** Principle of Parallel programming language co routines, synchronization of tasks using interrupts, semaphores and messages, mutual exclusion, critical section.

**6. Abstract data types:** Data Abstraction , information hiding, encapsulation by subprograms- subprograms as Abstract operation, subprogram definition & invocation, generic subprogram.

**7. Subprogram control:** Simple subprogram call-return with its implementation ,Recursive program with its implementation Referencing environment

**References:**

1. Programming Languages (2nd ed.) by Ravi Sethi
2. Programming Languages (2nd ed.) by Ravi Sethi & Terrence W.Pratt.

**MCA II SEMESTER****LAB COURSES**

MC-102P "Data Structure Laboratory" (Based on MC-102) Credits 2

MC-108P "Database Lab" (Based on MC-108) Credits 2

## MCA III SEMESTER

## THEORY COURSES

### MC -201 Operating Systems

Credits 4(3-1-0) -0)

**1. Introduction and History:** What is an operating system generations of OS. bare system, batch system time sharing and real time system, multi-processor systems, types of services, user's view operating system's view.

**2. Processor Management:** Concept of process, process state diagrams. CPU scheduling concepts job scheduling, process scheduling algorithms, multiple processor scheduling.

**3. File Management:** File concepts, types, access methods, operation on files, free space management , allocations, implementation, directory system.

**4. Concurrent Processes And Programming:** Precedence graphs, critical section problem, semaphores, classical process coordination problems, interprocess communication, motivation modularization, synchronization, concurrent languages.

**5. Memory Management:** Preliminaries, bare machines , resident monitor, swapping, fixed and multiple partitions, paging, segmentation, page replacement algorithms allocation of algorithms, trashing, locality concepts.

**6. Device Management:** Techniques of device management, device characteristics channels and control units, device scheduling algorithms, virtual devices, SCM, sector queuing.

**7. Protection and Deadlocks:** Goals of protection, mechanism and policies, domain of protection, access matrix, existing systems, language based protection, protection. Problems, security what is deadlock characterization, deadlock prevention, deadlock avoidance, detection and recovery from deadlock combined approach.

**8. Design Principles:** Goals, mechanisms and policies layered approach, virtual machines, multiprocessors, implementation, system generation.

**9. Case Study:** General concepts of UNIX MSDOS, CTSS, MULTICS OS/360.

### References:

1. Operating System concepts by J.Peterson & A. Silberschetx, Addison-Wesley Publishing Company.
2. Operating System by Deitel, Addison Wesley.
3. Operating System by M. Milenkovic, TMH.
4. Operating System: Design & Implementation by A.S. Tannenbaum, PHI.

## **MC -203 Analysis & Design Of Algorithms**

**Credits 4 (3-1-0)**

**1. Introduction:** What is an algorithm, Writing structured programs, Analyzing algorithms.

**2. Divide - And - Conquer:** The general methods Binary search, Finding the maximum and minimum, Merge-sort, Quick-sort, Selection sort, Strassens's matrix multiplication.

**3.The Greedy Method:** The general method, optimal storage on tapes, Knapsack problem, Job sequencing with deadlines, Optimal merges patterns, Minimum spanning trees, Single source shortest path algorithm.

**4. Dynamic programming:** The general method, Multistage graphs, all pairs shortest paths, optimal binary search trees, 0/1 Knapsack, The traveling salesperson problem.

**5. Backtracking:** The general method, the 8-queens problem sum of subsets, Graph coloring, Hamiltonian cycles, Knapsack problem.

**6. Graph Algorithms:** Introduction, representation of graphs, Breadth first search, depth first search, topological sort, strongly connected component, flow networks, ford-fulkerson method.

**7. NP-completeness:** the classes of P and NP, polynomial reductions, NP-completeness problems, NP-completeness proof of SAT, CLIQUE, and independent set problems.

### **References:**

1. Design and Analysis of Algorithms by Aho, Hopcroft and Ullman, Addison Weseley.
2. Algorithms: Theory and Practices by Brassard and Bratley, PHI.
3. Fundamentals of Computer Algorithms by Horowitz & Sahni, Computer Science Press

## MC-205 Object Oriented Programming

Credits 4(3-1-0)

**1. Basics Of Object Oriented Programming:** What is Object oriented programming, Procedure oriented programming, problems with structured approach, OO terminology, Characteristics of Object oriented languages, Objects, Classes, Data Abstraction, Data Encapsulation, Inheritance, Polymorphism, Dynamic binding, Message passing, Structure of C++ Program

**2. Tokens, Expressions And Control Structure In C++:** Tokens. Basic data types, User defined data types, reference variables. Operators in C++, Operator Overloading, Loops (For, while and do), Decisions( if, if-else and switch), Control statements(break , continue and goto ).

**3. Building Objects With Classes:** Specifying classes, defining member function, Inline function, main function, call by reference, function overloading, friend and virtual function, Constructor and Destructors, Copy constructor, Dynamic constructors.

**4. Defining Operations On Objects:** Copy constructor, Defining operator overloading, overloading unary operator, overloading binary operator, overloading binary operator using friend function, manipulation of strings using operators, rules of operator overloading.

**5. Using Inheritance In C++:** Derived class, single inheritance, multilevel inheritance, multiple inheritance, Hierarchical inheritance, hybrid inheritance, virtual base class, abstract class, Constructor in Derived class.

**6. Pointers, Virtual Functions And Polymorphism:** Dynamic binding, static binding, virtual function, pure virtual function, dynamic binding through virtual function, pointer to objects, this pointer and pointer to derived class.

**7. Working With Files:** Classes for file stream operation, detecting EOF, file modes, file pointers and their manipulations, error handling during file operation, command line argument.

**8. Object Oriented System Development:** Procedure oriented paradigm, procedure oriented development tools, object oriented paradigm, steps in object oriented analysis and steps in object oriented design.

**9. Templates And Exception Handling:** Templates, class templates, function templates, member function templates, exception handling.

### References:

1. Programming in C++ by Bjarne Stroustrup,
2. Object Oriented Programming with C++ by Balagurusamy, TMH.
3. Turbo C++ by Robert Lafore,
4. Complete Reference C++ by Herbert Schild,
5. Thinking in C++ by P.B.Mahapatra, Khanna Publication

**1. Introduction:** A general introduction to Strings, languages, graphs, trees and relations. Models of Computation: RAM and RASP Models of Computation. Complexities of Algorithm run on these models with linear and logarithmic costs and their inter relationships. Turing machines and their relationship to RAM & RASP models., Finite State Machines, Regular expressions: Deterministic- Finite systems, Non deterministic Automata with and without  $\epsilon$ -moves Proof of equivalence of DFA and N DFA without  $\epsilon$ -moves ,Construction of DFA from N DFA with  $\epsilon$ -moves Regular expressions: Definition, equivalence of finite automata and regular expression with the proof and examples.

**2. Properties of regular sets:** Definition of Pumping Lemma along with examples, effective Closure properties of regular sets: Union, Intersection, Complementation, Concatenation, Kleen-Closure, Minimisation of a given DFA(only numerical example and no proofs).

**3. Context Free Grammars:** Definition of CFG, left most and right most derivations, definition of Ambiguous grammars, simplification of context free grammar: Removal of useless symbols ,  $\epsilon$ -production, Unit production. Conversion of a given grammar into Chomsky normal form, Griebach normal form ( examples only).

**4. Push Down Automata & Properties of context free languages:** Definition of instantaneous descriptions, definition of Deterministic PDA, construction of PDA for a given language, construction of CFL's given the transition function of PDA . Pumping Lemma (definition and examples) , effective Closure, Properties of CFLs : Union, Concatenation and Kleen closure.

**5. Turing machine:** Definition, Construction of Turing machines for simple languages, Definition of Computable languages and functions, Definition of total recursive, partial recursive functions, construction of Turing machine for simple arithmetic function.

**References:**

1. Instruction to Automata Theory. Languages and Computation by J.E. Hoproft and J. D. Ullaman, Narosa Publishers.
2. Theory of Computation by D. Wood, John Welley and Sons.

**MCA-III SEMESTER****LAB COURSES**

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MC-203P Algorithms Laboratory (Based on MC - 203 ) Credits 2

MC- 201P Operating System Laboratory (Based on MC-201) Credits 2

## MCA IV SEMESTER

## THEORY COURSES

### MC-202 Computer Networks

Credits 4(3-1-0)

**1. Introduction:-** Introduction, use of Computer Networks, Network Structure, Network Architectures, OSI model, Connection Oriented and Connection-less services. Services primitives, The network.

**2. The Physical Layer:-** Theoretical Basis for Data Communication, Transmission media, ISDN Services, the Telephone system, Modems.

**3. The medium Access Sublayer:-** Local and Metropolitan Area Networks, the ALOHA Protocols, local area Network protocols, IEEE standard 802 for local Area Networks.

**4. The Data Link Layer:-** Data Link layer Design Issues, Error detection and correction. Elementary Data Link protocols.

**5. The Network layer:-** Network layer Design issues, services provided to the Transport layer, Routing , Congestion , Routing Algorithms , Internetworking, fragmentation, firewalls.

**6. The Application Layer:-** Introduction of Network Security & E-mail

**7. Case study:-**TCP/IP model, ATM network, Internet.

#### References:

1. Computer Networks by A.S. Tanenbaum, PHI.
2. Data Networks by Bertsekos. D & Gallager. R, PHI.
3. Telecommunication Networks: Protocols' Modelling & Analysis by Mischar Schwartz, Addison Wesley.

## MC-204 SOFTWARE ENGINEERING :

Credits 4(3-1-0)

**1. Software :** The process and its management: Software and Software engineering the importance of software, software characteristics, components and applications, a crisis on horizon, software, myths, software engineering paradigms- a definition. Classical life cycle. Prototyping, spiral mode fourth generation techniques.

**2. Project Management:** (a) Software Metrics: The project management process, metric for software productivity and quality, measuring software metrics for software quality, integrating metrics within software engineering process. ( b) Estimation: Observations on estimating, planning objectives, scope, resources, decomposition techniques LOC and FP estimation, models-COCOMO model. (c) Planning: Risk analysis, software project scheduling, acquisition. re-engineering, organizational planning project plan.

**3. Software Requirement Analysis:** (a) Requirement analysis fundamentals: Requirement analysis. communication techniques analysis principles software prototyping specifications. (b) Structured analysis and its extensions: Basic notations and its extensions-Data flow diagrams, extensions for real time systems, ward and Mellor extensions, Hatley and Pirbhai extensions. ( c) Object oriented analysis and data modeling : Object oriented concepts, object oriented analysis modeling classification and assembly structures, defining objects. ( d) Alternative Analysis Techniques:

Data structure oriented methods, the DSSD approach, Jackson system development.

**4. The Software Design Fundamentals:** The design process, design fundamentals abstraction, refinement, modularity software architecture, control hierarchy, data structure, software procedure, modular design data design procedure design.

**5. Various Design Techniques And Its Implementations:** (a) Data flow oriented design: Design and information flow; design process considerations, transform analysis, transaction analysis, design post processing design optimization. (b) Object oriented design: concepts, design methods, class and object definitions, refining operations, program components and interfaces, a notation for OOD, detail design, and alternative design strategy. (c) User interface design: Human factors, human computer interaction, human-computer interface design, interface design guidelines, interface standards.

**6. Software Quality Assurance And Testing:** (a) Software quality assurance: Quality assurance, software reviews formal technical reviews, software quality metrics, formal approaches to SQA, software reliability. (b)Software testing techniques: Fundamentals, White-Box testing , Black Box testing. (c) Software testing strategies: A strategic approach to software testing, unit testing, integration testing (top-down and bottom-up, integration comments on integration testing, test documentation), validation testing, system testing, the art of debugging.

**7. Software Maintenance And Configuration Management:** Software maintenance: A definition, maintenance characteristics, maintainability, maintenance tasks, maintenance side effects, reverse engineering and re-engineering.

### References:

1. Software Engineering: A Practitioner's approach by Roger S. Pressman (Mc-Graw Hill International Edition).
2. An Integrated Approach to Software Engineering : Pankaj Jalote, Narosa Publication.
3. Software Engineering Concepts by Fairley (TMH)

**1. Introduction:** Origin of computer graphics, display devices, general purpose graphics software display of solid objects.

**2. Display Techniques and Devices:** Point plotting techniques, coordinate, systems and incremental methods, line-drawing algorithm, circle generators, display devices, CRT, inherited memory devices, the storage tube display, refresh line-drawing display.

**3. Graphic Packages And Display Files:** A simple graphics, segments, functions for segmenting the display files, posting and unposting, segment naming schemes. appending to segment refresh concurrent with reconstruction free storage allocation, display file structure, geometric, models, defining symbols procedures, display procedure, structured display files.

**4. Two Dimensional Transformation:** Principle concatenation matrix representation, a line clipping algorithm, midpoint division, clipping other graphic entities, polygon clipping, viewing transformation, the windowing transformer.

**5. Input Devices:** Pointing and positioning devices, three dimensional input devices. graph input techniques.

**6. Event Handling & Input Functions:** Introduction, polling, interrupts, the event queue, functions for handling events, polling task design, light pen interrupts, dragging and fix, hit detection, on-line character recognizers.

**7. Raster Graphics:** Introduction, generating a raster image , conversion , natural images, solid area son conversion, interactive raster graphics raster display hardware.

**8. 3-D Graphics:** Write frame perspective display, perspective depth, projective transformation, curves & surfaces, hidden line and surface elimination, transparent solids, shading.

**References:**

1. Principles of interactive computer graphics by W. M. Newman & R. F. Sproull, Mc Graw Hill.
2. Computer Graphics by Roy A. Plastick & Gordon Kalley, Schaum's Outline Series
3. Computer Graphics by Donald Hearn & Baker, PHI.

## MC-208 Advanced programming

Credits 4(3-1-0)

**1. An overview of JAVA** :Object oriented programming (Two paradigms Abstraction, The three OOP principle), Entering the program, compiling the program, Lexical issues (white space identifiers, literals, comments, separators, keywords).

**2. Data types & Operators** :variables and arrays, The simple type, Integers (byte, short, int, long)Floating Point Types (float, double, character, Booleans), A closer look at literals (integer literals, floating point literals, character literals, string literals), variables (declaring a variable, Dynamic Initialization, The scope and lifetime of variables) Type conversion and casting Arrays (one Dimensional arrays, Multidimensional arrays). Arithmetic operators (The basic operators the modules Operator, Arithmetic Assignment operator, increment and decrement operators).

**3. Control statements** : Java's selection statements (if, switch), iteration statements (while do-while, for, some for loop variations nested loops), jump statements (using break using continue, return).

**4. Classes & Methods** : Class fundamentals (The general form of a class, a simple class, Declaring objects a close look at new), Assigning object reference variable, Introducing method (Adding a method to the box class, returning a value adding a method that takes parameters), Constructors the this keyword. Overloading Methods (Over loading constructors), Using object as parameters, A closer look at argument passing, Returning objects, recursion, introducing access, control understanding static, introducing final, introducing nested and inner class, exploring the string class.

**5. Inheritance** : Inheritance basics (Member access and inheritance), Using super using super to call super class constructors), creating a multilevel hierarchy, when constructors are called, method overriding.

**6. Packages and interfaces**, Packages (defining a package), understanding CLASSPATH), access protection, importing packages, inter ace (Defining an interface, implementing Interfaces, Applying Interfaces, Variables in Interfaces, Interface can be Extended).

**7. Exception & String Handling**, Exception- Handling fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch clauses, Nested try statements throw, throws, finally. String length, character Extraction (charact (), getChars (), getBytes(), to CharArray(), )String Comparision (equals(), compare to ()), Modifying a string (substring(), concat(), replace()), Data conversion using value () string buffer (length() and capacity, ensure Capacity () Setlength(),charAt() setCharAt(), getChars(), append(), insert(), reverse(), delete() and delete CharAt(), replace()).

**8. Multithreaded Programming** : The java thread model (Thread priorities synchronization, Messaging the Thread class and the Runnable Interface), The Main, Thread, Creating a Thread (Implementing Runnable, Extending Thread), creating Multiple threads, Thread priorities Synchronization (using Synchronized methods, the Synchronized Statement), Suspending, Resuming, and Stopping Threads.

**9. Input/Output** : Exploring java i/o, The java I/O classes and Interfaces File (Directors, Using File N The listfiles () The listfiles () Alternative, creating Directories), The Stream classes InputStream, Output Stream ,File Input Stream, File Output Stream Byte Array output Stream),The character Streams(Reader, Writer, File Reader,File CharArray Reader, Char Array Writer, Buffered,Reader, Bufferewriter).

### References:

- 1.The Complete Reference, by Patric Naughton, shildth.
- 2.Java by Oreilly
- 3.Thinking in Java by Bruce Eckel

**MCA IV SEMESTER**

**LAB COURSES**

MC- 206P Computer Graphics Lab (Based on MC-206) Credit 2

MC- 208P Java lab(Based on MC-208) Credit 2

## MCA V SEMESTER

## THEORY COURSES

MC-301    **Advanced Computer Networks**

**Credits 4(3-1-0)**

**1. Introduction and Overview** :TCP/IP, Internet, Internet services, Internet protocol and standardization, Approaches to network communication, WAN & LAN Ethernet Technology, FDDI, ATN.

**2. Internetworking concept and Architectural Model, Internet Addresses:**

Application label interconnection, Network label Interconnection, Properties of Internet, Internet Architecture, Interconnection Through IP Routers, Universal Identifiers, Classes of IP Addresses, Network and Broadcast services, weaknesses in internet addressing, dotted decimal notation, loop back address, summary of special address conventions.

**3. Mapping Internet Address to physical Addresses (ARP)** : The address resolution problem, Two type of physical addresses, Resolution through Direct mapping and dynamic binding, ARP refinement, relationship of ARP to other protocols, ARP Implementation, ARP protocol format, Determining an internet Address At startup (RARP)

**4. Internet Protocol** : Connectionless Datagram delivery : Virtual network, internet architecture & Philosophy, Concept of Unreliable delivery, connectionless delivery system, Internet datagram and its options, Routing IP Datagrams: Routing in Internet, Direct and Indirect delivery, Table-Driven IP & Next-Hop Routing, Default and Host-specific routers, IP routing algorithm, routing with IP addresses, Handling incoming datagrams, establishing routing tables.

**5. Reliable Stream Transport service (TCP)** : Need for stream delivery, properties of reliable delivery service, providing reliability, TCP, ports, connections and endpoints, passive and active opens, segments and sequence numbers, TCP segment format , TCP checksum computation , acknowledgement, timeout and retransmission, Karn's algorithms and timer back off, response congestion, establishing and closing a TCP connection, TCP state machine, TCP performance, silly window syndrome and avoiding silly window syndrome.

**6. TCP/IP over ATM Networks:** ATM hardware, logical view of ATM network, two ATM connection paradigms, ATM cell transport, Packet type and multiplexing, IP address binding in ATM network, Connection management, address binding with in an logical IP subnet, ATM ARP packet format, use of ATP ARP packet to determine an address.

**7. Bootstrap and auto configuration (BOOTP, DHCP), DNS and Application:**

BOOTP message format and retransmission policy, two step Bootstrap procedure, Dynamic Host configuration and IP address assignment, obtaining multiple addresses, address acquisition and lease renewal state, DHCP message format, option and message type, DSCP and Domain name, TCP/IP internal Domain names, mapping domain name to addresses, Domain name resolution , Domain server message format, compressed name format, abbreviation of domain names, inverse mapping, obtaining authority for subdomain, Applications : File access and transfer sharing by file transfer, TCP/IP file transfer protocol (FTP), FTP features, FTP process model, TCP port number assignment, TFTP, NFS, Remote procedural call (RPC), Electronic mail (822, SMTP, MIME).

### References :

1. Internetworking with TCP/IP Vol I by Stevens, addition wesley
2. TCP/IP vol I , by Comer, PHI

**MCA V SEMESTER****LAB COURSES**

MC- 305P Project Lab

Credit 2

MC- 301P Network Programming lab (Based on MC-301)

Credit 2

## **SYLLABUS OF ELECTIVE PAPERS**

### **MC-531      Artificial Neural Networks      Credits 4(3-1-0)**

**1.** Introduction to neural nets, Perceptrons and the LMS Algorithm. Backpropagation Learning, Visually-Guided Robot Control.

**2.** Optimization Techniques, Overfitting, Cross-Validation, and Early Stopping, Simple Recurrent Networks, Pattern Classification, Language Processing Models.

**3.** Radial Basis Functions, The EM (Expectation-Maximization) Algorithm, Neural Networks for Control, Support Vector Machines, Time Series Prediction.

**4.** Shared Weight Networks, Competitive Learning and Kohonen Nets, Hebbian Learning and Principal Components Analysis, Hopfield Nets and Boltzmann Machines.

**5.** Mean Field Approximation, Helmholtz Machines; Minimum Description Length, Bayesian Networks, Computational Learning Theory, Connectionist Symbol Processing, Reinforcement Learning, Neurophysiology for Computer Scientists.

#### **References:**

**1.** Bishop, C. M. (1995) Neural Networks for Pattern Recognition,. Oxford University Press.

**2.** Optional enrichment: Anderson, J. A., and Rosenfeld, E.

**3.** Handout: Derivation of the backprop learning rule

**4.** Haykin, S. Neural Networks: A Comprehensive Foundation, 2nd edition.

**5.** Kearns, M. J., and Vazirani, U. V. An introduction to Computational Learning Theory,. Cambridge, MA: MIT Press.

**6.** Churchland, P.S. (1986) Neurophilosophy: Toward a Unified Science of the Mind-Brain.. Cambridge, MA: MIT Press.

## **MC-532 Data Mining**

**Credits 4(3-1-0)**

**1. What is learning :** Introduction, What is learning, Self learning computer systems, Machine learning & Methodology of science, Ex:- A kangaroo in mist. What is data ware housing, why do we need it & Integration with Data Mining.

**2. Introduction :** What is Data Mining, Definitions, The knowledge discovery process in detail (Data selection, Cleaning, Enrichment, Coding process) KDD (Knowledge Discovery in Database) v/s Data MiNing, DBMS v/s Data Mining, Golden rules to setup KDD environment.

**3. Data Mining Techniques :** Preliminary Analysis of data set using traditional Query rules, Visualization techniques, Likelihood & distance, OLAP Tools, K-nearest neighbor, Decision Trees. Association rules, Neural Networks, Genetic algorithm.

**4. Association Rules :** What is an Association rule, Methods to discover Association Rules, A Priori algorithm, Partition algorithms, Pincer search algorithms, Discussion on different algorithms, Incremental algorithms, Border algorithm, Generalized association rule.

**5. Decision Trees :** What is a decision tree, Tree construction principle, Web-split, Splitting Indices, Splitting Criteria, Decision tree construction algorithm.

**6. Web Mining :** Web mining, Web content mining, Web structure mining, Web users mining, Text mining, Unstructured text, Episode Rule Discovery for Text, hierarchy of Categories, Text-Clustering.

### **References :**

1. Data Mining techniques by Arun Pujari, Universities Press.
2. Data Mining by Pieter Adriaans, Dolf Zantinge, Addison-Wesley.

**MC-533**

**Parallel Computing and Algorithms Credits 4(3-1-0)**

**Unit-I:**

Sequential model, need of alternative model, parallel computational models such as PRAM, LMCC, Hypercube, Cube Connected Cycle, Butterfly, Perfect Shuffle Computers, Tree model, Pyramid model, Fully Connected model, PRAM-CREW, EREW models, simulation of one model from another one.

**Unit-II:**

Performance Measures of Parallel Algorithms, speed-up and efficiency of PA, Cost optimality, An example of illustrate Cost-optimal algorithms- such as summation, Min/Max on various models.

**Unit-III:**

Parallel Sorting Networks, Parallel Merging Algorithms on CREW/EREW/MCC, Parallel Sorting Networks on CREW/EREW/MCC, linear array

**Unit-IV:**

Parallel Searching Algorithm, Kth element, Kth element in X+Y on PRAM, Parallel Matrix Transportation and Multiplication Algorithm on PRAM, MCC, Vector-Matrix Multiplication, Solution of Linear Equation, Root finding.

**Unit-V:**

Graph Algorithms - Connected Graphs, search and traversal, Combinatorial Algorithms-Permutation, Combinations, De-arrangements.

**References:**

1. M.J. Quinn, "Designing Efficient Algorithms for Parallel Computer" by Mc GrawHill.
2. S.G. Akl, "Design and Analysis of Parallel Algorithms"
3. S.G. Akl, "Parallel Sorting Algorithm" by Academic Press

## **MC-534 Topics in Distributed System      Credits 4(3-1-0)**

**1. Introduction to distributed system :** What is distributed system, Advantages of distributed systems over centralized systems and PCs, Disadvantages of distributed system. Hardware concepts: Bus based multiprocessors, switched Multiprocessors, Bus based multi computer, Switched multi computers. Software Concepts: Network OS, true distributed systems, Multiprocessor time sharing system.

**2. Architecture of Distributed System :** Motivation of distributed operating system, System Architecture types, Various issues in distributed operating system: Global Knowledge, Naming, Scalability, Compatibility, Process Synchronization, Resource Management, Security, Client-Server computing model. Communication Network (WAN and LAN), Communication Primitives, The Message Passing Model, Remote procedural calls.

**3. Theoretical Foundations of Distributed Operating system:** Inherent limitation of distributed system, absence of global clock, Absence of shared memory, Lamport's Logical clock, Global State Chandy-Lamport's global state recording algorithm, termination detection.

**4. Distributed deadlock, Distributed Mutual Exclusion and Agreement Protocol :** Mutual Exclusion: Centralized Algorithm, Distributed algorithm, Token ring algorithm., Deadlock in distributed system. Distributed deadlock detection, Distributed deadlock prevention., Introduction to Agreement protocols, System models: Asynchronous Vs Synchronous Computation, Model of processor failure, Authenticated Vs Non-Authenticated Messages, Performance Aspects.

**5. Distributed data storage and distributed Query Processing :** Data Replication, Data Fragmentation (horizontal, vertical and mixed), Data replication and fragmentation, Query Transformation, Simple join Processing. Semijoin strategy. Join strategy that exploits parallelism, Distributed transaction model.

**6. Commit protocol, Concurrency control and deadlock handling :** Commit protocols-two phase commit and three phase commit, Concurrency control-locking protocol and time stamping, Deadlock handling - centralized and distributed approaches.

### **Referemces :**

1. Advanced Concepts in operating system by Mukesh Singhal and Niranjana G. Shivaratri.
2. Distributed operating system by Andrew S.Tanenbaum.

**MC-536**

**FAULT -TOLERANCE COMPUTING Credit: 4(3-1-0)**

**1. INTRODUCTION** : Fundamental terminology, Objective of Fault -Tolerance, Applications of Fault-Tolerant computing, Reliability, Safety, Availability and Maintainability Modeling using Markov chain, Dependability Evaluation technologies, Failure rate, reliability function., Mean time to Failure (MTTF), Mean Time between, failures (MTBF) Mean time to Repair (MTTR)

**2: Architecture of Fault Tolerant Computer:** Taxonomy, Fault Avoidance Techniques, Fault Detection at IBM, Dynamic redundancy in multiple computer system & Recovery on Time and Space, Fault, Detection Techniques, Detection of errors in Data Management, Component Fault Detection, Detection Tests at System level.

**3: Reliable Design and Fault Diagnosis:** Hazard, Fault Detection in Combinational circuits, Fault location Experiments, Boolean Differences, Fault Detection by Path Sensitizing.

**4: Coding Theory For Fault-Tolerant System:** Error models, Basic structural properties of parity check codes, Matrix description of parity check codes, vector-space properties of parity check codes Error checking the syndrome, Group properties of Parity check codes, Distance properties of parity check codes Polynomial algebra and cyclic codes, Hamming - single error correcting codes, Unidirectional error correcting and Detecting codes, Asymmetric Error correcting codes, single-Asymmetric error correcting code.

**5. Software Design Faults:** Approaches for uniprocess software: Exception Handling Framework, Recovery Block Approach, N-version Programming. Backward Recovery in Concurrent systems: Domino Effect, Conversations, and FT-Actions, Conversation using monitors, Using Distributed FT-Action. Forward recovery in concurrent Systems: Exception Resolution, Exception Handling with FT-Action.

**References:**

1. D.K. Pradhan, Fault Tolerant Computer System Design, Prentice Hall PTR New Jersey.
2. Uvi S.T. Agrawale: Fault Tolerant System Design, Me GrawHill, International Ed.
3. Zvi Kohavi, Switching and finite Automata Theory, TMH.

## **MC-537 Advanced Data Base Management System**

**Credit 4(3-1-0)**

- 1.** Introduction to distributed data base systems, transaction processing  
Concurrency control techniques, security, Distributed Data Base architecture.
- 2.** Introduction to object oriented database system, Definition of Objects, Review of  
Key Object-oriented programming concepts, Object Orientation for Database  
Systems, Relational Extensions to Object-oriented Database Systems, Object  
Orientation in Relational Databases, Uses for Object-oriented Database.
- 3.** Introduction to data mining, Self-learning, What is data warehouse and why do  
we need, Designing decision support systems, Integration with data mining.
- 4.** Introduction to knowledge discovery process, Data selection, cleaning.  
Enrichment coding data mining, Preliminary analysis of the data set using traditional  
query tools, Decosopm trees, Association rules, Neural networks, Genetic  
algorithms Introduction to setting up a KDD environment.
- 5.** Advanced Transaction processing: Remote Backup systems, Transaction-  
Processing Monitors, TP-Monitor Architectures, High-Performance Transaction  
systems. Long Duration Transactions, Transactional Workflows, Query Optimization  
security and production, Encryption, Statistical Database.
- 6.** Data base triggers, functions, procedures, packages and forms with respect to  
existing database.

### **References :**

1. Stegano Ceri and giuseppe Pelagati : Distributed Data base system, Mc-Graw  
Hill Book Company. 1984. OR (Advance version)
2. Prabhat K. Andleigh, Michael R. Gretzinger : Distributed Object - Oriented Data-  
Systems Design, PTR Prentic- Hall Inc., 1992.
3. Pieter Adriaans Dolf Zantinge : Data Mining, Addison, Wesley, Longman Ltd.,  
1997.

**1.        Introduction** : Terminology, Substitution ciphers and Transposition ciphers, Simple XOR, One-Time Pads, Computer Algorithms. Cryptographic Protocols

**2.        Protocol Building Blocks** : Introduction, Communication using Symmetric Cryptography, One-Way Hash Functions, One-Way Hash Functions, Communication using Public-Key Cryptography, Digital Signatures, Digital Signatures with Encryption.

**3.        Protocols:** Authentication and Key exchange, Key Exchange, Authentication, Multiple key public key cryptography, Secret splitting, Secret Sharing, Cryptographic protection. Zero-Knowledge Proofs, Zero-Knowledge Proofs of Identity, Blind Signatures, Oblivious Transfer, oblivious signature, Simultaneous contract signing Cryptographic Techniques

**4.        Key Management** : Generating Keys, Nonlinear Keyspaces, Transferring Keys, Verifying Keys, Using Keys,

**5.        Using Algorithms** : Choosing an Algorithm, Public-Key cryptography versus Symmetric cryptography, Encrypting Communication Channels, Encrypting data for Storage.

**6.        Cryptographic Algorithms** - RSA, DES

**References :**

1.        Applied Cryptography by Bruce Schneier, John Wiley & Sons.

## **MC-539 Network management Systems**

**Credits 4(3-1-0)**

**1 Data communications and Network Management Overview** : Analogy of Telephone Network Management, Communications protocols and Standards, Case Histories of Networking and Management, Challenges of Information Technology Managers, Network Management: Goals, Organization, and Functions, Network and System Management, Network Management System Platform, Current Status and future of Network Management.

**2 SNMPV1 Network Management** : Organization and Information and Information Models. Managed network : Case Histories and Examples, The History of SNMP Management, The SNMP Model, The Organization Model, System Overview, The Information Model. SNMPv1 Network Management : Communication and Functional Models. The SNMP Communication Model, Functional model. SNMP Management: SNMPv2 : Major Changes in SNMPv2, SNMPv2 System Architecture, SNMPv2 Structure of Management Information, The SNMPv2 Management Information Base, SNMPv2 Protocol, Compatibility WithSNMPv1.

**3 SNMP Management** : RMON : What is Remote Monitoring? , RMON SMI and MIB, RMON1, RMON2, ATM Remote Monitoring, A Case Study of Internet Traffic Using RMON

**4 Telecommunications Management Network:** Why TMN? , Operations Systems, TMN Conceptual Model, TMN Standards, TMN Architecture, TMN Management Service Architecture, An Integrated View of TMN, Implementation Issues.

**5 Network Management Tools and Systems:** Network Management Tools, Network Statistics Measurement Systems, History of Enterprise Management, Network Management systems, Commercial Network management Systems, System Management, Enterprise Management Solutions.

**6 Web-Based Management:** NMS with Web Interface and Web-Based Management, Web Interface to SNMP Management, Embedded Web-Based Management, Desktop management Interface, Web-Based Enterprise Management, WBEM: Windows Management Instrumentation, Java management Extensions, Management of a Storage Area Network: , Future Directions.

### **Text Book:**

1. Network Management, Principles and Practice, Mani Subrahmanian, Pearson Education.

### **References:**

1. Network management, Morris, Pearson Education.
2. Principles of Network System Administration, Mark Burges, Wiley Dreamtech.
3. Distributed Network Management, Paul, John Wiley.

1. **Introduction:** object oriented themes, object oriented development, object oriented paradigms (encapsulation, abstraction, binding, polymorphism, inheritance, message passing), the object modeling techniques, impact of an object oriented approach.
2. **Modeling:** The object modeling techniques, object and classes, link and association, advance link and association, concepts, elements of object model, aggregation, abstract classes, multiple inheritance, candidate key.
3. **Dynamic and functional modeling:** Events and states, operations, concurrency, object oriented developments, functional model, data flow diagram, specifying operations, constraints.
4. **Analysis and system design:** Overview of analysis, principles of system design, object design, breaking of a system into subsystem.
5. **UML (Unified Modeling language):** Introduction to UML, importance and principles of modeling, A brief introduction to conceptual model of UML, architecture of UML, case study: Elevator problem

**Reference Books:**

1. James Rumbaugh et al, "Object Oriented Modeling and Design", PHI
2. Booch Grady, "Object Oriented Analysis & Design with application 3/e", Pearson Education, New Delhi.
3. James G. Booch, J. Rumbaugh "The Unified Modeling Language", .

**1 Overview of wireless communication:** History, Different Generations, General characteristics of mobile devices, Electromagnetic spectrum, Radio propagation mechanisms, characteristics of wireless medium, wireless topology, cellular system (cell concepts, cell hierarchy, cell fundamentals).

*Issues in mobile computing:* Introduction, functions, 3-Tier architecture, applications and services.

*GSM:* Mobile services, System architecture, Radio interface, Localization and calling Handover, Security.

**2 WLAN:** Technical issue (uses, design goal, types, components and services offered by a typical IEEE 802.11 network), IEEE 802.11 standard (physical layer, MAC layer mechanism & functionalities, CSMA/CA mechanism).

*HIPERLAN:* HIPERLAN standard, HyperLAN/1 (physical layer, DLC & RLC layer, MAC sub-layer), HyperLAN/2 (Physical layer, MAC sub-layer, power conservation issues)

*BLUETOOTH:* Specifications, transport protocol group, middleware protocol group, profile.

**3 Medium access control (wireless):** Motivation for a specialized MAC (hidden and exposed terminals, near and far terminals), SDMA, FDMA, TDMA and CDMA.

**4 Mobile Network layer:** Mobile IP: Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations, and dynamic host configuration protocols (DHCP).

**5 Mobile Transport layer:** Traditional TCP, Indirect TCP, Snooping TCP,, Mobile TCP, Fast retransmission/ fast recovery, transmission/ time-out freezing, selective retransmission, transaction oriented TCP. Wireless Application Protocol WAP: Introduction, protocol architecture and treatment of protocols of all layers.

**6 Introduction & issues in Ad Hoc wireless networks:** introduction ( cellular vs ad hoc wireless networks and applications), Medium Access Scheme, Routing, Multicasting, transport layer protocols, Pricing Scheme, QoS provisioning, Self-organization, security, addressing and service discovery, energy management, Scalability, deployment considerations, Issues in designing a routing protocol for ad hoc wireless Networks (Mobility, Bandwidth constraint, Error prone shared broadcast radio channel, Hidden & exposed Terminal Problems, Resource Constraints, characteristics of idle routing protocol), Classification of routing protocols: Table-driven routing protocols (DSDV,WRP), On-demand routing protocols (DSR, AODV, LAR).

**Text Books:**

1. J.Schiller, Mobile Communications, Pearson Education publication.
2. Murthy and Manoj, Ad Hoc Wireless Networks, Pearson Education publication.

**Reference Books:**

1. Talukder and Yavagal , Mobile Computing, TMH publication.
2. Pahlavan and Krishnamurthy, Principles of Wireless Networks, PHI publication.
3. Stomenovic and Cacute. “ Handbook of Wireless Networks and Mobile Computing”, Wiley,2002.

**MC-542      Internet programming with .net framework    Credits 4(3-1-0)**

1. **The .NET Framework:** Introduction, Common Language Runtime, Common Type System, Common Language Specification, The base class library, The .Net Class Library Intermediate Language, Just In Time Compiler, Garbage Collection, Assemblies
2. **C# Basics:** Introduction., .Data Type, Identifiers, Variabes & Constants, C# Statements, Object Oriented Concepts, Object & Classes, Arrays and Strings, System Collections, Delegates,
3. **Developing ASP.NET Applications:** Namespace System, Window Forms, C# in Web Application, Web Form Fundamentals, Validation and Rich Controls, Master Pages and Themes
4. **Working With Data:**, ADO.NET Fundamentals, Reflection, Site Navigation, State Management
5. **Advanced ASP.NET:** Error Handling ,Security Fundamentals, Web Services, Unsafe Mode

**Reference Books:**

1. 'Beginning ASP.NET 2.0 in C# 2005' by Apress
2. 'C# with .NET Framework ' by Shibi Pannikar & Kumar Sanjeev
3. 'Undestanding .NET Framework ' by Tonybaer

**MC - 543    Compiler Design**

**Credits 4(3-1-0)**

**1.Introduction to Compiling :** The phases of a compiler, Causing of the Compiler, grouping of Phases compiler, Compiler construction tools.

**2.Lexical Analysis:** Role of lexical analyzer, Input buffering, specification & Recognition of tokens, Finite automata, Regular expression, Conversion of regular expression to FNA, optimization of DFA states

**3.Syntax Analysis:** Role of Parser, Context Free Languages , Top-down & Bottom-up parsing, shift reduce parsing, LR Parser, predictive parser, Canonical collection of LR(0)items, SLR Parsing .

**4.Syntax Directed Translation:** Syntax directed definition, 3-address code , Quadruples, Triples, implementation of syntax directed translator, parse tree and syntax tree.

**5.Error detection and recovery:** Errors

**6.Code optimization:** Principles sources of optimization, loop optimization.  
Code Generation: issues in the design of code generator

**References:**

1.Aho, Sethi & Ullman," Compilers Principles & Techniques & Tools", Addison Wesley.

2.Aho & Ulman, " Compiler Design," Narosa Publishers, New Delhi

## **MC - 544    Advanced Computer Architecture Credits 4 (3-1-0)**

**1. Introduction to Parallel Processing :** Parallelism in uni-processor systems ; Parallel computer structures; Architectural classification schemes.

**2. Memory Input-Output subsystems :** Memory Hierarchy , Addressing Schemes for Main Memory, Characteristics of cache memory; Cache Memory Organization; Characteristics of input-output subsystems.

**3. Pipelining,** Classification of Pipeline Processors, General Pipelines and Reservation Table Design of instruction pipelined units; Arithmetic Pipeline Design Examples, Job sequencing and collision prevention ; Characteristic of Vector Processing ,Vector supercomputers; Scientific attached processor; Architecture of Star -100 and TI-ASC.

**4. Structures and Algorithms for Array Processors :** SIMD array processor; SIMD interconnection networks: Illiac, Cube, Shuffle Exchange, Omega, Modified Omega, Barrel shifter, Parallel algorithms for array processor: SIMD Matrix Multiplication, Parallel sorting on Array Processor.

**5. Multiprocessor Architecture and Programming:** Functional structures: Loosely Coupled Multiprocessors, Tightly Coupled Multiprocessors; Interconnection Networks: Time shared, Crossbar switch and Multiport Memories; Multiprocessor Operating Systems: Classification of Multi-processor Operating Systems, Exploiting Concurrency for multiprocessing; Language features, Matrix multiplication on concurrent processor; Multiprocessor Scheduling Strategies: Dimensions of Multiple processor Management .

**6. Data Flow Computers VLSI computation :** Data driven computing and languages: Control Flow versus Data Flow Computers , Data flow computer architectures; Static data Flow Computers, VLSI computing structures; Systolic Array Structure.

### **References :**

1. K. Hwang and F.A. Briggs , “Computer Architecture and Parallel Processing “ Mc Graw Hill Book Co. NY.
2. M.J. Flynn,” Computer Architecture : Pipelined And Parallel Processor Design “, Naros Publishing Co.
3. K. Hwang’ “ Computer Architecture “ Mc Graw Hill Co.NY.

**MC-545**

**Linux system Administration Credits 4(3-1-0)**

**1. Introduction :** What is linux, difference between UNIX and LINUX, File Systems , The ext3 File System , Features of ext3 , Creating an ext3 File System , Swap Space ,

**2. Access Control Lists:** Mounting File Systems, Setting Access ACLs, Setting Default ACLs , Retrieving ACLs , Archiving File Systems With ACLs , Compatibility with Older Systems,

**3. Installations and configurations:** Package Selection ,Basic Configuration, Installation Method, Boot Loader Options , Partition Information , Network Configuration , Authentication, Firewall Configuration , X Configuration , Saving the File

**4. Network-Related Configuration** , Network Configuration, Overview , Establishing an Ethernet Connection , Managing DNS Settings , Managing Hosts , Activating Devices , Working with Profiles , Device Aliases , Establishing an IPsec Connection, Saving and Restoring the Network Configuration, Basic Firewall Configuration

**5. Security Level Configuration Tool :**Activating the iptables, Service, Controlling Access to Services , Runlevels , ntsysv, chkconfig , Network File System (NFS) , Samba , Dynamic Host Configuration Protocol (DHCP) , Apache HTTP Server Configuration Apache HTTP Secure Server Configuration , BIND Configuration, Printer Configuration, Automated Tasks, Cron, At and Batch Log Files Locating Log Files , Viewing Log Files, Adding a Log File , Examining Log Files, Upgrading the Kernel

**6. Gathering System Information :** System Processes, Memory Usage File Systems , Hardware , Understanding /dev/profile/ .

**Reference book:**

1. Red hat Linux Bible
2. Red hat Linux online documents

1. **Introduction:** what is digital image processing ? origin of digital image processing. Use of digital image processing. Fundamental steps in digital image processing, components of an digital image processing.
2. **Digital image fundamentals:** elements of visual perception, brightness adaption and discrimination, image sensing and acquisition, image sampling and quantization, some basics on pixel, relationships between pixel,
3. **Image enhancement:** in spatial domain: basic gray level transformations, Histogram processing enhancement using arithmetic/logic operations, basics of spatial filtering, sharpening spatial filters, combining spatial enhancement methods.
4. **Image enhancement in the frequency domain:** Introduction to the fourier transform and frequency domain., smoothing frequency domain filters, sharpening frequency domain filters, homomorphic filtering, implementation.
5. **Image restoration:** a model of the image degradation/restoration process. Noise model, restoration in the presence of noise only, spatial filtering, mean filters, order statistics, filters, adaptive filters, periodic noise reduction by frequency domain filtering: band reject filters, band pass filters, notch filters, optimum notch filters, linear, position invariant degradations, estimating degradation function inverse filtering, wiener filtering, geometric mean filters, geometric transformation.
6. **Image compression:** Fundamentals of image compression models, error free compression: variable length coding, LZW coding, bit plane coding, lossless predictive coding, lossy predictive coding, transform coding, wavelet coding, image compression standard.
7. **Image segmentation :** detection of discontinuities, edge linking and boundary detection, threshold, region based segmentation.
8. **Representation and description;** Chain codes, polygonal approximations, signatures, boundary segments, skeletons, and boundary descriptors, shape numbers, Fourier descriptors, statistical moments, regional descriptors, texture 2d moments.

**Reference books:**

1. R. C. Gonzalez, R.E. Woods, "digital image processing", Pearson education.
2. R. C. Gonzalez "digital image processing using MATLAB", Pearson education.
3. W. K. prett, "digital image processing", Addison Wesley.

## **MC-547 Web Technology**

**Credits 4(3-1-0)**

**1. Introduction:** History of the Internet and World Wide Web, Growth of the Web, Protocols:HTTP, FTP, SMTP, POP3, MIME, IMAP. Choosing an ISP, Introduction to Internet Services, E-Mail concepts, Sending and Receiving secure E-Mail,

**2. Overview of Web page:** Web project, Web Team, Communication Issues, the Client, Multi-departmental & Large scale Websites, Quality Assurance and Testing, Technological advances and Impact on Web Teams, Overview of Static or Dynamic Web page, Portal, Search Engine.

**3 Overview of HTML:** Concept of Hypertext, Versions of HTML, Elements of HTML, Formatting Tags, Links, Hyperlinks, Image & Image map, List, Tables, Frames, Forms, Style Sheets, Background and Color Controls.

**4. Overview of DHTML and Java Script:** Introduction to DHTML. Advanced Netscape DHTML, Advanced Microsoft DHTML & Cross browser DHTML JavaScript: Introduction, Statements, Functions, objects in JavaScript, Events and Event Handling, Arrays, FORMS, Buttons, Checkboxes, Text fields and Text areas.

**5 Overview of XML and DTD:** Introduction, Problems with HTML & SGML, Types of XML Markup, Displaying an XML Document, Document Type Definitions (DTD), Linking, Using Style Sheets with XML. Data Interchange with an XML document, Document type definitions, Client-side usage, Server Side usage.

**6 Overview of ASP.NET:** Features of ASP.NET, Differences between ASP and ASP.NET. Create an ASP.NET web application, ASP.NET web forms, ASP.NET controls-validation controls, web server controls. Web database tools:

**7.Overview of ADO.NET:** difference between ADO and ADO.net ADO.NET architecture , Accessing data adapters and datasets, SQL server and AMS-ACCESS.

### **Text books:**

1. Burdman, "collaborative web development" Addison Wesley
2. ASP.NET 21 days, TMH
3. "magic with HTML, DHTML, Javascript", laxmi publication.
4. "web technology", laxmi publication

**MC-548      Distributed Data Base System**

**Credits4 (3-1-0)**

**1 Introduction:** to Distributed Data system, Distributed Database Architecture, Distributed Data base Design, Transaction processing Concurrency Control techniques, Security.

**2 Data Fragmentations:** Types of Data Fragmentations, Fragmentation and allocation of fragments, Distribution transparency, access primitives, integrity constraints.

**3 Grouping and aggregate function:** Query processing , Equivalence transformation of queries.

**4 Evaluation:** parametric queries, Query optimization, Join and general queries.

**5 Management of Distributed transaction and concurrency control:** Distributed Date base Administration, Catalogue Management Authorisation, Security and protection.

**References:**

1. Ceri & Palgathi, "Distributed Database System", McGraw Hill.
2. Raghu Rama Krishnan and Johannes Gechrib, "Database Management Systems", Mc Graw Hill.
3. Date C. J, "An Introduction to Database System, Vol1 & II", Addition Wesley.
4. Korth, Silbertz, Sudarshan , "Database Concepts", McGraw Hill.
5. Elmasari , Navathe, "Fundamentals of Data Base Systems", Addition Wesley.
6. Data C. J , "An Introduction to Database System" , Addition Wesley